

# A NEW APPROACH FOR DEADLOCK DETECTION AND REMOVAAL FROM DISTRIBUTED DATABASE SYSTEMS

MohitBhardwaj<sup>1</sup>, Dr. Parul Tomar<sup>2</sup>

<sup>1,2</sup>YMCA University of Science and Technology, Faridabad, Haryana (India)

## ABSTRACT

A Distributed database system (DDBS) is a collection of databases distributed over several sites interconnected by a communication network. It provides a resource-sharing environment where database activities can be performed optimally both in global and local framework. The distributed nature of database demand full proof control structure for its proper and effective functioning. Therefore the allocation of the resources should be properly controlled otherwise it may lead to several anomalies such as concurrency of transaction, synchronizing of events and deadlocks. A deadlock is a state where some processes request for some resources but those resources are held by some other processes. Occurrence of deadlock in a system will lead to resource wastage and breakdown of the system. This paper provides a new approach for detection and removal of deadlock in distributed databases.

**Keywords:** Database, Distributed Database, Deadlock

## I. INTRODUCTION

A distributed database management system ('DDBMS') is a software system that permits the management of a distributed database and makes the distribution transparent to the users [1]. In Distributed database system model, the database is considered to be distributed over several interconnected computer systems. Users interact with the database via transactions[2,3].Execution of transaction can lead to deadlocks in the system.

A deadlock is a situation in which the processes holding some resources request for the access of resources held by other processes in the same set. The simplest illustration of a deadlock consists of two processes, each holding a different resource in exclusive mode and each requesting an access to resources held by other processes. Unless the deadlock is resolved, all the processes involved are blocked indefinitely. Therefore, a deadlock requires the attention of a process outside those involved in the deadlock for its detection and resolution.

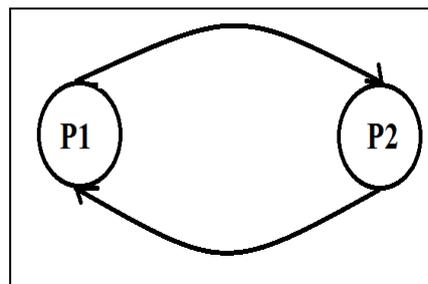


Figure 1 Deadlock Example

In Figure 1 a simple deadlock condition is shown. Assuming two processes P1 and P2 requested some resources for their computation. If the resource requested by process P2 is held by process P1 then P2 would be waiting for P1 to release the required process. Similarly at the same time if the resource requested by Process P1 is held by P2 and P1 is waiting for P2 to release the requested process. This situation leads to a deadlock.

Distributed database systems are very prone to deadlocks as different sites are unable to keep track of the transactions running at other sites[4].

There are three different techniques to handle the deadlocks[5]:

- **Prevention:** This technique prevents the system from making any deadlock. In this technique information of the all resources which are allocated to some process is recorded. Now if a process requests for some resources, the system will grant only when all the resources are available. System will make sure that not a single resource which is requested is required or hold by some other process.
- **Detection:** This technique is used to detect existing deadlock in the system. When Resource allocation is fair and processes holding and waiting for resources results in deadlock. When a deadlock occurs it should be detected and resolved as soon as possible for good efficiency of the system.
- **Removal:** When a deadlock is detected in a system, it must be removed by terminating some process. Removal of deadlock needs the roll back facility to the terminated process. There are various strategies for deadlock removal such as time stamping, youngest process removal, priority based removal etc.

## **II. ISSUES IN DEADLOCK DETECTION**

- Deadlock detection involves two basic tasks: maintenance of the state graph and search of the state graph for the presence of cycles. Categorization of deadlock detection algorithm largely depends upon the manner in which the state graph information is maintained. There are three types of algorithms for deadlock detection in distributed systems[6]:
- **Centralized algorithms:** In centralized algorithms the state graph is maintained at a single designated site, which has the sole responsibility of updating it and searching it for cycles.
- **Distributed algorithms:** In distributed algorithms the state graph is distributed over many sites of the system, and a cycle may span state graphs located at several sites, making distributed processing necessary to detect it.
- **Hierarchical algorithms:** In hierarchical algorithms sites are arranged in a hierarchy, and a site detects deadlocks involving only its descendant sites. Hierarchical algorithms exploit access patterns local to a cluster of sites to efficiently detect deadlocks.
- In a distributed system it is very difficult to identify the deadlocks as there is no global memory and communication occurs solely by messages. It is difficult to design a correct deadlock detection algorithm because sites may receive out-of-date and inconsistent state graphs information of the system
- The next section will give a new algorithm which will check for deadlock in local system first and then will detect the deadlock in a distributed system. This protocol will remove the possibility of false deadlock and will detect all the deadlocks in the system.

### III. PROPOSED MODEL

A process P arrives at site j and it request some resources. This request can be for any data from any site. Rp Denotes requested data (R1 R2 R3) where these sites R1 R2 R3 ... can be at any site i.e. process P could request some data from its home site and some data from some other site or it could request all data from home site or all data from other sites. After process P's arrival algorithm counts total number of resources requested by the process P and stores it in a variable "total".

```
A Process P arrives at site j and requests some resources.  
Rp Denotes requested data from various (R1 R2 R3 ...) sites by new process P.  
Total = count (Rp);
```

For each requested data by new comer process P, algorithm checks whether this requested data belongs to the home site or not. If it belongs to the home site then localAllocation function will be called. Requested data is passed in localAllocation function. If the requested data belongs to some site other then the home site then globalAllocation function will be called.

```
For (i=0; i<total; i++) {  
    If (xi belongs to Sj) {  
        localAllocation(xi);  
    }  
    Else {  
        Status = checkLocalDeadlock();  
        If(Status == NoLocalDeadlock) {  
            globalAllocation(xi);  
        }  
        Else {  
            Print("Can't Allocate as local deadlock is present");  
        }  
    }  
}
```

If the requested resource belongs to the home site then algorithm will check whether it is free or not. If it is free then algorithm will call checkLocalDeadlock function to check whether there is some local deadlock or not and then system will allocate Resource to Process P. If Resource requested at home site by Process P is not free then algorithm first call checkLocalDeadlock function and change the status that Process P is waiting for Resource.

```
Function localAllocation(Ri) {  
    If (Ri is free) {  
        checkLocalDeadlock();  
        Allocate Ri to P;  
    }  
    Else {  
        checkLocalDeadlock();  
        P waiting for Ri;  
    }  
}
```

If the requested resource belongs to some site other then the home site then algorithm will check whether the requested resource is free or not. If the requested resource is free then the algorithm will call checkGlobalDeadlock function to check whether there is some global deadlock or not and then system will

allocate Resource to Process P. If Resource requested at global site by Process P is not free then algorithm first call checkGlobalDeadlock function and change the status that Process P is waiting for resource Ri.

```
Function globalAllocation(Ri) {  
    If (Ri is free) {  
        checkGlobalDeadlock();  
        Allocate Ri to P;  
    } Else {  
        checkGlobalDeadlock();  
        P waiting for Ri;  
    }  
}
```

checkLocalDeadlock function will first create a local vector array. A local vector array is a series of processes waiting for one another. For example: P1 -> P2 -> P3 -> P4 -> P5, here P1 is waiting for P2, P2 for P3, P3 for P4 and P4 for P5. Now for each vector array formed, algorithm will check for circular wait in the vector array. If one process comes twice in a single vector array then it is called "localCircularWait" and it results into a deadlock. If any deadlock found removeDeadlock function is called by passing the value of that vector array to the function.

```
Function checkLocalDeadlock() {  
    Create Local Vector arrays VAi;  
    Foreach(VAi) {  
        Starting from Process P  
        If (localCircularWaitFound) {  
            Deadlock occurred;  
            removeDeadlock(VAi);  
        }  
    }  
}
```

checkGlobalDeadlock function will first create a global vector array. A global vector array is a series of processes waiting for one another at different sites. Now for each global vector array formed, algorithm will check for circular wait in the vector array. If one process comes twice in a single global vector array then it is called "globalCircularWait" and it results into a global deadlock. If any deadlock found removeDeadlock function is called by passing the value of that global vector array to the function.

Main difference in checkLocalDeadlock and checkGlobalDeadlock function is, checkLocalDeadlock make a local vector array for a single site on which it is called. All the transactions on that site are taken into account to check for a deadlock at that site. On other hand checkGlobalDeadlock function creates a global vector array which includes two or more sites. All the transactions of included sites are taken into account to check for a global deadlock in the system.

```
Function checkGlobalDeadlock() {  
    Create Global Vector arrays VAi;  
    Foreach(VAi) {  
        Starting from Process P;  
        If (globalCircularWaitFound) {  
            Deadlock occurred;  
            removeDeadlock(VAi);  
        }  
    }  
}
```

If there is a deadlock in our system, whether a local or a global, it must be removed as soon as possible to make our system deadlock free and to make it run properly without any error. removeDealock function takes a vector array as an input. This vector array contains the list of processes involved in the deadlock and making the system stand still.

Starting from the first process, eliminate it from the list and check for the existence of deadlock in the rest of the processes. If there is no deadlock present then terminate the eliminated process and make our system deadlock free.

If there is still a deadlock in our system, First we will include last terminated process in our vector array again and then move to next process and eliminate that process and check for the deadlock in rest of the processes including the previous eliminated process. If no deadlock found terminate this process and make our system deadlock free if not then move the next process and repeat the above process till no deadlock in the system.

Process of removing a local or a global deadlock is same we have to check for a cycle in our vector array which is formed using DTS or LTS and a transaction which will give less over head will be removed.

### 3.1 Algorithm for Deadlock Removal is Given Below

```
Function removeDeadlock(VA) {
    Make a list of processes in Vector Array (VA).
    Foreach (process p) {
        Eliminate process p;
        Create a vector array for the rest of the processes.
        If one process occurred twice in the vector array
        CircularWaitFound = true;
    Else
    CircularWaitFound = flase;
        If (CircularWaitFound) {
            Include the last eliminated process;
            Continue;
        }
        Else {
            Terminate process P.
            Deadlock Removed;
        }
    }
}
```

## IV. CONCLUSION

Deadlocks in distributed databases are very hard to determine. Some times this determination can lead to the detection of false deadlocks and sometimes some deadlocks remain undetected. Using this newly proposed algorithm the number of messages sent over the network has been reduced by putting a condition at local site that if there is a deadlock at local site then request for global allocation won't be entertained. Also in order to remove deadlock newest transaction won't be removed to, a transaction which results in zero deadlocks in the system will be terminated.

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# MORPHOMETRIC AND MERISTIC ANALYSIS OF AMBLYCEPS MANGOIS (HAMILTON- BUCHANAN) FROM MANDAL RIVER GARHWAL HIMALAYA

Ram Krishan<sup>1</sup>, A.K.Dobriyal<sup>2</sup>

<sup>1</sup>Department of Zoology Govt. Degree College Kathua, Jammu and Kashmir (India)

<sup>2</sup>Department of Zoology Pauri Campus, Hnb Garhwal Central University, Uttrakhand (India)

## ABSTRACT

*The research presented below deals with the work done on taxonomic analysis of a rare minor catfish- Amblyceps mangois, collected from river Mandal, a tributary of Ramganga in Garhwal Himalaya. For morphometric studies, the parameters considered were – the total length, standard length, head length, pre-dorsal length, pre-ventral length, pre-anal length, caudal length, snout length, eye diameter and maximum body depth. These (pre-dorsal length, pre-ventral length, pre-anal length, caudal length, snout length, eye diameter and max. body diameter) variables were studied in relation to total length, standard length and head length separately as per taxonomic requirement. Meristic characters were also studied.*

**Keywords:** *Morphometric and Meristic Analysis and Amblyceps Mangois*

## I. INTRODUCTION

Taxonomy or the identification of fish is based on inter-relationships of morphometric, meristic and some descriptive characters. Speciation process depends on Intra specific variations which are due to the influential environmental parameters (habitats, temperature, elevation, slope gradient, stream velocity, food, productivity, length, sex and age) or the difference in their genetic makeup. Day (1878), the first authority in fish taxonomy, described the taxonomy of various fishes of India, Burma, Pakistan and Ceylon in his book, "The fishes of India", based on all these characters. According to Nikolski (1961), the species is characterized by relatively high morphobiological stability, the result of adaptation to particular environment within which it formed, developed and lived. Variability within the limits of the species does not exceed the boundaries of morphobiological specificity. The characteristics of a species represent and reflect its adaptation to a given set of environmental conditions. The species fills a particular niche, within the limits of which living conditions are adequate and in accordance with its morphobiological peculiarities. But the morphometric and meristic interrelationships of the species are not worked out in details yet. The present work will be significant in the taxonomic study of this genus. The importance of morphometric has also been proved in the study of sexual dimorphism. The identification of different sexes is important in sexwise selection of fish for induced breeding.

## II. MATERIAL AND METHODS

Fishes were sampled monthly from different sections of river Mandal and were brought to the laboratory for further study. Morphometric measurements were taken in fresh condition and then the fish were preserved in 5 to 7% formaline solution. Fishes were tagged for further biological investigations.

## III. MORPHOMETRIC STUDY

For morphometric studies, the parameters considered were the total length, standard length, head length, pre-dorsal length, pre-pelvic length (pre-ventral length), pre-anal length, caudal length, snout length, eye diameter and maximum body depth. These variables were studied in relation to total length, standard length and the head length separately as per taxonomic requirement. Fish measurement board and sharp pointed needle like dividers were used for taking body measurements.

## IV. MERISTIC STUDY

The meristic characters like scale count and fin ray / spine count were made with the help of fine forceps and hand lens.

### 4.1 Regression Analysis

The original data were grouped into class intervals and the average values for the dependent (Y) and the independent variables (X) were calculated. These values then fed into an electronic calculator for computing the values of correlation coefficient (r) and regression coefficient (b) along with intercept (a). The relationships determined by fitting into the following straight-line equation:

$$Y = a + b \cdot X$$

(Y= dependent variables, X = independent variables and “a” and “b” are the constants - intercept and the slope respectively). The linearity of the regression was tested by the analysis of variance (F Test).

## V. OBSERVATIONS

For morphometric and meristic analysis, 82 specimens of *Amblyceps mangois* were used in different size groups. Body elongate, head small and broad depressed and covered with thick skin. Mouth wide, with 4 pairs of Barbels. The dorsal fin commences approximately midway between snout and the ventral fin. Caudal fin - truncate or imarginate. Eyes are small and dorso-laterally placed. As there was no any marked morphometric difference in male and female sexes, the detailed morphometric and meristic characters were studied in both the sexes together. Five size-groups were formed to interpret these characters. Morphometric characters are summarized in Table 2.1. The minimum sample size of 13 fish was considered in size group 5.1-6.0 cm and maximum (19) in the size group 7.1- 8.0 cm. Regression analysis of various body parameters with total length, standard length and head length were calculated and the statistical values of intercept (a), regression coefficient (b), coefficient of correlation (r) and coefficient of determination ( $r^2$ ) are presented in Table 2.5, 2.6 and 2.7 respectively.

Statistics regarding how body parameters grow in ratio of total length is presented in Table 2.2. The ratio of total length and standard length fluctuated in between  $1.26 \pm 0.04 : 1$  in a size group of 4.1 to 5.0 cm to a maximum of

1.28 ±0.03 : 1 in the size group of 6.1 to 7.0 cm. Ratio of total length and head length fluctuated from 7.17 ±0.07 in a length group of 5.1 to 6.0 cm to a maximum of 8.98 ±0.09 :1 in the length group of 7.1 to 8.0 cm. Ratio of total length to pre anal length was minimum 1.86 ±0.02 : 1 (4.0 to 5.0 cm) and maximum 2.13 ±0.02 : 1 (8.1 to 9.0 cm). Ratio of total length to pre dorsal length was minimum 4.41 ±0.06: 1 (5.1- 6.0 size groups) and maximum 4.93 ±0.09 (7.1 to 8.0). Ratio of total length to pre pelvic length was minimum 2.43 ± 0.05 : 1 (4.0- 5.1 cm) and maximum 2.66 ±0.02 (6.1 to 7.1 cm). Ratio of total length to snout length was minimum 21.52 ± 0.16: 1 (5.1-6.0 cm) and maximum 27.57 ± 0.19 (8.1-9.0 cm). Ratio of total length to maximum body depth was minimum 7.08 ±0.01: 1 (5.1 to 6.0 cm) and maximum 7.88 ±0.02:1 (8.1-9.0 cm). The ratio of total length to eye diameter was minimum 41.35 ±0.19 (8.1-9.0 cm) and maximum 68.8±0.16:1 (6.1-7.0 cm). Ratio of total length to caudal length was minimum 4.41 ±0.12:1 (4.1-5.0 cm) and maximum 4.85 ±0.09 : 1 (4.1-5.0 cm).

Body parameters in ratio of standard length were calculated and presented in Table 2.3. The ratio of standard length and head length fluctuated from a minimum 5.67 ± 0.14 : 1 in a size group of 5.1 to 6.0 cm to a maximum of 7.07 ± 0.11: 1 in the size group of 7.1 to 8.0 cm. Ratio of standard length and pre anal length was minimum 1.48 ± 0.01 in a length group of 4.1 to 5.0 cm to a maximum of 1.68 ± 0.04 :1 in the length group of 8.1 to 9.0 cm. Ratio of standard length to pre dorsal length was minimum 3.48 ± 0.03: 1 (5.1 to 6.0 cm) and maximum 3.88 ± 0.06 : 1 (7.1 to 8.0). Ratio of Standard length to pre pelvic length was minimum 1.925 ± 0.01: 1 (4.1 to 5.0 cm) and maximum 2.07 ± 0.02 (8.1 to 9.0 cm). Ratio of Standard length to snout length was minimum 17.00 ± 0.36: 1 (5.1 to 6.0) and maximum 21.77 ± 0.09 (8.1 to 9.0). Ratio of standard length to maximum body depth was minimum 5.59 ± 0.1:1 (5.1 to 6.0) and maximum 6.22 ± 0.17 (8.1 to 9.0). Ratio of standard length to Eye diameter was minimum 32.65 ± 0.5: 1 (8.1 to 9.0 cm) and maximum 53.6 ± 0.35: 1 (6.1 to 7.0 cm). Ratio of standard length to Caudal length was minimum 3.48 ± 0.03: 1 (4.1 to 5.0 cm) and maximum 3.85 ± 0.2: 1 (4.1 to 5.0 cm).

Body parameters in ratio of head length were calculated and presented in Table 2.4. The ratio of head length to eye diameter fluctuated from minimum 4.75 ± 0.1:1 in a length group of 8.1 to 9.0 cm to a maximum of 7.7 ± 0.08: 1 in a length group of 6.1 to 7.0 cm. The ratio of head length to maximum body depth was minimum 0.85 ± 0.1: 1 (4.1-5.0 cm) and maximum 0.99 ± 0.1:1 (5.1 to 6.0 cm). The ratio of head length to snout length was minimum 2.57 ± 0.16: 1 (6.1 to 7.0) and maximum 3.17 ± 0.18: 1 (8.1 to 9.0 cm).

Data on modeling based on regression analysis is presented in the Tables 2.5 (Total length as independent parameter), 2.6 (Standard length as independent parameter) and 2.7 (Head length as independent parameter).

### 5.1 Different Models and Allied Statistical Parameters are as Follows

1. Standard length = 0.0445 + 0.7809 Total length  
Correlation coefficient (r) = 0.9995,  
Coefficient of determination (r<sup>2</sup>) = 0.999
2. Caudal length = 0.0711 + 0.2036 Total length  
Correlation coefficient (r) = 0.988,  
Coefficient of determination (r<sup>2</sup>) = 0.976
3. Pre-Dorsal length = 0.2488 + 0.1748 Total length  
Correlation coefficient (r) = 0.9845,  
Coefficient of determination (r<sup>2</sup>) = 0.969

4. Pre-Pelvic Length = 0.3650 + 0.3328 Total length  
Correlation coefficient (r) = 0.9969  
Coefficient of determination ( $r^2$ ) = 0.994
5. Pre-Anal Length = 0.5039 + 0.3642 Total length  
Correlation coefficient (r) = 0.8009  
Coefficient of determination ( $r^2$ ) = 0.6407
6. Snout Length = 0.0847 + 0.0281 Total length  
Correlation coefficient (r) = 0.9065  
Coefficient of determination ( $r^2$ ) = 0.820
7. Eye Diameter = - 0.0304 + 0.0237 Total length  
Correlation coefficient (r) = 0.7896  
Coefficient of determination ( $r^2$ ) = 0.622
8. Maximum Body depth = 0.1242 + 0.1126 Total length  
Correlation coefficient (r) = 0.9907  
Coefficient of determination ( $r^2$ ) = 0.991
9. Head length = 0.1565 + 0.0935 Total length  
Correlation coefficient (r) = 0.9179  
Coefficient of determination ( $r^2$ ) = 0.842
10. Caudal length = 0.0645 + 0.2598 Standard length  
Correlation coefficient (r) = 0.9848  
Coefficient of determination ( $r^2$ ) = 0.9698
11. Pre Dorsal length = 0.2353 + 0.2245 Standard length  
Correlation coefficient (r) = 0.9878  
Coefficient of determination ( $r^2$ ) = 0.9757
12. Pre-Pelvic length = 0.0389 + 0.1818 Standard length  
Correlation coefficient (r) = 0.9666  
Coefficient of determination ( $r^2$ ) = 0.9343
13. Pre Anal length = 0.3428 + 0.4267 Standard length  
Correlation coefficient (r) = 0.9987  
Coefficient of determination ( $r^2$ ) = 0.996
14. Snout length = 0.0853 + 0.0356 Standard length  
Correlation coefficient (r) = 0.8960  
Coefficient of determination ( $r^2$ ) = 0.8028
15. Eye Diameter = - 0.0347 + 0.0309 Standard length  
Correlation coefficient (r) = 0.8044  
Coefficient of determination ( $r^2$ ) = 0.647
16. Maximum Body depth = 0.1176 + 0.1442 Standard length  
Correlation coefficient (r) = 0.9914  
Coefficient of determination ( $r^2$ ) = 0.982
17. Head Length = 0.1890 + 0.2234 Standard length  
Correlation coefficient (r) = 0.9425

Coefficient of determination ( $r^2$ ) = 0.887

18. Maximum Body depth = 0.0459 + 1.0622 Head length

Correlation coefficient (r) = 0.9513

Coefficient of determination ( $r^2$ ) = 0.9049

19. Eye Diameter = - 0.0519 + 0.2304 Head length

Correlation coefficient (r) = 0.7797

Coefficient of determination ( $r^2$ ) = 0.6079

20. Snout length = 0.0610 + 0.2706 Head length

Correlation coefficient (r) = 0.8878

Coefficient of determination ( $r^2$ ) = 0.6913

**Table 2.1: Summarized Data on the Morphometrics of A. Mangois (Ham-Buch)**

S.No.	Size groups(cm)	TL	SL	CL	PDL	PVL	PAL	Snt.L	ED	MBD	HL	No. of fish
1	4.1-5.0	4.85± 0.05	3.85± 0.05	1.00± 0.00	1.10± 0.00	2.00± 0.00	2.60± 0.00	0.20± 0.00	0.10± 0.00	0.65± 0.05	0.55± 0.05	16
2	5.1-6.0	5.38± 0.26	4.25± 0.19	1.22± 0.10	1.22± 0.10	2.16± 0.15	2.72± 0.22	0.25± 0.05	0.10± 0.00	0.76± 0.06	0.75± 0.08	13
3	6.1-7.0	6.88± 0.08	5.36± 0.07	1.51± 0.03	1.40± 0.05	2.59± 0.15	3.34± 0.09	0.30± 0.00	0.10± 0.00	0.88± 0.08	0.77± 0.11	18
4	7.1-8.0	7.54± 0.29	5.94± 0.22	1.60± 0.09	1.53± 0.09	2.88± 0.16	3.70± 0.18	0.30± 0.00	0.13± 0.05	0.99± 0.08	0.84± 0.11	19
5	8.18-9.0 8.1-9.0	8.27± 0.17	6.53± 0.24	1.73± 0.07	1.75± 0.11	3.15± 0.11	3.88± 0.16	0.30± 0.00	0.20± 0.06	1.05± 0.11	0.95± 0.11	16

TL=Total length, SL=Standard length, HL=Head length, Snt.L=Snout length, MBD=Max.Body depth, PAL=Pre anal length, PDL=Pre dorsal length, PVL=Pre Ventral length, ED=Eye diameter, CL=Caudal length.

**Table 2.2: Growth of Total Length in Ratio of Different Body Parts in Amblyceps Mangois**

S. No.	Size groups (cm)	SL	CL	PDL	PVL	PAL	Snt.L	ED	MBD	HL
1	4.1-5.0	1.26 ±0.04	4.85 ±0.09	4.41 ±0.07	2.43 ±0.05	1.86 ±0.02	24.25 ±0.11	48.50 ±0.24	7.46 ±0.01	8.82 ±0.06
2	5.1-6.0	1.27 ±0.07	4.41 ±0.12	4.41 ±0.06	2.49 ±0.03	1.98 ±0.06	21.52 ±0.16	53.80 ±0.21	7.08 ±0.01	7.17 ±0.07
3	6.1-7.0	1.28 ±0.03	4.56 ±0.13	4.91 ±0.04	2.66 ±0.02	2.06 ±0.01	22.93 ±0.13	68.80 ±0.16	7.82 ±0.02	8.93 ±0.06
4	7.1-8.0	1.27 ±0.08	4.71 ±0.09	4.93 ±0.09	2.62 ±0.06	2.04 ±0.01	25.13 ±0.13	58.00 ±0.17	7.62 ±0.01	8.98 ±0.09
5	8.1-9.0	1.27 ±0.06	4.78 ±0.11	4.72 ±0.07	2.62 ±0.02	2.13 ±0.02	27.57 ±0.19	41.35 ±0.19	7.88 ±0.02	8.70 ±0.1

Average		1.27± 0.01	4.66± 0.16	4.68± 0.23	2.56± 0.09	2.01± 0.09	24.28± 2.05	54.09± 9.22	7.57± 0.29	8.52± 0.68
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**Table 2.3: Growth of Standard Length in Ratio of Different Body Parts in A. Mangois**

S. No.	Size groups (cm)	CL	PDL	PVL	PAL	Snt.L	ED	MBD	HL
1	4.1-5.0	3.85 ±0.02	3.50 ±0.04	1.925 ±0.01	1.48 ±0.01	19.25 ±0.24	38.50 ±0.25	5.92 ±0.2	7.00 ±0.12
2	5.1-6.0	3.48 ±0.03	3.48 ±0.03	1.97 ±0.01	1.56 ±0.02	17.00 ±0.36	42.50 ±0.26	5.59 ±0.1	5.67 ±0.14
3	6.1-7.0	3.55 ±0.02	3.83 ±0.04	2.07 ±0.01	1.60 ±0.01	17.87 ±0.19	53.6 ±0.36	6.09 ±0.11	6.96 ±0.16
4	7.1-8.0	3.71 ±0.01	3.88 ±0.06	2.06 ±0.02	1.60 ±0.02	19.80 ±0.16	45.69 ±0.49	6.00 ±0.12	7.07 ±0.11
5	8.1-9.0	3.77 ±0.04	3.73 ±0.07	2.07 ±0.02	1.68 ±0.04	21.77 ±0.09	32.65 ±0.5	6.22 ±0.17	6.87 ±0.13
6	Average	3.67± 0.14	3.67± 0.18	2.02± 0.06	1.58± 0.06	19.14± 1.65	42.59± 7.02	5.96± 0.21	6.71± 0.52

**Table 2.4: Growth of Head Length in Ratio of Different Body Parts in A. Mangois**

S.No	Size Group (cm)	MBD	Snt. L	ED
1	4.1-5.0	0.85 ±0.01	2.75 ±0.11	5.5 ±0.06
2	5.1-6.0	0.99 ±0.01	3.00 ±0.12	7.5 ±0.07
3	6.1-7.0	0.87 ±0.01	2.57 ±0.16	7.7 ±0.08
4	7.1-8.0	0.85 ±0.01	2.80 ±0.15	6.46 ±0.09
5	8.1-9.0	0.90 ±0.02	3.17 ±0.18	4.75 ±0.1

**Table 2.5: Regression Analysis and Correlation Coefficient Between Total Length and Dependent Parameters**

S.N.	Dependent parameter	Intercept "a"	Regression coefficient "b"	Correlation coefficient "r"	Coefficient Of Determination "r <sup>2</sup> "

1	SL	0.0445	+0.7809	0.9995	0.999
2	CL	0.0711	+0.2036	0.9880	0.976
3	PDL	0.2488	+0.1748	0.9845	0.969
4	PVL	0.3650	+0.3328	0.9969	0.994
5	PAL	0.5039	+0.3642	0.8009	0.6407
6	Snt.L	0.0847	+0.0281	0.9065	0.820
7	ED	-0.0304	+0.0237	0.7896	0.622
8	MBD	0.1242	+0.1126	0.9907	0.981
9	HL	0.1565	+0.0935	0.9179	0.842

**Table 2.6: Regression Analysis and Correlation Coefficient Between Standard Length and Dependent Parameters**

S.N.	Dependent parameter	Intercept "a"	Regression coefficient "b"	Correlation coefficient "r"	Coefficient of Determination "r <sup>2</sup> "
1	CL	0.0645	+0.2598	0.9848	0.9698
2	PDL	0.2353	+0.2245	0.9878	0.9757
3	PVL	0.0389	+0.1818	0.9666	0.9343
4	PAL	0.3428	+0.4267	0.9987	0.996
5	Snt.L	0.0853	+0.0356	0.8960	0.8028
6	ED	-0.0347	+0.0309	0.8044	0.647
7	MBD	0.1176	+0.1442	0.9914	0.982
8	HL	0.18903	+0.2234	0.9425	0.887

**Table 2.7: Regression Analysis and Correlation Coefficient Between Head Length and Dependent Parameters in A.Mangois (Ham.-Buch.)**

S.N.	Dependent parameter	Intercept "a"	Regression coefficient "b"	Correlation coefficient "r"	Coefficient of Determination "r <sup>2</sup> "
1	MBD	0.0459	+1.0622	0.9513	0.9049
2	ED	-0.0519	+0.2304	0.7797	0.6079
3	Snt.L	0.0610	+0.2706	0.8878	0.6913

The significance of growth relationship between the independent and dependant morphometric characters was tested by analysis of variance (ANOVA). (Table 2.8, 2.9, 2.10). ).Study indicated that in case of total length dependent parameters, the difference with standard length, Pre anal length was non significant but it was significant at 5 % level (table value-  $F_{0.05} = 7.71$ ) with caudal length ( $F_{0.05} = 15.431$ ), pre dorsal length ( $F_{0.05}$

=7.814), pre pelvic length ( $F_{0.05} = 8.74$ ) and maximum body depth ( $F_{0.05} = 19.315$ ). However it was highly significant (table value-  $F_{0.01} = 21.2$ ) with snout length ( $F_{0.01} = 23.899$ ) and eye diameter ( $F_{0.01} = 24.76$ ).

In case of standard length dependent parameters, the difference with pre pelvic length, Pre anal length was non significant but it was significant at 5 % level (table value-  $F_{0.05} = 7.71$ ) with caudal length ( $F_{0.05} = 13.132$ ), pre dorsal length ( $F_{0.05} = 13.47$ ), Head length ( $F_{0.05} = 18.857$ ) and maximum body depth ( $F_{0.05} = 17.909$ ). However it was highly significant (table value-  $F_{0.01} = 21.2$ ) with snout length ( $F_{0.01} = 23.483$ ) and eye diameter ( $F_{0.01} = 25.1$ ).

In case of head length dependent parameters, the difference with maximum body depth was non significant but it was significant at 5 % level (table value-  $F_{0.05} = 7.71$ ) with snout length ( $F_{0.05} = 13.888$ ). Difference with eye diameter was significant at 1 % level ( $F_{0.01} = 25.1$ ). In present study it was observed that all the body parts grow in accordance with the total length of the body.

**Table 2.8: Analysis of Variance (ANOVA) Between Total Length and Dependent Morphometric Characters in A.Mangois (Ham.-Buch.)**

S.No.	Parameters	S <sup>2</sup> B	S <sup>2</sup> W	Observed F	Remarks
1	TL X SL	00.980	1.342	00.730	NS
2	TL X CL	13.364	0.866	15.431	*
3	TL X PDL	13.416	1.717	07.814	*
4	TL X PVL	08.080	0.924	08.744	*
5	TL X PAL	05.544	0.962	05.763	NS
6	TL X Snt.L	19.908	0.833	23.899	**
7	TL X ED	20.801	0.840	24.763	**
8	TL X MBD	16.302	0.844	19.315	*

**Table 2.9: Analysis of Variance (ANOVA) Between Standard Length and Dependent Morphometric Characters in A.Mangois (Ham.-Buch.)**

S.No.	Parameters	S <sup>2</sup> B	S <sup>2</sup> W	Observed F	Remarks
1	SL X CL	07.144	0.544	13.132	*
2	SL X PDL	07.220	0.536	13.470	*
3	SL X PVL	03.458	0.602	05.744	NS
4	SL X PAL	01.881	0.640	02.939	NS
5	SL X Snt.L	12.103	0.511	23.483	**
6	SL X ED	12.801	0.510	25.100	**
7	SL X MBD	09.331	0.521	17.909	*
8	SL X HL	09.768	0.518	18.857	*

**Table 2.10: Analysis of Variance (ANOVA) Between Head Length and Dependent Morphometric Characters in A.Mangois (Ham.-Buch.)**

S.No.	Parameters	S <sup>2</sup> B	S <sup>2</sup> W	Observed F	Remarks
1	HL X MBD	00.005	0.019	00.263	NS
2	HL X ED	00.205	0.009	22.778	**
3	HL X Snt.L	00.125	0.009	13.888	*

NS = insignificant, \* = Significant at 5 % level ( $F_{0.05} = 7.71$ ;  $ndf=1$ ,  $ddf=5$ );

\*\* = Significant at 1 % level ( $F_{0.01} = 21.2$ ;  $ndf=1$ ,  $ddf=5$ );

## 5.2 Meristic Analysis

On the basis of meristic analysis conducted on 82 specimen. The fin formula was summarized as follows:

$D_1-I / 5-6$ ,  $D_2-0$ ,  $P- I / 7$ ,  $V-I / 5-6$ ,  $A- II / 6-7$ ,  $C-19$ , Barbels- 4 Pairs

## VI. RESULT AND DISCUSSION

In the present study no any remarkable characters of sexual dimorphism were noticed in *Amblyceps mangois* except during breeding season when slight roughness on the belly of male fish was seen whereas there was smoothness on the belly of female. It is a temporary character which is seen especially during July-August, which was the breeding season of fish. Secondary sexual characters of many fishes are reported in earlier literature. According to Gunther (1886), in most teleost, the enlargement and coloration of the belly in adult female loaches is a characteristics feature during the breeding season. Hora (1922) identified sex distinguishing characters in male of *N. tibetanus* as a slit like deep groove in front of the eye and a kind of padding and thickening with tubercles on the upper surface of pectoral fins as found in most of the cyprinids. According to Banarescu and Nalbant (1968), in *N. rupelli*, males have a greater length of the head and a lesser depth of body and caudal peduncle. According to Pathani (1978), some males were brighter than the females and some males had small black spots on the lateral sides of mouth in *Tor tor*. According to Rita Kumari and Nair (1979), in *N. triangularis*, male, length of the head, caudal peduncle and height of head were found to be more than in the female whereas in the female, pre-dorsal, pre-pelvic length, pre-anal length, the length from tip snout to vent, height of caudal peduncle and depth and width of body were found to be more than in the male. Dobriyal et.al. (2007) reported sexual dimorphism in *P. conchoniuis*.

In present study it was observed that all the body parts grow in accordance with the total length of the body. Important highlights of the morphometric study are- (i) - The dorsal fin is situated almost midway between snout and pelvic fin. Apparently it is situated very close to pectoral fin. It is smooth and swollen, (ii) - Pre dorsal length (PDL) and caudal length (CL) is roughly similar ( $1.00 \pm 0.0$  to  $1.75 \pm 0.11$ ), (iii)- Body is slightly deeper ( $0.65 \pm 0.05$  to  $1.05 \pm 0.11$ ) than the head length ( $0.55 \pm 0.05$  to  $0.95 \pm 0.11$ ), (iv)- In small size fish, the eye diameter ( $0.1 \pm 0.0$  constant) doesn't grow in accordance with snout length ( $0.2 \pm 0.0$  to  $0.3 \pm 0.0$ ) but in adult fish eye diameter grows ( $0.13$  to  $0.2$ ) but snout length becomes constant ( $0.3$  cm) and (v) - Spongy anal fin and second dorsal fin (adipose fin) occupy almost similar distance from snout tip and caudal fin tip. The maximum size reported in this study being 9.0 cm.

The meristic analysis of 82 specimens indicated that the dorsal fin in the meristic count was  $D_1-I / 5-6$ ,  $D_2-0$ , Pectoral fin  $P- 8 (1/7)$ , Pelvic fin  $6-7 (1/5-1/6)$ , Anal fin  $8-9 (2/6-2/7)$ , Caudal fin-19, with 4 pairs of barbels. Slight difference was found in pelvic fin in which no spine is reported by Day (1878), However in present study 1 spine was recorded.

Lal (1967), while studing Rita rita from Varanasi and Mizzapur, observed no significant difference. Singh and Dobriyal (1983) studied the morphometric characters and their relationships in the hillstream cat fish *Pseudecheneis sulcatus* (McClelland) collected in the river Alaknanda at Srinagar and found no second stock. According to Dobriyal and Bahuguna (1987), there was no significant difference in the stock of population of *N. montanus* collected from Khanda stream. Dobriyal et al (1988) also reported single stock in *Noemacheilus*

denisonii and *Noemacheilus multifaciatus* from the same stream. Uniyal et al (2005) also studied the morphometric characters and their relationship in the fish *Tor chilonoides* at Western Nayar and found no any second stock. Bahuguna (2007) concluded that there was a single stock of the population of *Puntius conchoni* (Ham-Buch) in Mandal river. Kar and Barbhuiya (2010) worked extensively on morphometric and meristic characters of Chocolate mahseer *Neolissochilus hexagonolepis* and considered 26 morphometric characters.

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# A COMPARITIVE STUDY OF LINK BASED PAGE RANKING ALGORITHM

Shilpa Sethi<sup>1</sup>, Ashutosh Dixit

<sup>1</sup>Assistnt Professor, <sup>2</sup>Associate Professor, Dept of CE,  
YMCA University of Science and Technology, Faridabad , Haryana (India)

## ABSTRACT

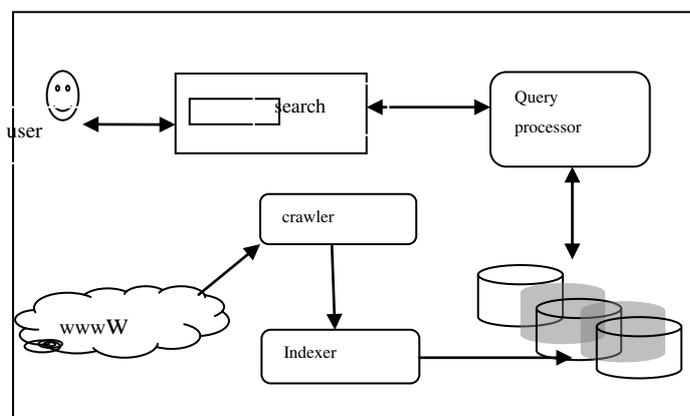
In order to assist the user to easily locate its information need, search engines use different page ranking algorithm to sort the pages based on some relevance factors. Most of the algorithms in this area are based on web mining concepts. Web mining discovers the useful pattern from the information repository This work in this paper conduct a comparative studies of various algorithm based on web mining techniques The study provides the benefits and limitations of these algorithms which can help researcher to discover new ideas for better page retrieval and page ranking.

**Keywords:** Search Engine, Page Ranking, Web Mining, Link Visits

## I. INTRODUCTION

The World Wide Web is a huge source of information which is growing at a rate of thousands of pages per day [10]. To access useful information such a huge repository, information retrieval tools such as search engines are used. The basic tasks of every search engine are crawling, indexing, ranking and presenting results to the user. Crawler downloads the web pages from different web server at some specified interval, indexer indexes these pages into search engine database and query processor fetches the documents based on term relevance with the user query and applies some ranking algorithms to sorts the matched documents. The basic architecture of search engine is shown in fig 1.

The paper is organized as follows: overview of web mining techniques is discussed in next section Section3 discuss various page ranking algorithms based on link structure mining with example illustrations. In Section 4, analytical results are provided. Concluding remarks are given in section 5.



**Fig1: Basic Architecture of Search Engine**

## II. RELATED WORK

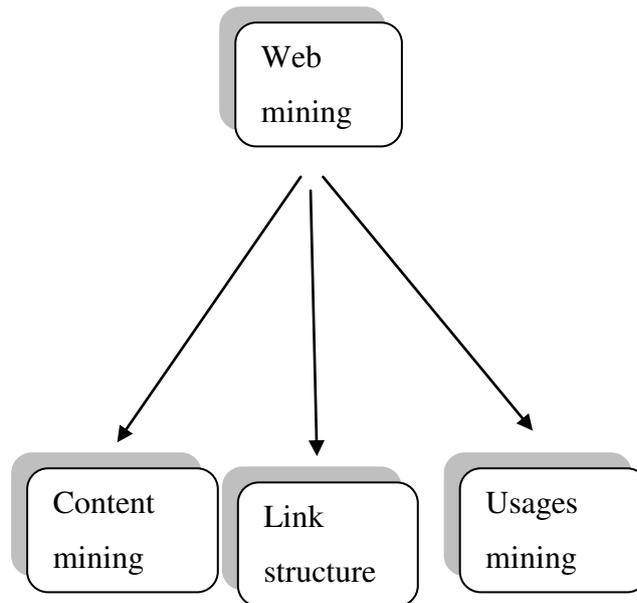
This section describes an overview of web mining and its different categories with examples illustration.

Web mining means discovering the nontrivial, previously unknown and extremely useful patterns from WWW.

It can be divided into three categories as shown in fig2.

- 1) web content mining
- 2) Link structure mining
- 3) Web usages mining.

These techniques are discussed in detail in subsequent sections



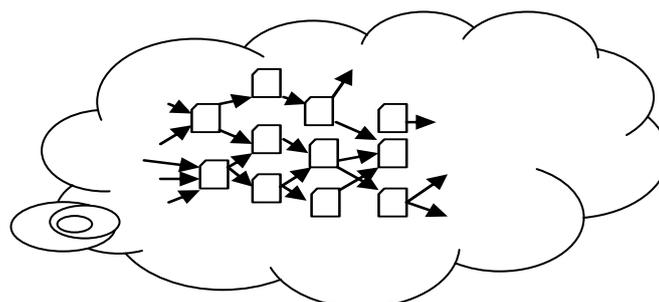
**Fig2: Categories of Web Mining**

### 2.1 Web Content Mining

It is the process of retrieving the information from WWW on the basis of content of pages [1,6] such as no. of keywords , frequency of keywords, the position of keywords in the document , their hyper textual information etc. the main focus is inner document structure. NLP, machine learning, association rules are some of methods used in this area.

### 2.2 Ink Structure Mining

link structure mining [2,6] provides the link summary of documents in the form of web graph by using the concept of hyperlink topology at inner as well as inter document level as shown in Fig 3.



**Fig 3: Web Graph**

### 2.3 Web Usages Mining

This technique identifies the user browsing behavior by monitoring and storing information of user navigational patterns. It focuses on user browsing history and interested domains which can be identified either explicitly or implicitly [9].

In implicit approach query logs and server logs are used to discover user interest [5] whereas in explicit approach, user is asked to fill interested domain. Machine learning, personalization algorithms, association rules are used to mine the useful patterns.

Some of the popular algorithm based on link structure mining is discussed in next section.

## III ANALYSIS BASED ON WEB STRUSUTE MINING

Link structure mining find out the link summary of pages in the form of web graph. A web graph is directed labeled graph having web pages as the nodes and hyperlinks as the edges between these nodes as shown in Fig 2 above. There are many algorithms based on link structure mining. Some of them which form the basis of comparative study are discussed in following sections.

### 3.1 Pagerank

The pageRank algorithm was developed Larry Page and S. Brim [4] . It is based upon citation analysis of web pages to find out the importance of a web page. According to this algorithm, if the incoming links of a page are important then its outgoing links also become important. The page rank of a page  $P$  is equally divided among its outbound links which further, propagated to their corresponding outgoing links. The page rank of a page  $n$  can be calculated by eqn (1) as given below.

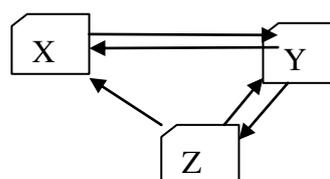
$$PR(n) = \sum_{m \in I(n)} \frac{PR(m)}{N_m} \dots (1)$$

Where:

- $PR(m)$  and  $PR(n)$  represents the page rank of page  $m$  and page  $n$  respectively
- $I(n)$  is set if incoming links of page  $n$
- $N_m$  represents the no. of outgoing links of page  $m$
- $d$  is the damping factor which is a measure of probability of user following direct link. Its value is usually set to 0.85

*Example Illustrating Working of PR*

To explain the working of page rank algorithm ,let us take an small hyperlinked structure shown in fig 4, consisting of three pages X, Y and Z. where page X links to the page Y and Z, page Y links to page Z and X, page Z links to page X and Y.



**Fig 4 Sample Hyperlinked Structure**

According to equation (1), Pagerank of page X, Y , Z can be computed as follows:

$$PR(X)=[1d)+d((PR(Z)/2] \quad (1a)$$

$$PR(Y)-[(1-d)+d(PR(X)/1+PR(YZ)/2] \quad (1b)$$

$$PR(Z)=[(1-d)+d(PR(X)/2 +PR(Y)/2] \quad (1c)$$

Initially considering the page rank of each page equal to 1 and taking the value of d=0.5 , the new page rank of pages can be obtained as follows:

$$PR(X) = 0.5 + 0.5 \left( \frac{1}{2} \right) = 0.75$$

$$PR(Y) = 0.5 + 0.5 \left( 1 + \frac{1}{2} \right) = 1.25$$

$$PR(Z) = 0.5 + 0.5 \left( \frac{1}{2} + \frac{1}{2} \right) = 1.0$$

Calculating pagerank of each page by using iteration method as shown in table 1

**Table 1 Calculation of Page Rank by PR Method**

PR(X)	PR(Y)	PR(Z)
1.0	1.25	0.75
1.0	1.188	0.813
1.0	1.203	0.797
1.0	1.199	0.801
⋮	⋮	⋮

From the above table, it may be noted that PR(Y)>PR(X)> PR (Z) .

These PR values are extracted by crawler while downloading a page from web server and these values will remain same till the web link structure will not change. In order to obtain the overall page score of a page , the query processor add the pre computed pagerank(PR) value associated with the page with text matching score of page with the user query before presenting the results to the user.

### 3.2 Weighted Pagerank Algorithm

Weipu Xing et.al [2] proposed an algorithm which is extension of basic page rank algorithm. It assigns the page rank on the basis of link popularity of incoming and outgoing links. The page rank of page n is computed by eqn (2) given below.

$$PR(n)=(1-d)+d \sum_{m \in I(n)} PR(m) * \frac{I_n}{\sum_{p \in R(m)} I_p} * \frac{O_n}{\sum_{p \in O_p} O_p} \dots\dots (2)$$

Where :

- PR(m) and PR(n) are page rank of page m and n
- d is damping factor
- R(m) denotes the reference list of page m
- I<sub>n</sub>, I<sub>p</sub> denotes the no. of incoming links to page n and page p respectively.
- O<sub>n</sub> , O<sub>p</sub> denotes the no. of outgoing links of page n and page p respectively.

*Example Illustrating Working of WPR*

By considering the same hyperlinked structure as shown in fig 4 and initially taking weighted page rank of each page equal to 1 and d=0.5, the new weighted page rank of pages X, Y and Z can be computed by using eqn. 2

$$PR(X) = 0.5 + 0.5 \left( \left( 1 * \frac{2}{3} * \frac{2}{3} \right) + \left( 1 * \frac{1}{2} * \frac{1}{3} \right) \right) = 0.53 \dots (2a)$$

$$PR(Y) = 0.5 + 0.5 \left( (1 * 1 * 1) + \left( 1 * \frac{1}{2} * \frac{1}{3} \right) \right) = 1.08 \dots (2b)$$

$$PR(Z) = 0.5 + 0.5 \left( 1 * \frac{1}{3} * \frac{2}{3} \right) = 1.11 \dots (2c)$$

Calculating weighted page rank of each page by iteration method as shown in table 2

**Table 2 Calculation of Page Rank by WPR Method**

PR(X)	PR(Y)	PR(Z)
0.53	1.08	1.11
0.8264	0.853	0.6188
0.7371	0.9627	0.5938
0.600	0.9160	0.6998
⋮	⋮	⋮

From the above table, it may be noted that PR(Y)>PR (Z)> PR(X). The order of page rank is different from PR method.

### 3.3 Pageranking Algorithm Based on Link Visit

Duhan et al [5] identified the limitation traditional PR method that it evenly distributes the page rank of page among its outgoing links whereas it may not be always the case that all the outgoing links of a page holds equal importance. So, they proposed a method which assigns more rank to an outgoing link that is more visited by the user. For this purpose a client side agent is used to send the page visit information to server side agent. A database of log files is maintained on the server side which store the URLs of the visited pages its hyperlinks and IP addresses of users visiting these hyperlinks. The visit weight of a hyperlink is calculated by counting the distinct IP addresses clicking the corresponding page. The page rank of page ‘m’ based upon visit of link is computed by the eqn (3).

$$PR(n) = (1-d) + d \sum_{m \in I(n)} \frac{PR(m) * LV(m)}{TV(m, O(m))} \dots (3)$$

Where:

- PR(m) and PR(n) is page rank of page m and n respectively.
- I(n) set of incoming links of page n
- LV (m, n) is no. of link visits from m to n.
- TV(m, O(m)) total no. of user visits on all the outgoing links of page m

Example illustrating the working of PRLV

Consider the same hyperlinked structure as shown in fig 4 above. Let the no. of visits from page X to page Y are 100; the no. of visits from page Y to X are 45 and the no. of visits from page Y to Z are 15; the no. of visits

from page Z to Y are 50 and the no. of visits from page from Z to X are 25.the PR based on link visit can be easily calculated using eqn (3). Initially taking page rank of each page equal to 1 and d=0.5

$$PR(x) = 0.5 + 0.5 \left( \left( 1 * \frac{45}{45+15} \right) + \left( 1 * \frac{25}{25+50} \right) \right) = 1.0416 \quad (3a)$$

$$PR(Y) = 0.5 + 0.5 \left( \left( 1 * \frac{100}{100} \right) + \left( 1 * \frac{50}{25+50} \right) \right) = 1.33 \quad (3b)$$

$$PR(z) = 0.5 + 0.5 \left( \left( 1 * \frac{15}{15+45} \right) \right) = 0.625 \dots (3c)$$

Calculating page rank based on link visit of each page by iteration method as shown in table 3

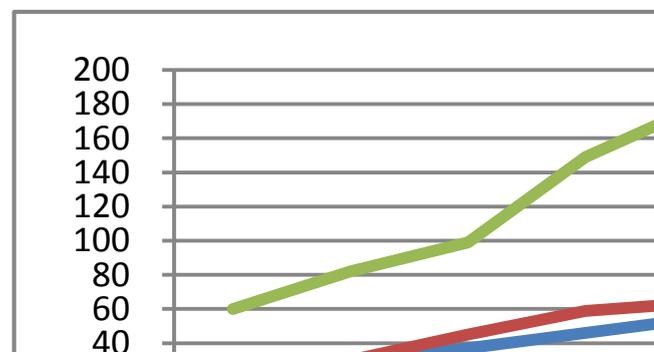
**Table 3 Calculation of Page Rank by PRLV Method**

PR(X)	PR(Y)	PR(Z)
1.0416	1.3333	0.625
1.1041	1.2229	0.6666
1.0719	1.2743	0.6536
1.0869	1.2537	0.6593
⋮	⋮	⋮

From the above table, it may be noted that PR(Y)>PR(X)> PR (Z) .The order of page rank is different from above two methods.By comparing the above methods results, it is found that page Y is obtaining highest precedence over other pages.

#### IV. ANALYTICAL RESULTS

The analysis is done using an online web log analyzer [7]. The analysis is done on a sample server log files of <http://www.smsync.com> from 1/4/2015 to 15/4/2015. It has been found that the page which is getting more hits directly or indirectly by the user, placed higher in the result set as shown in fig 5. The graph is potted between dates of observation and number of user hits. It is observed that a user cannot intentionally, increase the rank of a page as it depends on the ranks of its back links. Considerable improvements are observed in the ordering of search results by taking user's feedback on the result set.



**Fig 5: Graph Between No. of Hits and Dates**

## V. CONCLUSION

Web Mining plays an important role in providing relevant information to the user. The work in this paper evaluated the page rank of set of pages by using three popular page ranking algorithms. By comparing the result set of this algorithm and verifying it with the help of online tool, it is concluded that PRLV performs considerably good in terms of user satisfaction as compared to traditional page ranking algorithms. Comparison of PR, WPR, PRLV based on different parameters are given in the table 4

**Table 4 Comparison of PR, WPR and PRLV**

<i>Attributes</i>	<i>PR</i>	<i>WPR</i>	<i>PRLV</i>
<i>Mining technique</i>	WSM	WSM	WSM and WUM
<i>Input</i>	Hyperlinks	Hyperlinks	Hyperlinks User navigational patterns
<i>Complexity</i>	O(Log n)	< O(Log n)	>O(Log n)
<i>Relevancy of pages</i>	Less	Less	More
<i>Distribution of rank to outgoing links</i>	Equal	Unequal	Unequal
<i>Search engine</i>	Own(Google)	Research model	Research model
<i>Limitation</i>	-No focus on user query - evenly distribution of rank to outbound links	No focus on user query	Extra effort of client and server side agent

In future an efficient page ranking algorithm based on link visits and other factors of user behavior such as time spent on a page , degree of user interest in different domains can be incorporated to PRLV so that more user centered results can be presented to the user.

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# GENETIC VARIABILITY, HERITABILITY AND CORRELATION OF FABA BEAN (*VICIA FABA.*, L) GROWN IN NEW DELHI

S.Sheelamary<sup>1</sup>, Shivani<sup>2</sup>

<sup>1</sup>Scientist (Plant Breeding), <sup>2</sup>Student, Germplasm Evaluation Division, National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi, (India)

## ABSTRACT

*This study was conducted to determine variability, heritability and correlation between yield and yield components in 50 faba bean germplasm accessions in the year 2012-13. Ten morphological observations were recorded which showed a significant in the study material and there is a scope for the identification of best accession which will be used in future breeding programme. The phenotypic coefficient of variation is higher than the genotypic coefficient of variation for all the characters but the difference between them is low in the characters studied. High heritability was observed for most of the characters except for number of branches, number of pods per plant and pod width. A direct and indirect effect of yield components on seed yield per plant was also observed.*

**Keywords:** *Correlation, Faba Bean, Heritability, Seed Yield, Variability*

## I. INTRODUCTION

Faba bean (*Vicia faba* L.) is widely used as human food, cultivated especially in Europe, Northern Africa and China. It is the fourth most important legume crop. Faba bean is having superiority in yield and feeding value over other legumes, it is also widely used as animal feed. As like other legumes, it is one of the most effective nitrogen fixing legumes [1]. It contributes to human nutrition due to its higher protein content and other essential nutrients. Immature faba bean is used as a quality vegetable, numerous antioxidants and essential vitamins including carbohydrates and proteins.

Seed yield is a complex trait that is quantitatively inherited with low heritability value [2] [3] [4]. The low heritability and consequent limited genetic advance for yield in response to selection had led many scientists to search for characters which are associated with yield but which are more highly heritable [5]. The production of faba bean is severely limited by several constraints, which include the total lack of research emphasis on the crop, drought stress and salinity problems. The high heritability was followed by high genetic advance for fruiting branches per plant, number of pods per plant and seed yield per plant some traits indicating the scope for their improvement through selection [6]. The relationship between seed yield and its components would be of considerable value to breeders for characterising the germplasm accessions and selecting them as donor parents for breeding programs. The phenotypic correlation coefficient among number of seeds per pod and seed weight. Positive relationships were obtained between weight of seeds/pod and both seed weight and number of seeds per pod determined by [7]. The direct and indirect effects of plant height, pod number per plant and seed

number per pod upon biological yield was found by [8]. A significant and positive correlation was reported between seed yield and plant height, 100-seed weight, seed weight/plant and biological yield, but a negative correlation was determined with maturity date. [9]

The present investigation was aimed at selecting the best germplasm accession of faba bean adapted to Northern India. The faba bean germplasm accessions were characterised and the yield were compared to identify the best accession which can be used in the breeding programme for the faba bean improvement.

## II. MATERIALS AND METHODS

This present investigation was carried out at the Issapur farm, NBPGR, New Delhi during 2012-13. The material used in the experiment, technique followed, data analysis and interpretation of data was determined under this heading.

### 2.1. Seed Material

Experimental material consisted of 50 germplasm accessions of faba bean. They are obtained from the Hisar, NBPGR gene bank, New Delhi, India. Seeds were sown at the Issapur Experimental farm, NBPGR, New Delhi, India. In total of 50 faba bean germplasm accessions, 25 species are exotic collections, four from genebank and 21 accessions from Hisar.

### 2.2. Design and Observations

The crop was grown in Augmented Block Design with Vikrant as a check variety. During maturity period, the qualitative traits like pod colour, pod shape, seed coat colour and seed shape were observed. The quantitative characters like, days to 50% flowering, days to 80% maturity, plant height (cm), number of branches, pod length (cm), pod width (mm), number of pods per plant, number of seeds per pod, 100 seed weight (g) and seed yield per plant (g) were determined. The data was recorded in five plants of each accession.

### 2.3. Statistical Analysis

The genotypic parameters like genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance were calculated as follows.

#### 2.3.1. Phenotypic and Genotypic Coefficient of Variation (PCV and GCV)

Phenotypic and Genotypic coefficient of variation were estimated using the formula suggested by [10] and expressed in percentage.

a) Phenotypic coefficient of variation (per cent)

$$\text{Phenotypic Coefficient of Variation (PCV)} = \frac{\sqrt{\sigma^2_p}}{\text{Mean}} \times 100 \quad 1$$

b) Genotypic coefficient of variation (per cent)

$$\text{Genotypic Coefficient of Variation (GCV)} = \frac{\sqrt{\sigma^2_g}}{\text{Mean}} \times 100 \quad 2$$

The estimates of PCV and GCV were categorized based on the scale given below [11].

<15%                      Low

15-30% Medium  
>30% High

### 2.3.2. Heritability ( $h^2$ )

It is the ratio of the genetic variance to the total variance. Heritability in broad sense ( $h^2$ ) was calculated according to [12] and expressed in percentage.

$$\text{Heritability in broad sense } (h^2) = \frac{\sigma^2_g}{\sigma^2_p} \times 100 \quad 3$$

Where,

$\sigma^2_g$  = Genotypic variance

$\sigma^2_p$  = Phenotypic variance

The range of heritability was categorized as below. [13].

0 – 30 Low  
31 – 60 Medium  
>61 High

### 2.3.4. Genetic advance (GA)

Genetic advance was worked out based on the formula suggested by [13].

$$GA = \frac{\sigma^2_g}{\sigma^2_p} k \times \sqrt{\sigma^2_p} \quad 4$$

$K = \text{Selection differential at 5\% selection intensity} = 2.06$  [14].

$\sqrt{\sigma^2_p}$  = Phenotypic standard deviation.

### 2.3.5. Genetic Advance as Percentage of Mean

$$GA \% = \frac{GA}{\text{Mean}} \times 100 \quad 5$$

This was categorized by [13]

Range

>20 High  
10 – 20 Medium  
<10 Low

### 2.3.6. Estimation of Correlation Coefficient

The association between any two variables, regardless of the influence of other related characters is simple correlation coefficients ( $r$ ). The variance and covariance components were utilized to calculate.

It is the heritable association between two characters and was calculated by

$$r_g = \frac{\text{Cov}_g(x_1, x_2)}{\sqrt{\sigma_{g \cdot x_1} \cdot \sigma_{g \cdot x_2}}} \quad 6$$

### III. RESULTS AND DISCUSSION

#### 3.1. Morphological Characterisation

An investigation was made to determine the extent of variability among the faba bean germplasm accessions. TABLE 1 shows the qualitative trait observations (Fig.1.) and TABLE 2 shows the Estimates of phenotypic ( $\delta_{ph}$ ), genotypic ( $\delta_g$ ) and heritability ( $h_2$ ) in broad sense heritability for studied trait values of ten characteristics.

#### 3.2. Mean Performance

The mean performances for different traits of 50 faba bean germplasm accessions are given in the TABLE 2. Data revealed that there is wider range of variability observed for the traits plant height (82.80-135.60 cm), number of pods per plant (12.00 -55.80) and seed yield per plant (4.63 - 27.73). These results reflect that the selection prospects for these traits to improve the performance through breeding program.

#### 3.3. Genetic Parameters

The genetic parameters such as phenotypic coefficient of variance, genotypic coefficient of variance, heritability and genetic advance as percent of mean were computed and presented in TABLE 2. The coefficient of variation was worked out for valid comparison between the characters which were associated with different traits. The phenotypic coefficient of variation was high for the single plant yield (41.05) followed by number of pods per plant (34.36). The estimates of PCV were low for 100 seed weight (14.98), plant height (14.04), pod length (12.33), number of branches (11.94), number of seeds per pod (10.64), pod width (6.79), days to 50% flowering (3.63) and days to 80% maturity (1.76).(Fig.2.)

The genotypic coefficient of variation was high for the traits for the single plant yield (36.66) followed by number of pods per plant (31.53). The estimates of PCV were low for 100 seed weight (14.62) followed by plant height (13.45), pod length (9.44), number of branches (6.70), number of seeds per pod (5.65), pod width(2.11), days to 50% flowering (3.23) and days to 80% maturity (1.66).

Generally the difference between PCV and GCV for all traits was small and PCV value was greater than GCV for all the characters indicating that these characters were less influenced by environment. High PCV and GCV values were supported for the traits seed yield per plant, number of pods per plant. High heritability with moderate GA and high GCV was recorded for the characters seed yield per plant and number of pods per plant. Heritability ( $h_2$ ) estimates were generally low for all studied traits. The estimates of heritability and genetic advance as per cent of mean are furnished in the TABLE 2. The heritability estimate was higher for the traits , 100 seed weight (95.17%), plant height (91.79%), days to 80% maturity (89.09%), number of pods per plant (84.20%), seed yield per plant (79.76) and days to 80% maturity (79.06%) whereas the medium heritability estimates were established for the traits pod length (58.68%) and number of branches (31.50%). The heritability was low for the traits number of seeds per pod (28.20%) and pod width (9.68%). (Fig.3.) No trait has recorded the highest GA as per cent of mean. The moderate GA as percent of mean was recorded by pod length (14.95%) followed by number of pods per plant (13.66%). All other traits recorded the lowest genetic advance as per cent of mean. These results indicated that the environmental factors had a small effect on the inheritance of such traits. High estimates of heritability indicated that selection based on mean would be successful in improving these traits.

The variability for the same species from the Maghreb collection (161 lines accessions) and demonstrated variability in this parameter [15]. Accordingly [16] confirmed that faba bean genotype determines the number

of seeds per plant. Nevertheless [17] found no significant variability of seed number/ pod between twelve studied faba bean genotypes.

### 3.4. Correlation Studies

The inter relationship among the seven characters was estimated through correlation coefficient at phenotypic levels and are presented in the TABLE 3. Significant positive correlation values were detected between seed yield per plant and plant height (0.301), number of pods per plant (0.299), pod length (0.284) and hundred seed weight/plant (0.511). There is strong association of these characters can be give importance during selection to improve the yield potential of the crop.

Positive and significant correlation was observed between number of seeds per pod and plant length (0.446) and with number of pods per plant (0.433), between pod width and hundred seed weight (0.371), plant length (0.486), plant height (0.462). Similarly, positive and highly significant correlation was recorded between days to 50% flowering and plant height (0.485) but significantly correlated with pod length (0.355). There is a negative but significant correlation was observed between days to 80% maturity and plant height (-0.345) and pod length (-0.287). Plant height had a positive and highly significant correlation with pod length (0.622) and pod width (0.462) but it had a positive and significant correlation with hundred seed weight (0.283) and single plant yield (0.301). Pod length had recorded positive and highly significant correlation with number of seeds per pod (0.433) and pod width (0.486). Hundred seed weight had a positive and highly significant correlation with pod weight (0.371) and seed yield per plant (0.511). There is no correlation between number of seeds per plant and pod weight and hundred seed weight and seed yield per plant. Likewise number of branches also not correlated with any traits.

Thus, correlation helps breeders to identify the characters that could be used as selection criteria in breeding programme. These results suggested that improvement of grain yield in faba bean is linked with these traits and selection of these traits might have good impact on yield per plant. These results are in agreement with those obtained by [2] [7] [8] [9] [18] [19]

## IV. FIGURES AND TABLES

**TABLE 1. Quality Traits Observed in Faba Bean Germplasm Accessions**

S.No.	Traits	Mean	Minimum	Maximum
1.	Number of leaflets per leaf	5	4	6
2.	Pod colour	2	2	2
3.	Pod shape	3	3	3
4.	Seed coat colour	7	2	8
5.	Seed shape	3	2	3

**Table 2. Estimates of Phenotypic ( $\delta_{ph}$ ), Genotypic ( $\delta_{g}$ ) and Heritability ( $h^2$ ) in Broad Sense Heritability for Studied Traits Values of Ten Characteristics**

S.No.	Traits	Mean	Range	PCV	GCV	ECV	$H^2$ %	GA%
1.	Days to 50% flowering	68.56	64.00-75.00	3.63	3.23	1.69	79.06	2.54
2.	Days to 80% maturity	144.13	140.00-150.00	1.76	1.66	0.58	89.09	3.23
3.	Plant height (cm)	107.07	82.80-135.60	14.04	13.45	4.13	91.79	3.67

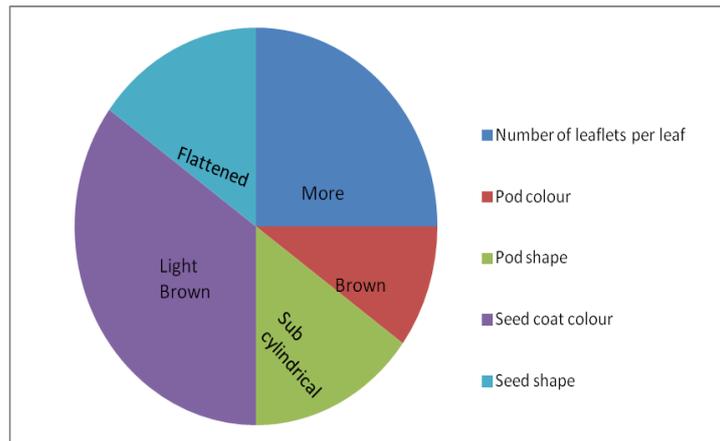
4.	Number of branches	4.92	4.00-6.40	11.94	6.70	9.48	31.50	9.24
5.	Pod length (cm)	5.22	3.90-6.70	12.33	9.44	7.77	58.68	14.95
6.	Pod width (cm)	9.11	7.76-11.11	6.79	2.11	6.65	9.68	1.68
7.	Number of pods per plant	21.90	12.00-55.80	34.36	31.53	12.90	84.20	13.66
8.	Number of seeds per pod	3.53	2.80-4.60	10.64	5.65	8.78	28.20	9.32
9.	100 seed weight (g)	21.24	14.84-27.24	14.98	14.62	3.66	95.17	7.71
10.	Seed yield per plant (g)	13.68	4.63-27.73	41.05	36.66	15.71	79.76	19.00

**Table 3. Correlation Coefficients Among Studied Traits of Faba Bean Genotypes**

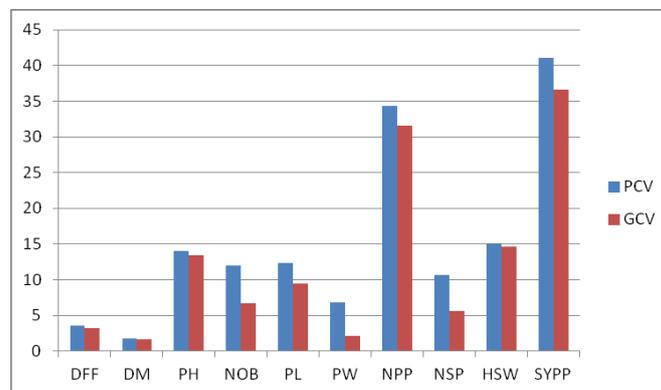
Characters	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	No. of branches	Pod length (cm)	Pod width (cm)	Number of pods per plant	Number of seeds per pod	100 seed weight (g)	Seed yield per plant (g)
Days to 50% flowering	1	-0.286*	0.485*	0.067	0.355*	0.221	0.124	0.147	0.066	0.156
Days to 80% maturity		1	-0.345*	0.188	-0.287*	-0.276	-0.106	-0.065	-0.193	-0.040
Plant height (cm)			1	0.171	0.622*	0.462**	0.249	0.183	0.0283*	0.301*
Number of branches				1	0.201	-0.028	-0.007	0.125	0.073	0.009
Pod length (cm)					1	0.486**	0.271	0.446**	0.185	0.284*
Pod width (cm)						1	0.486**	0.187	0.371*	0.107
No. of pods per plant							1	0.433**	0.033	0.299
No. of seeds per pod								1	-0.114	0.067
100 seed weight (g)									1	0.511*
Seed yield /plant (g)										1

\* Significance at 5% level

\*\* Significance at 1% level

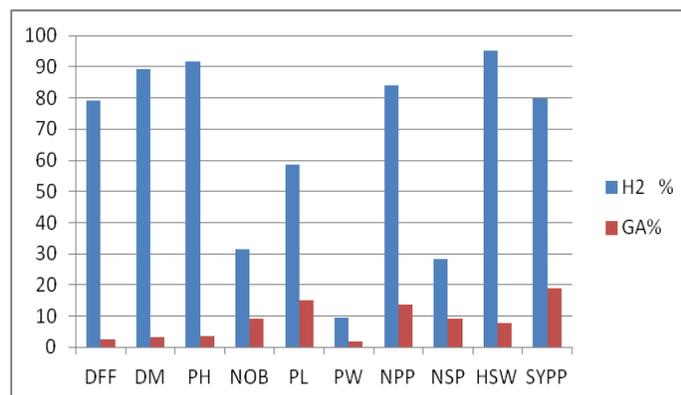


**Figure 1: Diagrammatic Representation of Mean of Qualitative Traits Observed in 50 Faba Bean Accessions**



**Figure 2. Comparison between PCV and GCV**

DFF: Days to 50% flowering; DM: Days to 80% maturity; PH: Plant Height; NOB: Number of branches; PL: Pod length; PW: Pod width; NPP: Number of Pods per plant; NSP: Number of seeds per pod; HSW: Hundred seed weight; SYPP: Seed yield per plant



**Figure 3. Graph Shows the Expression of Heritability and Genetic Advance in Percentage**

DFF: Days to 50% flowering; DM: Days to 80% maturity; PH: Plant Height; NOB: Number of branches; PL: Pod length; PW: Pod width; NPP: Number of Pods per plant; NSP: Number of seeds per pod; HSW: Hundred seed weight; SYPP: Seed yield per plant.

## **V. CONCLUSION**

This faba bean characterisation and evaluation which was carried out in NBPGR, New Delhi is with the purpose of assessing the variability on faba bean germplasm accessions. The planting materials tested can serve as a good resource of donor parent in the faba bean breeding programme. The positive and significant correlation was observed between single plant yield and hundred seed weight, plant height, pod length and number of pods. So, these traits are likely to be successfully employed for the selection of high yielding faba bean germplasm accessions.

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# SECURITY ISSUES IN CLOUD COMPUTING

## SERVICE MODEL

**Mrs. Neeraj Sharma**

Department of Computer Science

### ABSTRACT

*Cloud Computing provides a very flexible way to allocate valuable resources within a shared network, bandwidth, software's and hardware's in a cost effective manner and limited service provider dealings (The NIST Definition of Cloud Computing). Many people carry their portable devices when not on their desk and they can easily access their documents, media and pictures on cloud storage via the Internet. It is very easy to set up and decommission server instances in cloud computing. Using this cloud computing technology consumers can get benefit in the form of on-demand self services, cost saving and can access broad network and boosting their infrastructure resources with reduced capital expenses but as everything come with some drawback this also put the business world into a more risky environment. As user used to put their private data on cloud and expects that data is in the secured condition, second main concern is about loss of control over certain sensitive data. From above situation we can say security and data integrity are the very important aspect in cloud computing which has to be taken in deep considerations. In this paper, we will discuss present security issue in cloud computing service model IaaS, PaaS, SaaS and purposed a solution for these issues.*

**Keywords:** *Cloud Computing, Security Issues In Service Model, Solution For Security And Privacy Issue*

### I. INTRODUCTION

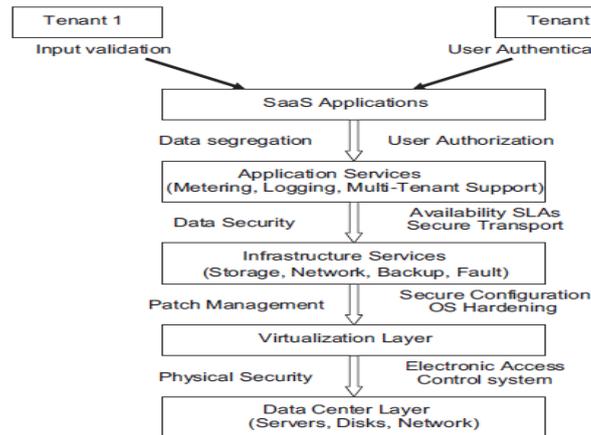
Despite the many benefits, cloud computing produces many open security issues which are the main reason for slowing down its acceptance even the leading and famous cloud providers such as Amazon, Google etc are facing many security related challenges and are yet working to stabilize them. Finding a complete solution for all the security, integrity related issues are still a very big task. In this present work we discuss different security issues with enterprise and the associated challenges in the cloud service delivery models and organized this paper in 3 section where Section 2 will describes the common security issues that are due to cloud service delivery models ( SaaS, PaaS, IaaS ) ,section 3 will cover the solutions for security related challenges and Section 4 provides conclusions derived out from this survey.

### II. PRESENT SECURITY ISSUE IN CLOUD COMPUTING SERVICE MODELS

#### 2.1 Software as a Service (SaaS)

Software as a Service is a software distribution model. In which application are hosted by vendor or service provider and delivered to multiple clients on demand via a client browser over the Internet. Typical examples are Google Docs and Salesforce.com .The cloud provider replicate the data of various enterprise at multiple locations across world for maintaining high availability. In business world there is a great deal of discomfort

with the lack of control over data and knowledge of how enterprise data is being stored and either it's secured or not. In Fig 2 we illustrated the layered stack for a typical SaaS vendor and all the aspects that must be covered in designing and developing, deployment process in order to ensure security of the data. Following are the key points:



**Fig. 2 Structure of SaaS Stack**

### 2.1.1 Data Security

In the SaaS model, the data is stored outside the enterprise location, at the SaaS vendor end. That's why, the SaaS vendor must adopt some security checks point to ensure data security and prevention due to various security vulnerabilities. For that good encryption techniques and fine authorization technique to control access to data can be to use. In cloud vendors like Amazon, the Elastic Compute Cloud (EC2) administrators even not any have access to the customer instances and they cannot even log as Guest .In EC2 administrators is required to use their own cryptographically strong Secure Shell (SSH) keys to gain any access to a host. All users need to encrypt their data before it is uploaded to Amazon S3, so that they are not accessed or tampered by any unauthorized party. Malicious users always seeking for knowing the weakness in security system to gain access over unauthorized data

Counter Measure:-By performing below assessments test we can validate the security of the enterprise data stored at the SaaS vendor: Insecure Configuration, Cookie Manipulation, OS and Cross-site scripting, SQL injection flaws, Cross-site request forgery, Access control weaknesses,Hidden manipulation and Insecure storage. If any type of vulnerability detected during these test, it can lead to gain access to sensitive data and which may lead to big loss.

### 2.1.2 Network Security

In SaaS deployment model, sensitive data of enterprises is processed by the SaaS application and stored at the SaaS vendor environment. Then data transfer over the network needs to be secured in order to prevent leakage of any type of sensitive information. For that we need some strong network encryption techniques for Transport Layer Security and Secure Socket Layer (SSL) for security. In Amazon for network security SSL encrypted endpoints use which are accessible from both the side, Internet and within Amazon EC2, which ensuring that data is safely transferred. But we need to aware from malicious users

Counter Measure: Performing below assessments test we can validate the network security of the SaaS vendor by Proper Session management, Network penetration and Packet data analysis, Insecure SSL trust configuration.

If find any vulnerability performing these tests we need to review the security measure as malicious user can hijack active sessions, can gain access to user sensitive data.

### **2.1.3 Data Locality/Physical Security**

In a SaaS model the consumers use the applications which are provided by the SaaS vender and process their business data online. Without knowing where the data actually stored, Regulations like the Federal Information Security Management Act (FISMA) says customers need to keep sensitive data within the country, but cloud vendors often not give any such guarantee. In some highly virtualized systems, data and virtual machines can move dynamically from one country to another in order to load balancing needs and for some other factors. E.g. like in Google if a user live in California goes on a business trip to London, it's better for that user's data to be served up by a data center in Europe. The typical SaaS vendors have held the view that it doesn't matter where the servers are, he continues. "We understand your laws, but the Internet doesn't work that way." Symantec, which has data centers in 14 countries, even not offer an in-country guarantee. But if data stays within a country, customers should be able to verify the data's location in order to meet regulatory requirements.

Counter measure: For this some integration requires between EMC, VMware and Intel products to find actual location of data. As right now, there's nothing that help to verifiability of where a virtual machine lives .There's nothing stopping you from moving a VM from one place in the world to somewhere else, and more importantly, there's no way to audit that at any sort of scale."

### **2.1.4 Data Integrity**

In Cloud computing the problem of the data integrity is a big issue, as there are mix of on-premise and SaaS multi-tenant applications hosted by third party. SaaS applications expose their functionality by XML based Application Program Interfaces (APIs). But the biggest challenges is with web services at the protocol level, as Hyper Text Transfer Protocol (HTTP) does not give any guarantee of delivery, so the only option is to implement these at the API level as any lack of control over integrity lead to big problems.

Counter Measure: One method to deal with is all the transactions must be handled carefully in safe manner. Another method is to use hash value as hash value is derived by condensing a set of data into a single unique value by way of a pre-defined algorithm.

### **2.1.5 Data Segregation**

As Multi-tenancy are the major characteristics of CC's, which helps multiple users to store their data using the applications provided by SaaS. Although, data of many users will reside at the same location which may lead to intrusion of data of one user by another user becomes possible. This can be done by injecting client code into the SaaS system. If the application executes this code without any verification, it leads to problem.

Counter Measure: The following are the assessments test to validate the data segregation is Data validation check, inserting SQL injection flaws and insecure storage check. If any vulnerability detected while performing these test, it can be exploited to gain access to sensitive enterprise data of other tenants. Some security policies must be follow by the cloud provider to avoid intrusion of data from unauthorized users The SaaS model must be able to provide boundary within the cloud not only at the physical level but also at the application as multiple enterprise deploying their business processes within a single cloud environment.

## **2.2 Infrastructure as a Service (IaaS)**

In an IaaS model, a third-party provider hosts hardware, software, servers, storage and other infrastructure components on behalf of its clients and host users applications and handle tasks including system maintenance,

backup and resiliency planning and offer highly scalable resources that can be adjusted on-demand. In IaaS customers pay- as-use basis, which eliminates the capital expense of deploying in-house hardware and software's example of these are Amazon Web Services (AWS), Windows Azure, Google Compute Engine, Rackspace Open Cloud, and IBM Smart Cloud Enterprise.

Security issues in Infrastructure-as-a-service IaaS

### **2.2.1 Platform Virtualization**

In IaaS model of CC's the resources are shared and rented to the different customers. One single physical machine can be shared by many of different customers. Thus if virtualization become weak and it can easily lead to major attacked.

Counter measure: We propose a solution for this type of problem which is Virtualization-Aware Security Solution, which will help to examine volatile memory to detect and prevent kernel data rootkits also some new control objective for virtualization management are needs for more data protection and so that Virtual machines will help to managed and control all the information from internal and external threats.

### **2.1.2 Denial of Service (DoS)**

DoS attacks in virtual environment are a critical threats .This type of attack is mainly happens when a great amount of non-sense requests sended and system start working against these requests due to that system consume all recourses and not able to supply any service to another users. However, Hypervisors is there to prevent VM from gaining 100% usage of any shared hardware resources, like CPU, RAM, network bandwidth.

Counter measure: For this type of attack we need appropriate hypervisor's configuration which detect extreme resource consumption, filter the malicious requests either by installing firewall or provide some solution for this of type issue and inform the administrator.

### **2.1.3 Networks & Internet Connectivity**

In order to maintain availability and performance of cloud infrastructure multiple geographical sites use to reduce the load. Each of these site connected locally as local area network also connected with the other sites by high speed Internet. These sites compose the whole cloud infrastructure Thus, Cloud can use better conventional of vulnerabilities of Internet and computer networks.

Counter Measure: IaaS model is vulnerable to IP Spoofing, DDOS, MITM, and Port Scanning. For that some traffic encryption technique require to access the resources on the clouds, as VPNs use Layer 2 Tunneling Protocol (L2TP) and Point-to-Point Transfer Protocol (PPTP ) and the WSSecurity help to maintain a secure context over a multi-point message but WS-Security need all the entities within the cloud to support the web services and for communicate using SOAP messages.

### **2.2.5 Network Monitoring**

In IaaS model network monitoring is done by some site which are able to notify the events to selected users or groups and also use some technique to fix network problems automatically Eg MapCenter and NetSaint, in NetSaint, the INFN-Testbed use, but more research need to show more feasibility and performance of cloud environment.

## **2.3 Platform as a Service (PaaS)**

In a PaaS provider hosts the hardware and software on its own infrastructure and make users free from any type of installation typical examples are Google App Engine Mendix, Amazon Web Services (AWS) Elastic Beanstalk, Google App Engine and Heroku.

Security issues in Platform-as-a-service (PaaS)

### 2.3.1 Third-Party Relationships

As PaaS provide third-party web services components such as mashups . Mashups[9] is which combine more than one source element into a one single integrated unit. Thus, PaaS models also inherit some security issues related to mashups such as data and network security Also, in PaaS users have to depend on both the security of web-hosted development tools and third-party services.

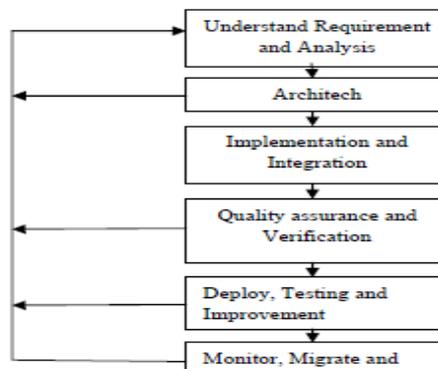
Counter measure: In internet many web services available which providing QoS (Quality of Service). Therefore services mashup have to search for an optimal set of services to construct a composite service [6]

### 2.3.2 Underlying Infrastructure Security

In PaaS model, developers do not have any access to the underlying layers, so service providers are responsible for security infrastructure as well as for the applications services.

### 2.3.3 Development Life Cycle

Software Development Life Cycle (SDLC) is main and difficult phase of any application development .In which all the future issue related to security and privacy should examine carefully, if at single step of security measure fail to discuss, application can easily hack also SDLC should be design in such a way that any type of updation have no any effect on Data loss, Deletion, Security and Privacy



**Fig 2: Cloud Development Life Cycle**

In conclusion, we can say there is less material in the literature about security issues in PaaS rather than reality

## III. PURPOSED SOLUTION FOR SECURITY AND PRIVACY ISSUE

In order to provide high security and privacy of enterprise data, some areas should be reconsidered. These areas are Governance Domains and Operational Domains [5]. As Governance domains deal with all strategic and policy issues in Cloud environment, whereas the operational domains addresses to all different type of security concerns and there right implementation

### 3.1 Governance Domains

#### 3.1.1 Governance and Enterprise Risk Management

A good risk management system is need to redesign which deal with issues like legal precedence for agreement, ability of different organizations to adequately assess risk of a cloud provider and it should be responsible to protect and handle sensitive data and all aspect related to international boundaries should cover in this.

### **3.1.2 Legal Formality**

Some process need to assign which deal with the legal issues when enterprises adopt Cloud Computing eg like protection of information and computer systems, security breach disclosure laws, regulatory requirements, privacy requirements, international laws etc.

### **3.1.3 Information Lifecycle Management**

Information lifecycle management need to introduced which deal with issue like where data resides in the cloud and how to control the data also which and what type of compensations need to controls the loss of physical control, and who will responsible for data confidentiality, integrity and availability.

### **3.1.4 Service Level Agreement (SLA)**

As cloud user have no control over the underlying computing resources, which means when consumers have migrated their core business to entrusted cloud provider no any surety about Quality, performance, availability are provided. In other words, it is vital for consumers to obtain guarantees from providers. This can provided through Service Level Agreements.SLA can negotiate between the providers and consumers.SLA specifications must be redefine in such a way that has an appropriate level of granularity, between expressiveness and complicatedness, so that they can cover most of the consumer expectations .For different cloud offerings (IaaS, PaaS, SaaS) we need to define different SLA specifications. For that advanced SLA mechanisms need to constantly incorporate user feedback and customization features into the SLA evaluation framework.[4]

## **3.2 Operational Domains Consist of**

### **3.2.1 Data Center Operations**

Detailed study need to discuss on the provider's data center and its architecture, In order to make it stable for long terms.

The entire item should be discuses in detailed at provider side and user levels to ensure proper incident handling and forensics.

### **3.2.2 Application Security**

We also need to guide all the client about how to secure the application software, and Client should know in detail how cloud work ,how to move from one cloud to another cloud ,which they should to adopted and what are their benefits.

### **3.2.3 Encryption and Key Management**

A proper encryption key and scalable key management should used in all level both for protecting access to resources as well as for protecting data in cloud from leakage and unauthorized access.

### **3.2.4 Identity and Access Management**

It discusses the management of identities and leveraging directory services to provide access all the control and also takes into account the assessment of an enterprise's readiness to conduct cloud based Identity and Access Management (IAM).

### **3.2.5 Fragmentation Redundancy Scattering Technique for Data Leakage**

Using this technique we can secure the storage and intrusion tolerance, this technique first breaking down sensitive data into irrelevant different fragments, so that any fragment does not have any significant information by itself. Then, these fragments are transfer across different sites of the distributed system to protect data from leakage.

### **3.2.6 Digital Signatures**

Use of digital signatures can also protect data from any type of unwanted access when data being transferred from one place to another, this always work with RSA algorithm to as RSA is the most recognizable algorithm .

### **3.2.7 Web Application Scanners**

we can scans the web applications through web scanner in front-end to identify security vulnerabilities. This may also help to routes all web traffic through the web application firewall which inspects specific threats.

### **3.2.8 Protection Aegis for Live Migration of VMs ,VNSS**

A secure live migration framework is needed which preserves integrity and privacy protection during and after migration of data from any type of threat and provide more security framework with customizes security policies for each virtual machine.

### **3.2.9 Virtual Network Security**

[8] Presents a virtual network framework that secures the communication among virtual machines. This framework is based on Xen which offers two configuration modes for virtual networks: “bridged” and “routed”. The virtual network model is composed of three layers: routing layers, firewall, and shared networks, which can prevent VMs from sniffing and spoofing. An evaluation of this approach was not performed when this publication was published.

Furthermore, web services are the largest implementation technology in cloud environments. However, web services also lead to several challenges that need to be addressed. Security web services standards describe how to secure communication between applications through integrity, confidentiality, authentication and authorization. There are several security standard specifications [6] such as Security Assertion Markup Language (SAML), WS-Security, Extensible Access Control Markup (XACML), XML Digital Signature, XML Encryption, Key Management Specification (XKMS), WS-Federation, WS-Secure Conversation, WS-Security Policy and WS-Trust. The NIST Cloud Computing Standards Roadmap Working Group has gathered high level standards that are relevant for Cloud Computing.

## **IV. CONCLUSION**

In this paper security considerations in cloud computing services model SaaS,PaaS,IaaS are highlighted . As we Know, the threats in CC’s are numerous, and each of them requires an in-depth analysis in last we purposed a solution for various issue we faced in cloud computing like governance and risk management to monitor the cloud protection in terms of information and security breach disclosure laws, regulatory requirements, privacy requirements, international laws, and FRS technique for secure storage, digital signature to protect data. There is no doubt that CC’s has the potential to become a frontrunner in promoting a secure, virtual and economically viable IT solution in the future. For that new security techniques are needed as well as redesigned traditional solutions that can work with cloud architectures.

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# A NOVEL APPROACH TO PAGE RANKING MECHANISM BASED ON USER INTEREST

Ankur Mittal<sup>1</sup>, Shilpa Sethi<sup>2</sup>,

<sup>1</sup>PG Scholar, <sup>2</sup>Assistant Professor, Department of Computer Engineering,  
YMCA University of Science & technology, Faridabad, Haryana, (India)

## ABSTRACT

Information searching on the web is more popular than the traditional method but is not an easy task on the web because the World Wide Web (WWW) is collection of huge no of document which available on internet. Thus a tool is required called search engine which helps in find the required information for user. Search engines are provide the list of document which sort according to page rank algorithm in which lots of not relevant to the user's information needs. Hence the personalized search is required a better page rank mechanism to provide the more relevant document to user. In this paper we design a page ranking mechanism which based on the various factor time-span, interest score, activity performed, and user interest score which helps in improve the ranking.

**Keywords:** Information Retrievals, Search Engine, Interest Score, Personalized Model, User Profile, Page Rank

## I. INTRODUCTION

In the area of internet technology development is very fast more no of person and information is added in the every second that way World Wide Web (WWW) size in manner of collection of information is increasing rapidly and a huge amount of information is stored on the internet but this growth of the web is create more difficulties to retrieve the information which relevant to user's needs. Here one more problem is present in the previous search these are focused on the keyword of query given by the user not consider context of query. If user searches the "Apple" it mostly provides document related to "Apple Fruit and other fruits" not mention the apple phone or "Apple Mac book" if user interested in electronics product.

The solution to this problem is personalized search which is recently more active research field. Web personalized is required a better page ranking mechanism to provided the more relevant information to the user to satisfy user needs. Various page ranking mechanism are peresnt but they are used the link oriented mechanism or content oriented mechanismof web mining. Here we proposed the page ranking mechanism which based on link and usage mining by considering their previous browsing history, user interest and preference etc. In case of our previous example searching for "Apple" and user previously browse the "Apple phone" related documents so our system based on our page ranking mechanism try to provide the phone related document not like the traditional page search engines provide most viewed document which not having relevancy to user.

This paper is arranged as it follows. Section II provides the related work. Section III provides our proposed search engine architecture and working of system. And we conclude in the Section IV.

## **II. RELATED WORK**

Many algorithm in the area of personalization have been developed in past which are based on the user interest and user browsing history. In [1] Surgey Brin and Larry Page give the ranking algorithm named as Page Rank (PR) which used by the search engine Google. Google used the Page rank algorithm to rank the web pages. Page rank algorithm is classified in the web structure mining technique where algorithm is based on link structure of web pages. Page rank algorithm tells that both incoming and outgoing link is important and in this algorithm page rank is calculated by added all backlinks rank and final page rank score is calculated. In [6] Page Ranking based on Link Visit (PRLV) user browsing information is additional used to the original Google Page rank algorithm. PRLV is based on the web structure and web usage mining. Here user search behaviour is also considered. In this algorithm outgoing links which is more visited having the more rank score then less visited pages. User profiles can be created explicitly and implicitly. In [7] personalized search system is based on the web usage mining and user profile is created explicitly. Here user profile is created using the user browsing history and it attributes such as no of page visited, no of page clicked, time spent on web page and action performed on page. Previous history is used to re-rank the search results and using these factor more users relevant results are obtained. In [5] proposed the personalized search engine model that is based on the web usage mining. Here user profile is created when user registers first time on the system. User is asked to enter their interest area explicitly which keeps on adding their interest area depending on user browsing patterns. Feature words are extracted from the web page visited by the users which are further used to create the short term and long term user profile.

A critical on the available literature indicate the following short coming which needs to be address

- Although [1] the no of outgoing and incoming links to the page indicates its importance within the web, but it should not be considered as the only parameter to rank a page. The user browsing history may play a major role in finding the page relevance.
- Although the work in [7], considered the browsing patterns of the user while ranking the results but incorporating the short term and long term interest can better determine the page relevance to user.

## **III. PROPOSED PAGE RANKING MECHANISM**

The proposed page ranking mechanism model as shown in the figure1. In the proposed model when the user process the query from the search engine interface then a signal is send to the profile generation module to monitoring the activity. In while query is send to the query processor and query processor retrieved the list of document from the database related to query keywords and performing the ranking on the list and send to search engine interface which display the result to user.

They are described as follows:

- Search Engine Interface
- Profile Generation Module
- Query Processor
- Database

- Page Classifier

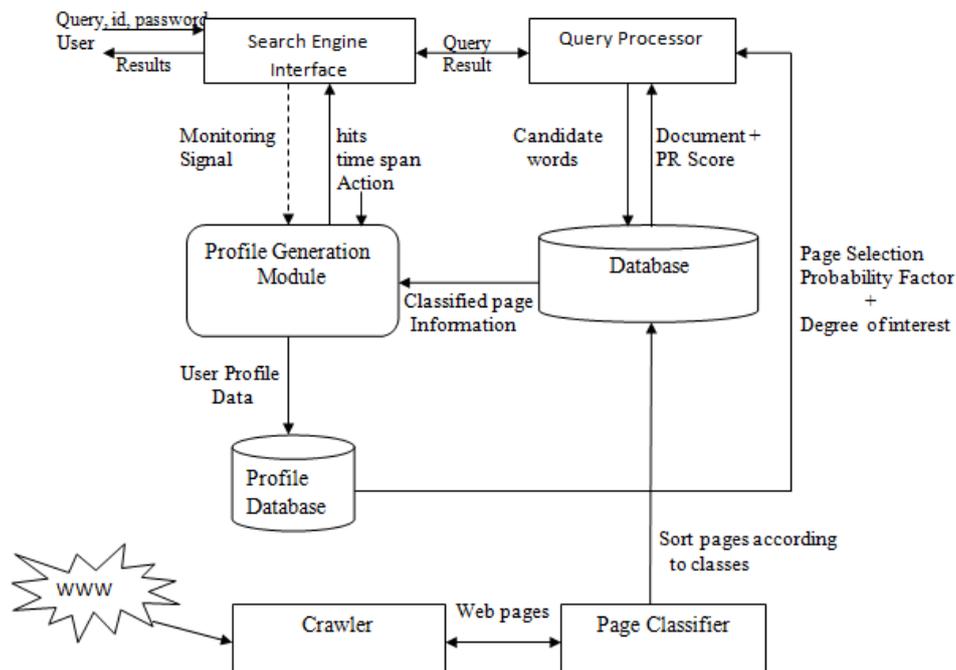


Fig 1 Proposed Architecture

### 3.1 Search Engine Interface

The search engine interface is a web page which having the text box in which user enters the query and search engine display the results. It registers the new user and authenticates the exiting user with user id and password. Search engine interface send the query submitted by user to the query processor to find the appropriate results related to query and pass signal “monitoring signal” to the user profile generation module. After getting the sorted results from query processor, presents the result to the user.

### 3.2 Profile Generation Module

The user profile is created by the special module is called “Profile Generation module”. It creates the profile for every user which registers on the system. When user enters the query at search engine it gets the signal from search engine interface and become active. It monitors and save the information such as

$hits(p_i, u_i)$  = no of hits on Page  $P_i$  by user  $u_i$   
 $Action(p_i, u_i)$  = action performed on page  $p_i$  by user  $u_i$   
 $ts(u_i, p_i)$  = time-span on page  $p_i$  by user  $u_i$   
 $Interest\ score\ Is(u_i, c_i)$  = degree of interest of user  $u_i$  in class  $c_i$

Fig 2 Profile Information

It stores the user profile information in the separate profile database. Three different table are used to store user information namely; Hits\_info table, Time\_span Table, user interest\_class table

- 1) The Hits\_info table store the page as the column and row as the different user and each entry is no of hits made by user  $u_i$  on the page  $p_i$  as shown in table 1.

**Table 1 Hits\_info Table**

Class	C <sub>1</sub>					C <sub>2</sub>					C <sub>k</sub>				
Page user	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	----	P <sub>n</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	---	P <sub>m</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	---	P <sub>q</sub>
U <sub>1</sub>	10	15	6	-	-	7	41	20	-	-	2	14	25	-	-
U <sub>2</sub>	3	7	11	-	-	13	5	14	-	-	41	17	2	-	-
U <sub>3</sub>	4	22	2	-	-	26	25	1	-	-	47	5	4	-	-
⋮	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U <sub>n</sub>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- 2) The Time\_span table store the pages as the column and row as the different user and each entry of table contain time span on page  $p_i$  by user  $u_i$  as shown in table 2

**Table 2 Time\_Span Table**

Class	C <sub>1</sub>					C <sub>2</sub>					C <sub>k</sub>				
Page user	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	----	P <sub>n</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	---	P <sub>m</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	---	P <sub>q</sub>
U <sub>1</sub>	30	25	8	-	-	11	16	18	-	-	32	21	23	-	-
U <sub>2</sub>	20	12	28	-	-	10	25	11	-	-	13	27	21	-	-
U <sub>3</sub>	42	22	24	-	-	14	35	10	-	-	7	35	14	-	-
⋮	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U <sub>n</sub>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- 3) The interest score table store the class of page as column and row as different user and each entry is contain the degree of user interest in the particular classes as shown in the table 3

**Table 3 Interest\_Score Table**

class user	A	B	C	D	E
U1	65%	5%	15%	10%	5%
U2	20%	20%	25%	15%	20%
U3	10%	10%	50%	15%	5%
U4	5%	15%	40%	25%	15%

Example :- if user U1 is search about the India and it found in page P1 and P2. P1 in class A and P2 in class D the P1 have 65% interest\_score and P2 have 10% interest\_score.

Interest Score is calculation of degree of interest of user in different classes. The interest score is calculated with corresponding the classes of web page which define in database. User interest is can divided in short term and long term interest. Due Short term interest change in degree of interest is minor and long term having major role and it easily calculated. Calculation of interest score is shown in eq. 1

$$\text{Interest score } Is(u_i, c_i) = \frac{P(u_i, c_i)}{P_t} \quad \text{----- 1}$$

Where :

- Interest score ( $u_i, c_i$ ) is interest of user  $u_i$  in class  $c_i$
- $P(u_i, p_i)$  is total page browsed by the  $u_i$  related to the web page class  $c_i$
- $P_t$  is the total page browsed by the user  $u_i$

Here we also computed the Page Selection Probability Factor (PSPF). Which based on the user browsing pattern and PSPF is further used by the query processor in calculating the final page rank. PSPF tells the user browsing behaviour by which finding page relevance to user is may become more accurate. PSPF is computed by the hits, time-span, and action factor as we consider personalizing.

$$\text{PSPF}(P_i) = \text{hits}_{wt}(P_i) + \text{ts}_{wt}(P_i) + \text{Action}_{wt}(P_i) \quad \text{-----2}$$

Where:

- $\text{hits}_{wt}(P_i)$  is the ratio of number of HITs done by user  $u_i$  on the page  $p_i$  w.r.t. total no. Of HITs on all the pages made by user  $u_i$
  - $\text{ts}_{wt}(P_i)$  is ratio of time-span spent by the user  $u_i$  on the web page w.r.t. highest time-span spent on any page.
  - $\text{Action}_{wt}(P_i)$  is activity performed by the user on web page like the print, saving, bookmark etc.
- 1) Hits weight is used in personalization because as many clicks or visits made by user means it more interested in this web page. Hits weight is count the number of click or visit made by user  $u$  on page  $p$ . In eq. 3 calculate the hits weight.

$$\text{hits}_{wt}(P_i) = \frac{\text{hits}(u_i, p_i)}{\text{hits}(u_i, *)} \quad \text{----- 3}$$

Where:

- $\text{hits}(u_i, p_i)$  is number of hits on Page  $P_i$  by user  $u_i$
  - $\text{hits}(u_i, *)$  is total no of hits on all Pages of belongs to all classes by user  $u_i$
- 2) Time-span is a important factor in web personalization if any user spent more time on the web page it means it more like the page content means more relevance to user. Time-span weight is calculated of page  $p_i$  shown in eq. 4

$$\text{ts}_{wt}(p_i) = \frac{\text{ts}(u_i, p_i)}{\text{Highest time-span}(u_i, p_i)} \quad \text{----- 4}$$

Where:

- $\text{ts}(u_i, p_i)$  is time-span spent on page  $p_i$  by user  $u_i$
  - Highest time-span spent is the time spent on any page by user  $u_i$
- 3) Action is mainly classify in four type [3] which are print, save, bookmark and send. These four action listed in the below. We give the highest weight to print after that save, bookmark and last send. Action weight is calculated by sum of all action weight given in eq. 5

$$\text{Action}_{wt} = \frac{\text{Print}_{wt} + \text{Save}_{wt} + \text{Bookmark}_{wt} + \text{Send}_{wt}}{4} \quad \text{----- 5}$$

Where

- $\text{Print}_{wt} = \log\{\text{click}(u_i, p_i) + 1\} * n * 4$
- $\text{Save}_{wt} = \log\{\text{click}(u_i, p_i) + 1\} * n * 3$
- $\text{Bookmark}_{wt} = \log\{\text{click}(u_i, p_i) + 1\} * n * 2$
- $\text{Send}_{wt} = \log\{\text{click}(u_i, p_i) + 1\} * n * 1$
- $\text{click}(u_i, p_i)$  is no times page viewed by user  $u$
- $n$  is no of time action performed

### 3.3 Query Processor

Query processor extract the candidate words form the query by apply stop word removal. After that query processor executes query on the database and fetch the page based on the term relevance.

After that query processor calculate the term relevane\_score of all in the list pages. Term \_relevance is calculated using the query candidate words and page keywords by checking the similarity between page and query and which matching score is called term\_relevance. This term relevance score is used in the eq 6 to calculate final rank of all pages.

Query processor gets the PSPF and degree of interest from the profile database and applies the formula given in eq-6 on the list of document fetched form the database. Finally shorted list of document is provides to search engine interface. Formula of modified page rank:

$$\text{PR}(P_i) = \text{Term Relevance\_score} + \text{Degree of Interest}\{\text{interest score}\} + \text{PSPF} \quad \text{----- 6}$$

### 3.4 Database

Database is collection of summary of list of documents and their URL of page. Database is having the various attributes related to pages in the table as follows:

- URL of pages
- Class Ids
- Keywords of page
- Page Rank

### 3.5 Page Classifier

Page Classifier gets the keywords and summery of downloaded web page form the crawler and puts in the repository called database. Page classifier is classifying the pages in the different classes by matching the keyword of page to class. One page is may be belong to one or more classes.

Example: Page classifier classifying page in class like the:

- Entertainment
- Sports
- Real Estates
- Stock Market
- Education and etc.

Here a page related to sports class may also belong to entertainment because sports are also entertainment.

Hence some pages are comes under the one or more class.

#### IV. CONCLUSION

In this paper we have presented a new page rank mechanism which based on the user browsing history and degree of interest of user and a personalized search engine is build based on this new proposed page rank mechanism. Its provide the more relevant information to user needs.our page rank mechanism work better then previous availabe page rank algoritmm but its have some limitation it create some extra burden of dividing page in classes but its not major. It give the better result to user and user needs of inormation is likely be more satisfy then our previous page rank algorithm. Comparison in between the different page rank algorithm is given in the below table 4

Model Item	PR[1]	PRLV[2]	PSE[3]	Proposed
Page Rank	Original	Modified	Modified	Modified
User Profile	Not created	Not created	Explicit	Explicit
Search Engine	Depended (Google)	Google	Google	Own
Ranking Factor	Ingoing and Outgoing links	Browsing patterns	Action, Click, Time	Browsing history attributes, degree of interest
Limitation	Not include user browsing behaviour	Link visit is not major factor some other like action, time not consider	Not consider degree of interest	Extra effort to divide page in classes and its some case not feasible

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# IMPROVING YOUR PAGE RANK

Kavita

Assistant Professor, Dept of Computer Science, CRM Jat College, Hisar, Haryana (India)

## ABSTRACT

As the demand of web is increasing, the issue for website owner is to provide useful information to the users as per their requirement and fulfil their needs. The search engine Google used hyperlink structure for the ranking of websites [2]. In this paper it is shown that how a web site is optimized. There are two major factors which are used for web site optimization. These are On Page factor and Off Page factor. In On page factor some tags are set for a website which has to be optimized and the rules of w3c are used for developing a web site. Off page factors are those factors which are not include on the pages. These are not controlled by site developer but these have an important role for improving page rank of a web site. The main Off page seo factors are incoming links from other websites to a website [11].

**Keywords:** Website Performance, On-Page Factors, Off-Page Factors, Page Rank.

## I. INTRODUCTION

Now a day's the numbers of web pages on internet are increasing. So there is a challenge for website owner to provide proper and relevant information to the internet user. Fig-1 shows a working of a typical search engine, which shows the flow graph for a searched query by a web user. A good ranking of query words has a major role in best searching for query words. There are various factors are associated with the ranking of web pages [10]. How and where the keyword are set on a web page so that when user search the web by input the keyword in search engine. it is found best result according to user interest. The factor which are used for better indexing of a web pages are keywords, meta tags, header tags and directory submission etc.

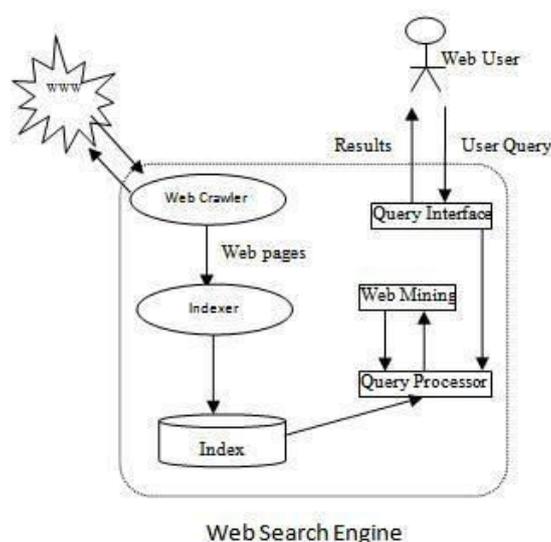


Fig 1: Working of Search Engine

But increasing the page rank of a site depends on how much are incoming links for a site are coming from another site which also have a good rank[4]. A formula is given by Sergey Brin and Lawrence Page[1] who are inventor of Google that how the page rank of a web site is calculated. Which use the incoming link of another site to a site and another site have good rank. The algorithm is given below  $r(a) = (1-d) + d(\text{pr}(t1)/c(t1) + \dots + \text{pr}(tn)/c(tn))$

## II. HOW PAGE RANK AND SEARCH RESULTS ARE INCREASED OF A WEB SITE?

All the factors which are considered by Google for indexing a web site and used to improve page rank of a web site. There are mainly two types of factors on page and off page which are used for rank improvement. Work is done on web site [www.creativebloggingideas.com](http://www.creativebloggingideas.com). First any factor which increases page rank of web site is not set. Page rank is checked by online tools which are given below and the rank is found 0. Result is shown in fig-1 generated by on2. tools. [http://www.prchecker.info/check\\_page\\_rank.php](http://www.prchecker.info/check_page_rank.php) The main factor which is shown in this paper to increase the rank of a web site is incoming link.

### Check PAGE RANK of Web site pages Instantly

In order to check pagerank of a single web site, web page or domain name, please submit the JRL of that web site, web page or domain name to the form below and click "Check PR" button.

Web Page URL: <http://www.creativebloggingideas.com/>

The Page Rank:  /10

Fig-2: Show Page Rank of a Web Site

## III. SEARCHING IN GOOGLE

Now a web site is searched in the Google by entering the Query "seo training in Chandigarh". First when it is searched in Google it is found the link of the web site on the 9th page in the Google search index[20]. After that the on page factors are set for a web site and after setting these, again by this query result which are found are shown in the fig-8. For this result the many on Page factor are to be setted. Mostly is how the keyword of a site are set in which tags it is shown. Because when any query is input in the search engine than the result which are generated by search engine are totally based on the keyword which are setted by the site developer. These key word are related to site mean what kind of information is provided by the site and what type of query is put by user, it is also guessed by the site developer. Then keywords are set for a web site.

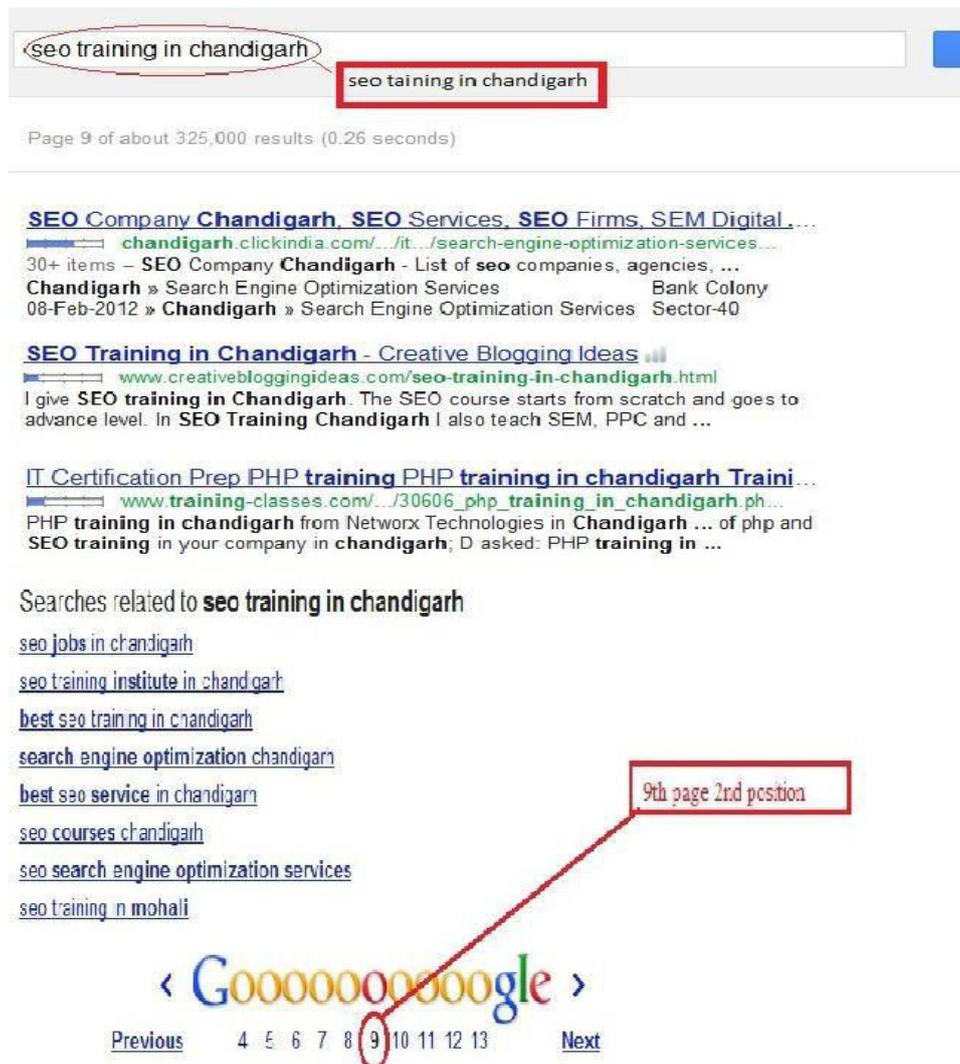


Fig-3: Showing the Result of Google Search after Entering Query “seo training in Chandigarh”.

### 3.1 Keyword in Title Tag

The title tag is possibly most important consideration when it is try to raise search engine rankings for a particular keyword or keyword phrases. Search engines use the text contained within the title tag as a primary factor to determine what the content of a certain web page is about. Search engines will display the title tag at the top of each item in the search engine results page (SERPs). The words are used for the title tag is also the text that is displayed at the top left corner of the browser window. In this website coding title tag is used in every webpage of this website [5]. <title> seo training in Chandigarh </title>

### 3.2 Keyword in Meta Tag

Meta description tags are part of the display information that visitors see when web site is listed in the search engine results pages. Even though the meta description tags are not important to search engine rankings, they are extremely important in gaining user click-through from search engine result pages (SERPs). This is checked by the online tools which link is given below[7] <http://www.seocentro.com/tools/search-engines/metatag-analyzer.html>.< meta name="description" content="I give seo training in Chandigarh. The seo course starts from scratch and goes to advance level. In seo Training Chandigarh I also teach sem, ppc and online earning."/>

Meta tags report for: <a href="http://www.creativebloggingideas.com">http://www.creativebloggingideas.com</a>		
meta tag	length	value
Title:	23	Creative Blogging Ideas
Description:	149	Free website with blog tutorials, blog tips, blog tools and blog ideas. Everything bloggers need on WordPress blogs and start blogging.
Keywords:	94	blogging,make money online, blogger, wordpress, thesis theme, blogging tips, social networking
Robots:	13	noodp, noydir

Fig-4: show the result for meta tag by online tools <http://www.metachecker.net/>

### 3.3 Optimize Keywords in heading tag:

The heading tags are headlines for a articles and it is mentioned in the title tags area, user have less than 10 seconds to attract user's attention. The words written for title is shown in the search engine result index pages. When it is structuring the html coding for a Web page, it can look a little like an outline, with main headings and subheadings. For best SEO results, it is important to place keywords in those headings, within heading tags. This tag is written as given below. `<h1 style="font-size:15px;margin:0px;" title="seo training in chandigarh"></h1></div>` Another element of organic seo that can be classified as important as web site content is cross-linking, anchor text on a web page is written as which is shown in the anchor tag `<a href="http://www.creativebloggingideas.com/unli mitedhosting- truth-internet-fraud-series" title="Permalink to Unlimited Hosting Truth Internet Fraud Series Part 1">Unlimited Hosting Truth : Internet Fraud Series Part 1 <span>35</span></a>`

### 3.4 Alt Tag Optimization

Anchor text is the visible characters and words that hyperlink display when linking to another document or location on the web. If many sites think that a particular page is relevant for a given set of terms, that page can manage to rankwell even if the terms never appear in the text itself[8].

```

```

### 3.5 Write Robots.txt for a Web Page

Robots.txt files inform search engine spiders how to interact with indexing your content. By default search engines are greedy. They want to index as much high quality information as they can, & will assume that they can crawl everything unless you tell them otherwise. Robot.txt file is written for that web site. it is checked by on line tools which is given below[13] .<http://tools.seobook.com/robots-txt>



Fig-5: Shows that Result for Robots.txt

### 3.6. Submission on Dmoz Text

Dmoz is a website that brings together and features the best of the Internet by using the submissions and votes for thousands of users. Members of dmoz, find and submit interesting, newsworthy, funny or useful pages from around the internet. There are various rules about what and how you submit this content, mostly to try and avoid spammers making too much noise on the site[9]. Web is large, and one way to reach the Web documents is to use directory services, such as Yahoo (<http://www.yahoo.com>), or the open directory project (<http://www.dmoz.org>). Typically directories are manually created, and the judgments of which category a page belongs to are done by human editors.



Fig-6: Shows Submission on Dmoz

After doing



Fig-7: Show the Result Index of Google Search

Till now the web site does not have any back link. The web site which is used [www.creativebloggingideas.com](http://www.creativebloggingideas.com). So after setting many parameters it has enhanced search engine visibility for a web site which is shown in Fig-7. But cannot increase page rank of the web site. For increasing the page rank of a web site it is visited by many users or that web site has many incoming link from another site. So the further work is done on incoming link for a site.

**Your website has not backlinks to report. -- Go on .. and build backlinks first ; )  
btw.. you can look into following few options to build backlinks**

- [Lrks From PR9 Sites](#)
- [PR-7 links on Actual PR pages](#)
- [1000 visitors GUARANTEED @ \\$7.00](#)
  - [PR 6 links @ Just \\$11](#)
  - [PR6 Links For Only \\$44](#)
- [Google PR Formula Revealed!](#)
- [11 Incredibly Costly SEC Mistakes](#)

Fig-8: Show that Site Not have any Back Link



**Fig-9: Show Page Rank is 0.**

#### **IV. OFF PAGE RANKING FACTOR**

Page rank is a numeric value that represents how important a page is on the web. Google figures that when one page links to another page, it is effectively casting a vote for the other page. The more votes that are cast for a page, the more important the page must be. Also, the importance of the page that is casting the vote determines how important the vote itself is. Google calculates a page's importance from the votes cast for it. How each vote is taken into account when a page's rank is calculated? Many algorithms are used to calculate page rank like salsa and hits etc. Page rank is Google's way of deciding a page's importance. It matters because it is one of the factors that determine a page's ranking in the search results. It isn't the only factor that Google uses to rank pages, but it is an important one[15]. Since the early stages of the World Wide Web, search engines have developed different methods to rank web pages. Until today, the occurrence of a search phrase within a document is one major factor within ranking techniques of virtually any search engine. The occurrence of a search phrase can thereby be weighted by the length of a document (ranking by keyword density) or by its accentuation within a document by html tags. For the purpose of better search results and especially to make search engines resistant against automatically generated web pages based upon the analysis of content specific ranking criteria (doorway pages), the concept of link popularity was developed. Following this concept, the number of inbound links for a document measures its general importance. Hence, a web page is generally more important, if many other web pages link to it. The concept of link popularity often avoids good rankings for pages which are only created to deceive search engines and which don't have any significance within the web, but numerous webmasters include it by creating masses of inbound links for doorway pages from just as insignificant other web pages.[3]

##### **4.1 Back Link**

Contrary to the concept of link popularity, page rank is not simply based upon the total number of inbound links. The basic approach of page rank is that a document is in fact considered the more important the more other documents link to it, but those inbound links do not count equally [18]. First of all, a document ranks high in terms of page rank, if other high ranking documents link to it. So, within the page rank concept, the rank of a document is given by the rank of those documents which link to it. Their rank again is given by the rank of documents which link to them[19]. Hence, the page rank of a document is always determined recursively by the page rank of other documents. Since even if marginal and via many links the rank of any document influences the rank of any other, page rank is, in the end, based on the linking structure of the whole web. Although this

approach seems to be very broad and complex, Page and Brin were able to put it into practice by a relatively trivial algorithm [16].

#### **4.2 Algorithm**

The original page rank algorithm was described by Lawrence Page and Sergey Brin in several publications. It is given by [6]  $PR(a) = (1-d) + d (p(t1)/c(t1) + \dots + PR(n)/c(tn))$  PR(a) is the page rank of page a, PR(ti) is the page rank of pages Ti which link to page a c(ti) is the number of outbound links on page tid is a damping factor which can be set between 0 and 1.

#### **4.3 How Medium Quality Links are Got**

This is first step towards link building. A blog is submitted to high PR blog directories. Submitting a site to blog directories is worth beneficial because search engines index sites very quickly that is accepted on trusted directories. Below is list of trusted directories to submit a blog on. Instead of begging for links from high PR sites [17]. Back links are given from these sites which are given below:

Check out the list:

1. <http://www.dmoz.org/>
2. <http://www.iromania.com>
3. <http://www.feedage.com>
4. <http://www.abc-directory.com>
5. <http://www.hotvsnot.com>
6. <http://www.business-directory-uk.co.uk>

#### **3.4 How High Quality Links are Got**

Now comes the main part of this paper. Getting high quality links are a bit difficult. The evergreen method of getting high quality back links that is guest posting. Guest posting is done on the following blogs:

1. [www.QuickOnlineTips.com](http://www.QuickOnlineTips.com)
2. [www.HowToMakeMyBlog.com](http://www.HowToMakeMyBlog.com)
3. [www.ShoutMeLoud.com](http://www.ShoutMeLoud.com)
4. [www.TricksDaddy.com](http://www.TricksDaddy.com)
5. [www.Techpp.com](http://www.Techpp.com)
6. [www.DevilsWorkshop.com](http://www.DevilsWorkshop.com)
7. [www.blogcreate.com](http://www.blogcreate.com)

#### **3.5 How Some Back Links from High Page Rank Sites are Taken**

After doing link exchange, directory submission and guest posting It concentrated on writing that content with which a site can get a lot of back links and at last a site got the best way with which a site can get huge high quality back links very easily. What is done for it, a series of articles are written on website design and four articles are written under this series. Below is a list of those articles [14].

1. Top 10 inspirational comment box designs.
2. Inspirational sidebar designs.
3. Designing a perfect navigation menu bar.

4. Inspirational & attractive header designs.

After writing these articles, these are submitted to following sites. These all sites are design related sites and have high page rank. List is:

1. Inspiration Feed <http://inspirationfeed.com/design/> (Located on Sidebar)
2. 10steps.sg <http://10steps.sg/wp-content/themes/10StepsBlue/communitylink#submitfeed>  
CreativeBloggingIdeas
3. ThemeFlash <http://www.themeflash.com/user-feed-link/#add>
4. Graphic Mania <http://www.graphicmania.net/news-archive/>
5. DesignrFix <http://designrfix.com/category/news/>
6. DevSnippets  
<http://devsnippets.com/submit>
7. Colorburned  
<http://colorburned.com/link-feed#submit>

After doing these page rank is checked of a web site which is found increased

Symbol	Definition
PR	Pagerank of backlink giving url.
OBL	Outbound Links which means total external links found on backlink giving webpage.
Flag	Any abnormal flag like nofollow tag used on your backlink.
	This is Blank which means no Anchor text found for this url so PR+OBL+FLAG would not be checked.
Total Backlinks	12179 (CHECK MORE BACKLINKS)

After all results are loaded you can click column headers to sort the results.  
\* You can click anchor text to 'further' analyze the keyword competition to improve your ranking.

No.	Backlink URL	
1	<a href="http://blogessive.com/blogging-tips/20-corporate-free-....">http://blogessive.com/blogging-tips/20-corporate-free-....</a>	SEO Training in Ch
2	<a href="http://www.btheme.info/">http://www.btheme.info/</a>	
3	<a href="http://cotiblue.com/">http://cotiblue.com/</a>	
4	<a href="http://www.wchinva.com/2010/05/promote-facebook-fan-pa....">http://www.wchinva.com/2010/05/promote-facebook-fan-pa....</a>	How To Display Cu Form In Thesis The
5	<a href="http://selinacoi.blogspot.com/">http://selinacoi.blogspot.com/</a>	How To Display Cu Form In Thesis The
6	<a href="http://blog.kissmetrics.com/landing-page-design-infoographic/">http://blog.kissmetrics.com/landing-page-design-infoographic/</a>	SEO Training in Ch
7	<a href="http://www.quickonlinetips.com/archives/2010/04/first-a....">http://www.quickonlinetips.com/archives/2010/04/first-a....</a>	SEO Training in Ch
8	<a href="http://www.problogger.net/archives/2010/05/12/if-you-ha....">http://www.problogger.net/archives/2010/05/12/if-you-ha....</a>	SEO Training in Ch
9	<a href="http://kikolani.com/fetching-friday-resources-mashup-bl....">http://kikolani.com/fetching-friday-resources-mashup-bl....</a>	Few Tips To Make 1

Fig-10: Show List of Backlines by Online Tools <http://www.backlinkwatch.com/index.php#>

## Check PAGE RANK of Web site pages Instantly

In order to check pagerank of a single web site, web page or domain name, please submit the JRL of that web site, web page or domain name to the form below and click "Check PR" button

Web Page URL: <http://www.creativebloggingideas.com/>

The Page Rank:  2/10

Fig-11: Show Result of Page Rank

## **V. TOOLS WHICH ARE USED FOR IMPROVING PAGE RANK OF A SITE**

1. [http://www.prchecker.info/check\\_page\\_rank.php](http://www.prchecker.info/check_page_rank.php)
2. <http://www.seocentro.com/tools/search-engines/metatag-analyzer.html>
3. <http://www.metachecker.net/>
4. <http://tools.seobook.com/robots-txt>
5. <http://www.backlinkwatch.com/index.php#>

## **VI. CONCLUSION**

In this paper it is found that there are many factors which affect the performance of web site. And time to time the most popular search engine Google changes its page rank algorithm. How much the web site is popular it is shown by its page rank which is 1 to 10. The more page rank the more popular the web sites. And another approach is that the link comes on to the web site from another web sites which are called incoming link. These Incoming links show the popularity of web site and increase the page rank for a site. After analysing the result which are generated by this paper, any web site which has high page rank is the site that has many visitor and many inbound link. It can be said if a site avoids the entire on page factor and has many visitors and inbound link then page rank for that site will be high. So to improve traffic on the site first of all we have to put good content on that site.

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# FLOURISHING BANCASSURANCE BUSINESS IN INDIA- SWOT ANALYSIS

**Minaxi Rani**

<sup>1</sup>Assistant Professor (Extn.), Department of Commerce, N.M. Govt. P.G. College,  
Hansi (Haryana), (India)

## ABSTRACT

Everywhere in the world the insurance sector is one of the most important segments for mobilizing financial resources for the growth of any economy. It plays an important role for diminishing the life's uncertainties. When the banks and insurance companies do collective efforts it is known as bancassurance. In India the Bancassurance business is floating start now. Economics of scale and scope make such a settlement for both the parties. Bancassurance simply means selling of insurance products by the banks. In this strategy insurance companies and banks undergo a bind – off, thereby allowing banks to sell the insurance products to its customers. This is a system in which banks do the work of a corporate agency with one insurance company to sell the product of insurance company. Through the selling of the insurance policies bank earns a revenue flow with the exception of interest income. The income that is earned from insurance companies is fee-based income and that is purely risk free for the bank because the bank simply plays the role of a middleman for well spring business to the insurance company. Everywhere in the planet the banking business is changing due to amalgamation of global financial markets, development of new technologies in market, generalization of banking operations and heterogeneity in non-banking activities. Due to all these evolution, the boundaries that have kept various financial services separate from each other have been disappeared. India has the largest banking network on the one hand and lowers insurance penetration on the other hand. When the banks and insurance company's effort well balanced for selling the insurance policies then the density of the insurance increased. Through the Bancassurance insurance product is available for the common man at the most nearest financial point , that is local bank .Simply we can say that, bancassurance is the process through which insurance products are sold to customers at their local banks. This paper analyzes flourishing bancassurance business through the SWOT analysis. It purify the bancassurance processes to reach its maximum potential. This paper gives equal importance to flourishing bancassurance and SWOT analysis.

**Keywords:** Corporate Business Agency, Customer Oriented Product, Insurance Compactness, Insurance Penetration, Bancassurance.

## I. INTRODUCTION

The banking business all around the world is growing due to integration of global financial markets, development of new technologies in banking industries, internationalization of banking operations and diversification in non-banking activities. Due to all these modernization, the boundaries that have kept various financial services separate from each other have disappeared. The coming together of different financial services

has provided union in operations and development of new concepts. One of the developments is bancassurance. Bancassurance is one of the important channels for any insurer.

Bancassurance in its simplest form is “the distribution of insurance products through a bank's delivery channels. In reality we can also say that the Bancassurance, which is also known as Allfinanz describes a package of financial product and services that can fulfilled both banking and insurance needs at the one place. "Bancassurance" in French and "All Finanz" (Universal Banking) in German refers to a bound off arrangement of banks with insurance companies for selling the insurance products in life and general segments as agents for fee based income. This income is purely risk free for the bank since the bank simply plays the role of an intermediary for sourcing business to the insurance company. Bancassurance has grown at different places and taken different shapes and forms in different countries depending upon that countries demography, economic development and legislative established in that country. Through the Bancassurance, effective distribution of the life insurance and pension's product is possible. In a broad sense, we can say that the bancassurance provided insurance and banking services at one place.

Coming to India, bancassurance is a new phrase in India. It established in India, year 2000 when the Government issued notification under Banking Regulation Act which allowed Indian Banks to do insurance distribution with banking services. It started picking up after Insurance Regulatory and Development Authority (IRDA) passed a notification in October 2002 on 'Corporate Agency' regulations. According to that regulations banks works as an agent of one life and one general insurer.

In India the growth rate of bancassurance is moderate in comparison with other countries. The growth can be magnify many overlap times with appropriate strategies such as SWOT analysis. This paper focuses on FLOURISHING Bancassurance SWOT. The scope of bancassurance can be enumerated from the SWOT analysis easily. The aches areas of bancassurance highlighted in the SWOT can be handled with appropriate strategies to avoid snag. Thus the outcome of the SWOT will be very useful for the insurer and bank. Many times the bancassurance channel is over focused. This research paper has balanced approach towards bancassurance channel. Origin Bancassurance has grown in different places in different forms based on the economic development, demographic and legislative condition of that country. The Bancassurance concept has been organized from France in 1980. This concept has been successful in Europe, France, Italy and Belgium. In the beginning the bancassurance concept was not much popular in USA due to the STEAGALL act 1933. Because it prohibit bank of usa for entering into affiliation with financial service provider.

As a result of this life insurance was primarily sold through individual agents, who focused on majority of luxuriance individuals of the American,through that middle class households being under-insured. With the US Government repealing the Gram-Leach Bliley Act in 1999, the concept of bancassurance started gaining grounds in the USA also.

### **1.1. Definition of Banacassurance**

The Bancassurance is the distribution of insurance products through the bank's distribution channels. It is a phantasm where in insurance products are offered through the distribution channels of the banking services along with a complete range of banking & investment products & services. In simple term we can say that Bancassurance tries to exploit alliance between both the insurance companies & banks.

### **1.2. Motives Behind Bancassurance**

The motives of bancassurance are different for banking industries and insurance companies. For banks it is a means of product heterogeneousness and a source of additional revenue income. For Insurance companies it is a tool for increasing their market share and premium turnover. The customer sees Bancassurance as a gold mine in terms of high quality product at reduced price and delivery at doorsteps.

### **1.3. Why Should Banks Enter In Insurance?**

Banks entered in the Bancassurance, due to the various reasons. The most important reason is to increased return on assets (ROA) and capital employed.

Free from regulation of banking industry has given each banking an opportunity to differentiate its products and services.

Technology has *permit* the banks to design the innovative products that need to be promoted and marketed.

Growing Competition has induced the banks to create niche market for itself by giving importance and highlighting the areas of their strength and excellence.

Banks are expecting to increase its commission, customer satisfaction, overall productivity, and customer trustworthiness by increasing the branch network, the brand image and client data base.

## **II. OBJECTIVE OF THE STUDY**

- To examine the latest trends of bancassurance business in Indian industry
- To examine the growth of life insurance business in India.
- To examine the reasons for growing phenomena of bancassurance.
- To analyze the different bancassurance models offered by Indian Banks.
- To find about the multi-face of bancassurance business such as SWOT analysis.
- To know the issues regarding marketing of insurance products through bancassurance mode.

## **III. BANCASSURANCE RECENT TREND IN INDIA**

Bancassurance is quiet developing in South Asia and this is still in infancy in India and it is too early to determine the exact position. However, a quick survey declared that a large number of banks cutting across public and private Banks including foreign banks have made use of the bancassurance channel in one form or the other in India. Banks all things considered are resorting to either “referral models” or “corporate agency” to going with. Own infrastructure is also provided by the banks for insurance business in their own proposition to hold the insurance staff for selling the insurance products or giving access to their client’s database for the use of the insurance policies. Number of banks in India have going to act as corporate agent’s to one or the other insurance company, it is a common place where banks do the banking functions as well as banks marketing the insurance products across the counters.

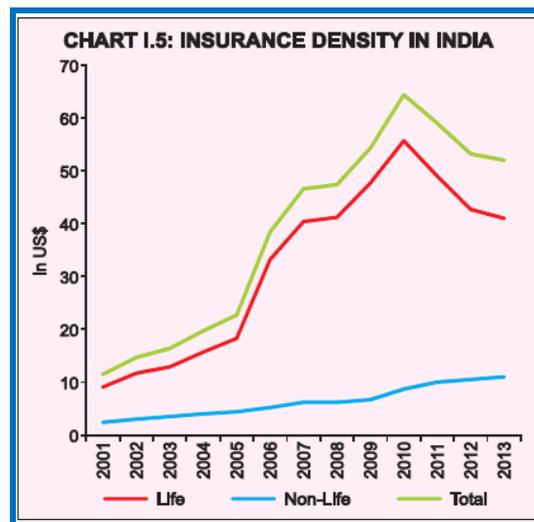
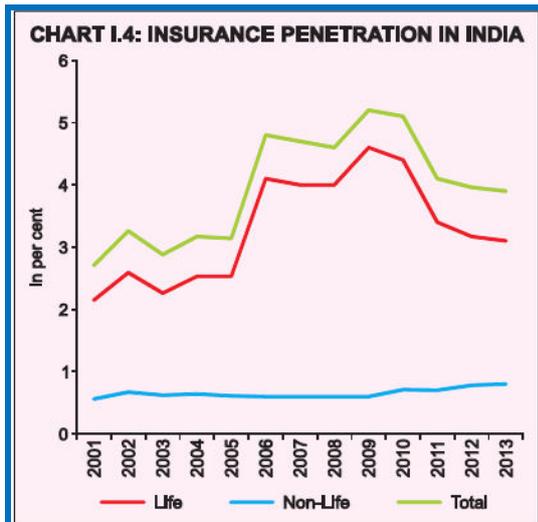
The management of the new Indian operations is conscious about the need to grow quickly or to reduce painful start-up expense. Banks with their huge networks and large customer bases give insurers an opportunity to do this efficiently. According to the banking regulations banks are required certain percentage of sales to the rural and social sectors give an added impetus to the drive for bancassurance. Selling through traditional methods to rural and social sectors can be inefficient and more expensive. Tie up with a bank with

an appropriate Customer base can give an insurer relatively cheap access. In India, as elsewhere, banks are seeing margins decline sharply in their main money lending business. Continuously, banks are looking at other entrance, including the sale of insurance products, to expend their income. The sale of insurance products can earn banks very significant commissions. In addition, one of the major strategic gains from implementing bancassurance successfully is the development of a sales culture within the bank and used by the bank to promote traditional banking products and other financial services as well. Bancassurance is not simply about selling insurance but about changing the mindset of a bank.

Bancassurance alone has contributed richly to as much as 45 per cent of the premium income in individual life segment of Birla Sun Life Insurance. Incidentally even the public sector major Life Insurance Corporation reported to have tie-up with 34 banks in the country, these are the largest number of banks selling single insurance company's products. Ridiculously, Life Insurance Corporation is the oldest and the largest presence of its own business in to the country. SBI Life Insurance for example, is uniquely placed as a original data of the user to the bancassurance into India. The company has been extensively utilizing the SBI Group as a platform for cross-selling insurance products along with its numerous banking product packages such as Education loans, housing loans, Car loans, personal loans and credit cards, debit cards etc.

ANNUAL REPORT 2013-14						
TABLE I.7 INSURANCE PENETRATION AND DENSITY IN INDIA						
Year	Life		Non-Life		Industry	
	Density (USD)	Penetration (percentage)	Density (USD)	Penetration (percentage)	Density (USD)	Penetration (percentage)
2001	9.1	2.15	2.4	0.56	11.5	2.71
2002	11.7	2.59	3.0	0.67	14.7	3.26
2003	12.9	2.26	3.5	0.62	16.4	2.88
2004	15.7	2.53	4.0	0.64	19.7	3.17
2005	18.3	2.53	4.4	0.61	22.7	3.14
2006	33.2	4.10	5.2	0.60	38.4	4.80
2007	40.4	4.00	6.2	0.60	46.6	4.70
2008	41.2	4.00	6.2	0.60	47.4	4.60
2009	47.7	4.60	6.7	0.60	54.3	5.20
2010	55.7	4.40	8.7	0.71	64.4	5.10
2011	49.0	3.40	10.0	0.70	59.0	4.10
2012	42.7	3.17	10.5	0.78	53.2	3.96
2013	41.0	3.10	11.0	0.80	52.0	3.90

\* Insurance density is measured as ratio of premium (in USD) to total population.  
 \* Insurance penetration is measured as ratio of premium (in USD) to GDP (in USD).  
 \* The data of Insurance penetration is available with rounding off to one digit after decimal from 2006.  
**Source:** Swiss Re, Sigma, Various Issues.

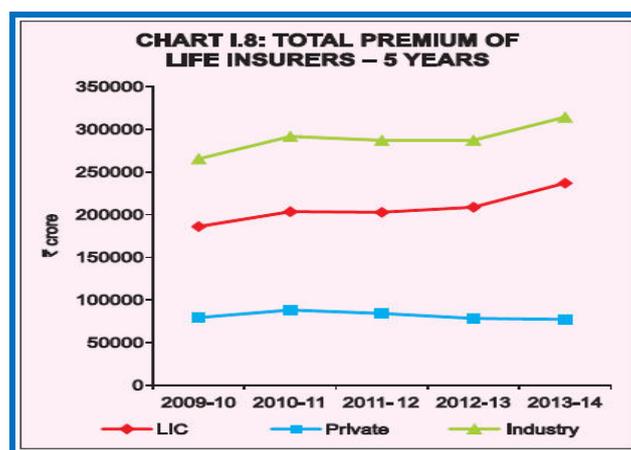


**TABLE I.46**  
**TOTAL INVESTMENTS OF THE INSURANCE SECTOR**  
 (AS ON 31<sup>st</sup> MARCH)

(₹ crore)

INSURER	Life		Non-Life		Total	
	2013	2014	2013	2014	2013	2014
Public	14,02,991 (10.55)	15,74,296 (12.21)	83,644 (17.64)	93,785 (12.12)	14,86,635 (10.93)	16,68,081 (12.21)
Private	3,41,902 (9.52)	3,83,169 (12.07)	39,348 (39.71)	46,025 (16.97)	3,81,250 (12.02)	4,29,194 (12.58)
<b>Total</b>	<b>17,44,894</b> <b>(10.35)</b>	<b>19,57,466</b> <b>(12.18)</b>	<b>1,22,992</b> <b>(23.90)</b>	<b>1,39,809</b> <b>(13.67)</b>	<b>18,67,886</b> <b>(11.50)</b>	<b>20,97,275</b> <b>(12.28)</b>

**Note:** 1. Figures in brackets represent growth in percentage over the previous year



**Note:** Above source is taken from IRDA.

#### IV. STRUCTURAL CLASSIFICATION

##### 4.1 Referral Model

When banks deliberated not to take risk then the banks adopt 'referral model'. In this model banks simply part with their client bibliography business, in that bank take commission for their work. In this model there is a simple agreements, at which point the bank, while makes controlling access to the clients

data base, then banks only parts with the business edge to the agents of insurance company for a 'referral fee' or commission . This model would be suitable for almost all types of banks including the cooperative banks /RRBs and even cooperative societies both in urban and rural.

#### **4.2 Corporate Agency**

The other form of non-sick participatory distribution channel is that of 'Corporate Agency'. In that model bank's staffs performed work as an association, corporate agent for the insurance product for a fee/commission. Corporate agency model of bancassurance worked very great in the USA, because in USA consumers commonly favored to purchase policies through dealer banks that offer a wide range of products from rival insurers.

#### **4.3 Insurance As Fully Integrated Financial Service/ Joint Ventures**

Aside from the above two, the fully integrated financial service involves much more comprehensive and complex relationship between bank and insurer, where the bank does it all the functions in its operation and selling of insurance products is just one more function within. In this model banks having wholly owned insurance subsidiaries with or without foreign encouragement.

### **V. PRODUCT BASED CLASSIFICATION**

#### **5.1 Stand-Alone Insurance Products**

In this model bancassurance involves marketing of the insurance products through with the help of either referral arrangement or corporate agency. In the stand alone insurance product is not mixing any of the banks' own products or services. Insurance product is sold as one more item in the menu of products offered to the bank's own customer.

#### **5.2 Amalgamation of Insurance with Bank Products**

This method aims at amalgamating of insurance products as a 'value addition' while promoting the bank's their products. Banks sold the insurance products without any additional energy. In most times, giving insurance cover at a simple premium, fee or sometimes without accurate premium does act as an added attraction to sell the bank's own products, e.g. car loans, housing loans, gold loans, Agriculture loans, education loans, credit card, etc.

### **VI. SWOT ANALYSIS**

Today Banking and Insurance are very differential businesses. Banks have less risk for selling the banking products but the insurance business has a greater risk for selling the insurance. Even nevertheless, banks and insurance companies in India are yet to exchange their communications. Bancassurance operates as a way of sharing of insurance products is already in force in some form or the other. SWOT analysis is done in the context of bancassurance procedure in India.

SWOT analysis of Bancassurance is given below:

## **6.1 Strengths**

In a country like India more than one billion people where sky is the limit there is a vast introductory waiting for life insurance products. The other strength of India is the extensive pool of skilled professionals whether it is banks or insurance companies who may be easily transposed for any bancassurance venture.

### **6.1.1 Accurate Customer Details**

Customers who opened the bank account provide accurate data. So that the accuracy of data is very high in bancassurance business. Accurate data helps the banks in targeting and positioning the right segment of customers for right policy. The exchange address and contact number of customers are updated on time and avoids wastage of time and resources in communication with the customer.

### **6.1.2 Insurance Is Mandatory For Loans**

The banks whenever offers loan bound to issue appropriate class of insurance too. It is legally compulsory for a bank to club loan products with relevant a insurance policy.

### **6.1.3 Customized Policies at Lower Premium**

The insurance policies are customer oriented for bancassurance channel. The statistical analysis of customer data helps to devise right set of policies for different customers. The features and premium of insurance products designed for bancassurance channel comparatively better than any other channel. In fact, the insurance policies are money making in bancassurance channel.

### **6.1.4 Good Numbers of Leads to Cross Sell**

The bank customers can be targeted to sell insurance policies. The existing customer database can be used to generate more customers. As the number of sales calls increase the sale closures also increases.

### **6.1.5 Services Under One Roof for Customers**

The customer can enjoy convenience of core banking products and insurance policies under one roof. When both the services are not provided under the one roof the customer needs to run around in search of different financial products to meet his needs time to time.

### **6.1.6 Important Source of Income**

The banks are in the search of new business in its existing infrastructure. The productivity of the employee as well as the bank branches is increased through the fee based income. The existing resources can be fully utilized to sell financial products and services. Otherwise the insurance company needs to spend on resources that are too much costlier for the insurance business.

## **6.2 Weaknesses**

### **6.2.1 Failure of the internet connectivity**

Due to the not good work of the IT culture collaboration the internet connection are also not properly to the staff.

### **6.2.2 Lack of Initiatives from Bank Employees**

The bank employees should sell insurance product in addition to their routine works. They take insurance as a burden on their mind without considering its benefits. Because of lack of initiative they are not interested in attending insurance programs and training and suffer without product knowledge.

### **6.2.3 Dependency on insurer Employee**

The bank employees are exclusively depending on the employees of the insurance for sales of the insurance product. The sales managers can constraint in the initial time but not always.

**6.2.4** Banks work insurance work for commission so that the bank gives maximum efforts to selling those policies which fetch maximum commission and not give maximum efforts for selling the those polices which fetch them less income. Banks want only commission so that forgive to customer requirement and the requirement of the low income group. The bank employees are profit oriented not customer oriented.

## **6.3 Opportunities**

### **6.3.1 Growing Channel of Marketing**

The growing channel of marketing is good opportunity for bancassurance. The bancassurance generates significant proportion of premium for any insurer. The bancassurance cannot be avoided as it generates huge premium.

### **6.3.2 Dual Support Model**

The customer enjoys dual support who takes the insurance policy through bancassurance communication channel. Customer takes benefit bank as well as insurance company. The scope for better customer services is higher in bancassurance.

### **6.3.4 Tax Payers Can Be Targeted**

In the march month the sale of the insurance product is very high. Sothat the sale of the life insurance policy at its peak or maximum level in this month. Customers who are tax payers are selected for a single premium policies.

## **6.4 Threats**

### **6.4.1 Insurance Becomes Additional Responsibility**

The bank employees should sell insurance product or banking product in addition to their basic work. When the bancassurance is introduced the burden of the bank employees has been increased. As the time passed, the bank employees have full knowledge about the insurance product and they feel satisfying for selling the insurance product. Those banks who achieved the initial stage profitably can really come throw in selling insurance.

### **6.4.2 New Bancassurance Proposals**

The bancassurance channel has limited contractual term and can be renewed subsequently. Generally, each bank receives invitation from insurer to become partner of bancassurance. Those bank who gets profitable contract than the any other contract of the bank then the bank tie-up.

### **6.4.3 That venture require to change the thinking of everybody**

As we all know that the success of the insurance product is depend upon the to change the thinking of everybody who involved in that. The employees at every level are so well entrenched in their classical way of working that there is a definite threat of resistance to any change that Bancassurance may set in.

### **6.4.4 Non- response of customers**

Another possible threat may come from non-response from the targeted customers.

## **VII. CONCLUSIONS**

- a.* The success of bancassurance greatly hinges on banks ensuring excellent customers relationship, therefore banks need to strive towards that direction. The changing mindset is paur through the banking sector in India and this would be a right time for banks to resorting to bancassurance, chiefly in the situation of proactive policy environment of regulatory authorities and the Government.
- b.* As pointed out by law (2004), the changing mindset is cascading through the banking sector in India and this would be a right time for banks to resorting to bancassurance.
- c.* In addition to acting as distributors, banks have recognized the potential of bancassurance in India and follows a similar trend observed in the United Kingdom and elsewhere where banks started off as distributors of insurance but then moved on to the fully owned insurance subsidiaries.
- d.* It is important for an insurer to understand the merits and demerits of the channel of bancassurance. When we have fully know about the good and bad points that information'scomfort excessively to plan the resources in accordance with the requirement of the channel. In other words we can say that the lawful circumstances etc can be planned to maximize the channel performance. Else-way we can say that peaceful working of bancassurance channel is difficult. Thus the analysis of internal and external environment of bancassurance channel is vital one for an insurer.
- e.* There needs to be a clear cut identification of activities between banking and insurance at the institutions level as also at the level of managersadequate training must be imparted to the bank staff.
- f.* In sum, bancassurance strategy would be a win-win situation for all the parties involved - the insurance companies, the customer, and the banks.

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# REVIEW OF ELECTROMAGNETIC COMPUTATIONAL ANALYSIS METHODS USED FOR METAMATERIAL BASED ANTENNA

Sandeep Sharma<sup>1</sup>, Dr.M.R.Tripathy<sup>2</sup>

<sup>1</sup>Department of Electronics and Communication, Bhagwan Parshuram Institute of Technology,  
(GGSIPU) Delhi (India)

<sup>2</sup>Department of Electronics and Communication Amity School of Engg. and Technology,  
Noida, U.P (India)

## ABSTRACT

*This paper provides a review of most commonly used numerical methods for computational electromagnetic which have been used for analysis of metamaterial based antenna. It gives mainly the strengths and weakness of given methods.*

**IndexTerms:** Computational Electromagnetic, Metamaterials, Numerical Methods

## I. INTRODUCTION

With the increase in the demand of enhancing the performance of small antennas using metamaterials, search has been pursued actively for different ways to increase directivity, reduce side lobes and back lobe levels, improve the bandwidth. Metamaterials belongs to the group of artificial media which became one of the most important topics of classical electromagnetic theory in last two decades. The permittivity, permeability and conductivity of a material characterize its ability to interact with an electromagnetic field. In nature magnitude of these three quantities are restricted to mostly positive values. Metamaterials are the artificially produced composite media exhibiting electromagnetic responses that natural material does not provide.

## II. REVIEW OF COMPUTATIONAL METHODS

In the following section the mostly used computational electromagnetic numerical methods are presented, their strengths and weaknesses are also stated.

### 2.1 AEM (Asymptotic-Expansion Methods)

AEM are high frequency methods. They are only accurate when the dimensions of the objects being analyzing are large compared to the wavelength of the field. Physical Optics (PO) approximation is efficient method for analyzing large scatters. It is a current-based method in which the physical optics approximation is used to obtain the current density induced on a surface. Geometrical Optics (GO) or Geometrical Optics with Aperture Integration (GO/AI) is a ray-based method. In GO analysis geometrical optics techniques (ray tracing) are used to set up equivalent currents on an aperture plane which is normal to the axis of the reflector.

#### Strength

a) works well for large, smooth surfaces with low curvature

- b) Ignore the edge diffractions
- c) Integration over the aperture plane can be performed with ease

**Weakness:** integration of the reflector may be complicated

## 2.2 BEM (Boundary-Element Methods)

The first step in a BEM is to represent the problem geometry as a distribution of equivalent surface currents in a homogeneous medium (usually free space). The fields exterior to an object consist of fields incident on the object, fields reflected from the object and fields emanating from the object. Since the forms are only valid for current distributions in a uniform homogeneous medium, all objects in the problem space must be removed and replaced with (initially unknown) surface currents conforming to their boundaries.

### Strength

- a) good for modeling unbounded problems
- b) Good for modeling metal plates and thin wires
- c) good for modeling structure with lumped circuit elements

**Weakness:** homogeneous/complex structure may be complicated

## 2.3 . FDTD (Finite Difference Time Domain Method)

FDTD method is a direct solution of Maxwell's time dependent curl equations. It uses simple central-difference approximations to evaluate the space and time derivatives. Because the basic elements are cubes, curved surfaces on a scatterer must be staircase.

### Strength

- a) ability to obtain wideband results using a transient excitation in one simulation
- b) Great flexibility, good at modeling inhomogeneous or complex materials
- c) quick implementation on massively parallel computers

### Weakness

- a) staircased approximation may lead to significant errors
- b) Uniform cells must be small enough to model necessary detail, but still fill the entire volume
- c) Dispersion errors for too large time steps
- d) Difficult to model thin wires

## 2.4 FEM (Finite Element Method)

FEM techniques always solve a differential equation. The domain problem must be finite and bounded, FEM code divide it into small elements. To form a linear system of equations, the governing differential equation and associated boundary conditions are converted to an integro-differential form using either a variational method

### Strength

- a) good at modeling inhomogeneous or complex materials
- b) Good at modeling problems that combine small detailed geometries with larger objects
- c) Good at modeling structures in the resonant cavities or waveguides

### Weakness

- a) absorbing boundary required for modeling unbounded (radiation) problems
- b) Difficult to model thin wires accurately

## 2.5 FVTD (Finite Volume Time Domain Method)

FVTD is based on Maxwell's curl equations in their conservative form [3]

$$\oiint_{\partial v} \mathbf{B} \cdot d\mathbf{v} = \iiint_v \nabla \times \mathbf{E} \cdot d\mathbf{v} \quad (1)$$

Where  $\partial v$  represents the boundary enclosing  $V$ . The FVTD method solves the above form of Maxwell's equations numerically by integration over small elementary volumes.

### Strength

- a) well suited for implementation with unstructured meshes
- b) Good potential for the simulation of a variety of complex electromagnetic problems
- c) Especially well suited for microwave device simulations

## 2.6 MoM (Method of Moment)

MoM is also called the Method of Weighted Residuals. It is a technique for solving linear equations of the form

$$L(\phi) = f \quad (2)$$

where  $L(\phi)$  is a linear operator,  $f$  is a known excitation or forcing function, and  $\phi$  is an unknown quantity. This linear system of equations has the form

$$[Z][A] = [B] \quad (3)$$

Where the elements of  $[Z]$  are known quantities that can be calculated from the linear operator and the chosen basis and weighting functions. The elements of  $[B]$  are determined by applying the weighting functions to the known forcing function. The unknown elements of  $[A]$  can be found by solving the matrix equation.

### Strength

- a) Can be used to solve a wide range of equations involving linear operations including integral and differential equations
- b) Widely used to solve equations derived from Maxwell's equations

## 2.7 TDM (Time Domain Method of Moment)

Like the method of moments in the frequency domain, the MoM-TD method discretizes the scatterers or targets into segments or patches. The time axis is then divided into equal increments or time steps. The temporal basis functions are generally versions of the main function shifted by a certain number of time steps. It leads to a set of matrix equations that can be written as

$$[V] = [Z][I]$$

The vector  $[V]$  contains the known incident field quantities and the terms of the  $Z$ -matrix are functions of the geometry. The unknown coefficients of the induced current are the terms of the  $[I]$  vector or a weighted-residual (moment) method

### Strength

- a) Especially well suited for dealing with fast transient electromagnetic fields incident
- b) Especially well suited for dealing with from structures in free space.

#### **Weakness**

- a) not very effective when applied to arbitrary configurations with complex geometries or with inhomogeneous dielectrics
- b) Not well-suited for analyzing the interior of conductive enclosures or thin plates with wire attachments on both sides

### **2.8 HLM (Transmission Line Matrix Method)**

TLM method was introduced by Johns [1] in this method instead of interleaving E-field and H-field grids a single grid established and the nodes of this grid are interconnected by virtual transmission lines. Excitations at the source nodes propagate to adjacent nodes through these transmission lines at each time step

#### **Strength**

- a) analysis is performed in the time domain and the entire region of the analysis is gridded
- b) Complex, nonlinear materials are readily modeled
- c) Impulse responses and the time-domain behavior of systems are determined explicitly

#### **Weakness**

require more computer memory per node than FDTD

### **III. CONCLUSION**

Each method has advantages and disadvantages. In real world it is difficult to find a method for all problems' aspects, thus hybrid like FEM/BEM, MOM/PO, or FEM/PO is used.

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# AN APPROACH OF MICROSTRIP PATCH TO MAGNETO HYDRO DYNAMIC ANTENNA- A REVIEW

**Mahender Singh<sup>1</sup>, R.S Yaduvanshi<sup>2</sup>**

<sup>1</sup> *Department of Electronics and Communication, Guru Tegh Bahadur Institute of Technology,  
Delhi (India)*

<sup>2</sup> *Department of Electronics and Communication,  
Ambedkar Institute of Advanced Communication Technologies & Research, Delhi (India)*

## ABSTRACT

*In Communication system an antenna plays a very crucial role for high frequency applications. The transfer of maximum power from Transmitter end to Receiver end by matching the impedance of an antenna. The MHD antenna is combination of magnetic field (Maxwell's equation) and hydrodynamics (Navier's Stokes equation). This paper gives us a review of MHD antenna discussing and analysing the problem facing such as matching impedance, radiation pattern (gain, directivity, and polarisation)*

***Keywords: Microstrip Antenna, Dielectric Resonator Antenna, Reconfigurability, High Gain, Hybrid Structure, Return Loss***

## I. INTRODUCTION

An antenna (or aerial) is an electrical device which converts electric power into radio waves, and vice versa. It is usually used with a radio transmitter or radio receiver. In transmission, a radio transmitter supplies an oscillating radio frequency electric current to the antenna's terminals, and the antenna radiates the energy from the current as electromagnetic waves (radio waves). In reception, an antenna intercepts some of the power of an electromagnetic wave in order to produce a tiny voltage at its terminals that is applied to a receiver to be amplified. Antennas are essential components of all equipment that uses radio. They are used in systems such as radio broadcasting, broadcast television, two-way radio, communications receivers, radar, cell phones, and satellite communications, as well as other devices such as garage door openers, wireless microphones, Bluetooth enabled devices, wireless Computer networks, baby monitors, and RFID tags on merchandise.

## II. LITERATURE REVIEW

Microstrip antennas are attractive due to their light weight, conformability, low cost and ease of fabrication [1-3]. These antennas can be integrated with printed strip -line feed networks and active devices. In its most fundamental form, a Microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side. For a rectangular patch, the length of the patch is usually  $0.3333\lambda_0 < L < 0.5\lambda_0$ , where  $\lambda_0$  is the free space wavelength. The patch is selected to be very thin such that  $t \ll \lambda_0$  (where  $t$

is patch thickness). The height  $h$  of the dielectric substrate is usually  $0.003 \leq h \leq 0.05 \lambda_0$ . The dielectric constant of the substrate ( $\epsilon_r$ ) is typically in the range  $2.2 \leq \epsilon_r \leq 12$  [6].

Microstrip antenna radiates primarily because of the fringing fields between the patch edge and the ground plane. For good antenna performance, a thick dielectric substrate having a low dielectric constant is desirable since this provides better efficiency, larger bandwidth and better radiation [6]. However such a configuration leads to a larger antenna size. In order to design a compact Microstrip patch antenna, substrate with higher dielectric constants must be used which are less efficient and results in narrower bandwidth [5]. Hence a trade-off must be realized between the antenna dimensions and antenna performance.

However the major disadvantage of the microstrip patch antenna is its inherently narrow impedance bandwidth. Much intensive research has been done in recent years to develop bandwidth enhancement techniques. These techniques include the utilization of thick substrate with low dielectric constant [7] and slotted patch [6]. The use of electronically thick substrate only results in limited success because a large inductance is introduced by the increased length of the probe feed resulting in a few percentage of bandwidth at resonant frequency.

Now with the loading of some specific slot in the radiating patch of the microstrip antennas, compact or reduced size microstrip antennas can be obtained [9]. The loading of the slots in the radiating patch can cause meandering of the excited patch surface current paths and results in lowering of the antenna's fundamental resonant frequency, which corresponds to the reduced antenna size for such an antenna compared to conventional microstrip antenna at same operating frequency.

Antenna miniaturization plays a vital role in the design of global positioning systems and modern personal wireless systems. Many techniques have been reported to reduce the patch antenna size, such as a square-ring patch fed by a micro strip line, the use of cross end bent slots embedded in the radiating patch [10-12] and the use of slot in ground plane [13].

The purpose of these methods is to lengthen the excited surface current path, increasing the antenna length and decreasing the resonant frequency. Recently an annular-ring patch antenna with strips has been used to obtain circular polarization characteristics [14-15]. In case of a narrow annular ring patch, it is very difficult to obtain a 50 ohm impedance match.

MHD antenna uses fluid as dielectric. The word magneto hydrodynamics (MHD) is derived from magneto- meaning magnetic field, and hydro- meaning liquid, and -dynamics meaning movement. MHD is the study of flow of electrically conducting liquids in electric and magnetic fields [18-20]. Here author have developed and tested magneto-hydrodynamic prototype antenna with detailed physics. Ting and King determined in 1970 that dielectric tube can resonate. To our knowledge no work has been done on MHD antenna as described here. Based on our own developed theory, authors have proposed this prototype model with return loss results. Fluid antenna has advantage of shape reconfigurability and better coupling of electromagnetic signal with the probe, as no air presents in between [27]. Author have developed physics as per (16-27) for electromagnetic wave coupling with conducting fluid in presence of electric and magnetic field. Here, author demonstrates, how the directivity, radiation resistance and total energy radiated by this magnetohydrodynamic antenna can be computed, by the elementary surface integrals. Author have developed, equations for rotating frame of conducting fluid, velocity field, electric field, magnetic field, pointing vector, current density, permittivity, permeability and vector potentials to realise an MHD Antenna [21-23]. Authors have used saline water, ionised with DC voltage applied with the help of electrodes, in presence permanent magnetic field. Fluid acts as

radiating element in the PPR (propylene random copolymer) cylindrical tube. SMA connector is used to supply RF input. Volume and shape of the fluid decides the resonant frequency.

Dielectric resonator antennas (DRAs) have been investigated during the last two decades and significant advances are being made in developing them for many applications. One major aspect of the state-of-the-art research with DRA is how to enhance the element bandwidth as evident from survey of open literature, e.g., [28-30]. For DRAs with broadside radiation, different shapes [31-33] and composite structures [28], [34], [35] have been investigated. For monopole type radiation pattern, only a few handful investigations with DRAs are available in open literature. The mode in coax-fed dielectric ring resonator was used to generate monopole-like radiation in [36]. The narrow impedance bandwidth of the structure in [36] was improved by introducing an air gap between the DRA and the ground plane in [37], [38]. Two broadband variants of dielectric ring resonator have recently been proposed in the form of coax-fed disc-ring [39] and rod-ring [40] combinations, respectively. An electric monopole-fed dielectric ring has been reported as an ultra wideband antenna in [41]. Since 1970's, dielectric resonators helped achieving the miniaturization of active and passive microwave components, such as oscillators and filters [28, 29]. In a shielded environment, the resonators build with DRs can reach the unloaded Q factor of 20,000 at frequencies between 2 and 20 GHz. The principle of operation of the dielectric resonators can best be understood by studying the propagation of electromagnetic waves on a dielectric rod waveguide. The mathematical description [44] and the experimental verification [45] of the existence of these waves has been known for a long time. Their massive application begun with the introduction of optical fibers.

UWB antennas, the key elements of any ultra wideband systems, has become a competitive academic and industrial topic after 2002 date of the RST standards ruling the commercial use of ultra wide band technology reported by the Federal Communications Commission (FCC). Recently, DRAs have attracted a steady increasing attention during the last decade due to their main advantages such as wider bandwidth, better radiation efficiency compared to those of their microstrip antennas counterparts and due to other additional characteristics such as light weight and low size, and their ability to support harsh environment conditions (i.e., high temperature degree). In the last few years, UWB DRAs [42-45] have been designed for high data rate local wireless communication systems, radars and imaging systems, in microwave and millimetre wave frequency ranges, responding to the extensive demand of wideband application from their higher efficiency performance. However broad band and ultra wideband DRA structures are still suffering from some designing disadvantages making them less competitive such as complex geometries, higher dielectric constant material involved and/or the incompactness of proposed DRAs. UWB DRAs have been designed for high data rate local wireless communication systems, radars and imaging systems, in microwave and millimetre wave regions, responding to the high demand of wideband application and benefiting from their higher efficiency and gain performance.

### **III. CONCLUSIONS**

This paper describes the feature and various problem of microstrip patch antenna. It provides the technology and method to face the challenges and to improves its shortcomings i.e. bandwidth enhancement problem, gain improvement problem, impedance matching etc. This is also explained the brief structure of Dielectric resonator antenna and MHD antenna with its ultra wideband application system in higher efficient modes

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