# Analysis of Effective service Retrieval in Service Oriented Architecture

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*Abstract: SOA oriented plays a vital role in software industry and generally these services are required for third party needs and Many Search engines are using SOA services in order to obtain any form of service from the web. Thus it becomes essential for them to provide fast retrieval and accurate results to users which contain salutary information that best fulfills user's requirements and contain data that is trustworthy and contain least insignificant information. As the web is open for everyone without any restrictions so there are possibilities that the data retrieved contains false facts deceits and assumptions and thus the service retrieval systems are becoming more aware about the authenticity and significance of the web documents to provide best service retrieval. service Mining is widely used in this context which is used to discover the content of the service, the user's behavior in the past and the web pages that the users want to view. Bing; one of the most popular search engine uses the concept of Data Priority in order to rank web documents so to maintain the trustworthiness and importance of the documents and to retrieve results. Data Priority is used in service Structure mining; a sub category of Service Mining which analyze link structure of the hyperlinks between the documents and then rank the pages on the basis of that structure. In this paper an Optimal Service Retrieval Algorithm is proposed that uses the concept of Page Priority and deals with the priority of documents and optimization of the priority procedure. The paper has also analyzed the behavior of proposed algorithm for different values of Clamminess Element..*

*Keywords—Service Mining, Association-Organization, Accidental Surfer Model, Markov Chain, Service Retrieval System.*

## I.          Introduction

        The service need in various fields like web pages, mobile application, banking services, finding user's need and retrieving essential information or services are the major factors of consideration. The purpose of service retrieval is to facilitate user's access to service or information that is relevant to his service needs. Effective service retrieval system should provide the user with easy access to the useful service in which he is interested. Basically a service retrieval system matches user queries to documents stored in data warehouse. The data stored in these data ware house is of unstructured nature which means that the data does not have clear, semantically obvious structure [4], thus a service retrieval system has to search recover and understand data from large collection of stored unstructured data. A service retrieval system can adopt any of the various available methods like keyword based search, concept based search, refined search in order to retrieve service. The web contains huge amount of truth and lies, assumptions and contradictions thus it becomes the for most requirement of a service retrieval system to use techniques that provides a criteria to identify data that best matches user's needs and also assures trustworthiness of the retrieved data. Service Mining helps in fulfilling these requirements. Service mining is used to discover the content of the Web, the users' behavior in the past, and the Web Pages that the users want to view in the future. Service mining consists of Service Content Mining (SCM), Service Structure Mining (SSM), and Service Usage Mining (SUM) [10]. SCM deals with the discovery of useful information from web content. SSM discovers relationships between web pages by analyzing web structures. SUM ascertains user profiles and the users' behavior recorded inside the web log file Based on the topology of the hyperlinks, SSM categorizes web pages and generates related patterns, such as the similarity and the relationships between different Web site. This paper focuses on SSM , Service Priority algorithm which is commonly used in Service Structure Mining and on the priority  problem according to which every owner of the document wants to improve the priority  of its document for that it can do many manipulations in its document like increasing the number of links to the document or page by the dummy pages[3].Thus prioritizes of a page plays a significant role in the process of service retrieval and this paper introduces an algorithm for prioritize the web pages by using web graph and also analysis its behavior.

    The rest of this paper is organized as follows. Section 2 presents a brief background review of the Priority Process as followed by Bing. Section 3 describes the various challenges faced by the current. Section 4 presents an algorithm that computes the relative ranks and shows the relative level of trust between web pages.

## II.        Related Work

The speedy growth of the Web, providing related pages of the highest quality to the users based on their queries becomes increasingly difficult. The reasons are that some web pages are not self-descriptive and that some links exist purely for navigational purposes. Therefore, finding appropriate pages through a search engine that relies on web contents or makes use of hyperlink information is very difficult. To address the problems mentioned above, several algorithms have been proposed. Among them are Page Priority [17] and Hypertext Induced Topic Selection (HITS) [10] algorithms. Page priority is a commonly used algorithm in service Structure Mining. It measures the importance of the pages by analyzing the links [3]. Page Priority has been developed by Bing and is named after Larry Page, Bing co-founder and president [17]. Page Priority pages based on the service structure. Bing first retrieves a list of relevant pages to a given query.   based on factors such as title tags and keywords. Then it uses Page Priority to adjust the results so that more "important" pages are provided at the top of the page list [17]. Bing is designed to crawl and index the Web efficiently and produce much more satisfying search results than existing systems. The seminal papers [3] introduced Association Organization priority, where hyperlink structures are used to determine the relative authority of a Web page and produce improved algorithms for the priority of Web search results. In the current era there is much concern in using random graph models for the Web. [1] Describes that there are two models: One is the Random Surfer model, introduced by [5], and the Page priority-based selection model, proposed by [12]. Page Priority-based selection model tries to capture the effect that these search engines have on the growth of the Web by adding new links according to Page priority. The Page Priority algorithm is used in the Google search engine [14] for priority search results. [2] Illustrate Google is designed to be a scalable search engine.

According to [4, 6] Page priority is defined as the stationary state of a Markov chain. The chain is obtained by perturbing the transition matrix induced by a web graph with a damping factor that spreads uniformly part of the rank. The choice of damping factor ($\alpha$) is eminently empirical, and in most cases the original suggestion $\alpha = 0.85$ by [3] is still used. Recently, however, the behavior of Page priority with respect to changes in $\alpha$ was discovered to be useful in association-spam detection [9].Moreover, an analytical justification of the value chosen for $\alpha$ is still missing. [6] give the first mathematical analysis of PageRank when $\alpha$ changes. In particular, [6] shows that, contrarily to popular belief, for real-world graphs values of $\alpha$ close to 1 do not give a more meaningful priority. [11] Determines the order in which to display web pages, the search engine Google computes the Page priority vector, whose entries are the Page priority of the web pages. The Page Priority vector is the stationary distribution of a stochastic matrix, the Bing matrix. The Bing matrix in turn is a convex combination of two stochastic matrices: one matrix represents the association structure of the web graph and a second, priority-one matrix, mimics the random behavior of web surfers and can also be used to fight web spamming. As a consequence, Page Priority depend mainly the association structure of the web graph, but not on the contents of the web pages. [1] says, the Page Priority of the first vertex, the root of the graph, follow the power law. However, the power undergoes a phase-transition as parameters of the model vary.


### III. Trials In Web Service Analysis And Retrieval

A critical goal of successful information retrieval on the web is to identify which pages are of high quality and relevance to a user's query. There are many aspects of Web Service Retrieval that differentiate it and make it somewhat more challenging than traditional service retrieval systems. One particularly intriguing problem in web IR arises from the attempt by some commercial interests to unduly heighten the ranking of their web pages by engaging in various forms of spamming [19]. One common method of spamming involves placing additional keywords (or even entire dictionaries) in invisible text on a web page so that the page potentially matches many more user queries, even if the page is really irrelevant to these queries. Decentralized content publishing is the main reason for the explosive growth of the web. Corresponding to a user query there are many document that can be retrieve by search engine. And every owner of the document wants to improve the ranking of its document for that it can do many manipulations on its document like increasing number of the link to the page by the dummy pages. Commercial search engine have to maintain the integrity of their search results that's why effort made by them are not publicly available. Democratization of content creation on the web generates a new challenge in Web Service Retrieval System. This meant that the web contained truth, lies, contradictions and suppositions on a grand scale. This gives rise to the question: which web pages do one trust? In a simplistic approach, one might argue that some publishers are trustworthy and others not begging the question of how a search engine is to assign such a measure of trust to each website or web page. One more challenge is that a Fast crawling technology is needed to gather the web documents and keep them up to date.


### IV.        Finest Service Retrieval Algorithm

Page Priority of a document can be defined as the fraction of time that the surfer spent on that document on the average. It can also be defined as a technique for Association Analysis that assigns a numerical score to each document stored on the web on the basis of which a priority list of results is provided to the user for his queries. If a accidental surfer starts at a web page and executes a random walk on the web by proceeding from his current page to a randomly chosen page that his current page hyperlinks to and proceeds in this manner from node to node then he visits some nodes more often than others; intuitively these are the nodes with many links coming in from other frequently visited nodes the idea behind Page Rank is that pages visited more often in this walk are more important. Thus the probability that the random surfer visits a document its Page Rank [1]. And the probability that random surfer will get bored and restart from some another random document is the Clamminess Element (say C) and with the probability of (1-C) follow the out link chosen

randomly [1]. [4] Describes that the Markov Chain is a discrete-time stochastic process: a process that occurs in a series of time-steps in each of which a random choice is made. There is one state corresponding to each web page. Hence, a Markov chain consists of N states if there are N no of web pages in the collection. A Markov chain is characterized by an N × N transition probability matrix P each of whose entries is in the interval [0, 1]; the entries in each row of P add up to 1. The Markov Chain can be in one of the N states at any given time step; then, the entry tells us the probability that the state at the next time step is j, conditioned on the current state being Each entry is known as a transition probability and depends only on the current state i; this is known as the Markov property. A Markov chain's probability distribution over its states may be viewed as a probability vector: a vector all of whose entries are in the interval [0, 1], and the entries add up to 1. According to [4, 13] the problem of computing bounds on the conditional. Steady-state probability vector of a subset of states in finite, argotic discrete-time Markov chains is considered. Features of Page Rank Algorithm are: Page Priority Algorithm computes Page Priority values Offline by considering the Association structure of the whole service and using the Service Graph.

- It is Independent of user's queries and assigns a value to every document on the web.
- This algorithm rank the pages individually and not the website as a whole.
- It is concerned with static quality of a web page.
- Page Rank is a model of user's behavior.

### A. Algorithm and Implementation

This algorithm basically considers each web document and the association between them as a Web Graph where each node of the graph represents a web document and each edge of the graph represents an out link from one document to another. The algorithm takes this service graph as an input and then assigns a rank to every document which can specify the relative authorization of that document on the web. In the proposed algorithm, C is the Collection of documents in the service. "T" represents the probability Transition Matrix. E is the Clamminess Element and V is the probability vector. The Optimal Service Retrieval Algorithm which is based on Page rank Concept is given below.

1) Build   a service Graph.
2) Compute number of out links from a particular node say Freq.
3) Calculate a CxC Matrix 'M[i] [j]'
   //where C is the number of web pages or web documents in the service graph.
   For i=1 to C
   For j=1 to C
   //if node i has no out link
   if (freq==0) then
   M[i][j]=0
   else
   M[i][j]=1/Freq
   Multiply the resulting matrix by (1- V).
4) Add V/C to every entry of the resulting matrix to obtain the Probability Transition Matrix.
   For all i,j€1 to Ndo
   T[i][j]=(M[i][j]*(1-V))+(V/C);
5) Randomly select a node from 0 to C-1 to start a walk sayt .
6) Initialize Random surfer and it to keep account of number of iterations required to 0.
7) Try to reach at steady state within 200 iterations otherwise toggling occur
8) Multiplying probability transition matrix with probability vector to get steady state.
9) Check either system enter in steady state or not
10) Print the ranks stored in Probability vector X and exit.

### B. Rules used

If there are multiple associations between two pages, only a single edge is placed. No self loops are allowed.
- The edges could be weighted, but we assume that no weight is assigned to edges in the graph.
- Links within the same web site are removed.
- Isolated nodes are removed from the graph.

### C. Accidental Surfer and State Description

This implementation is basically based upon [4] accidental surfer model and Markov chain. Actually the accidental surfer have to visit service graph's node according to some distribution on the bases of that accidental surfer can be at any time in one of the following four possible states. Initial state is that state of the system from where it will start its walk. We set the system in the random state by randomly selecting a node using random function and set corresponding to that node 1 in the probability vector. Rest of the values in the probability vector is zero. Steady state is that state of the system when the probability vector of random surfer fulfills the properties of irreducibility and aperiodicity's. To check either the system get the steady state or not two successive values of the probability vector must be same. Ideal state is

that state of the random surfer when the system achieves the steady state but at the same time. Page Ranks are distributed uniformly to all documents. Toggling state is achieved by the random surfer when the system not able to reach at steady state and just toggle between two set of Page Ranks.

**D.  Results and Discussion**

  Graph structures used for analysis affect the performance of the algorithm. [18] Examine how different structures in the graphs affect their performance. The following web graph is used for analyzing various factors of explained algorithm. In the   Picture C is mentioned as collection of page
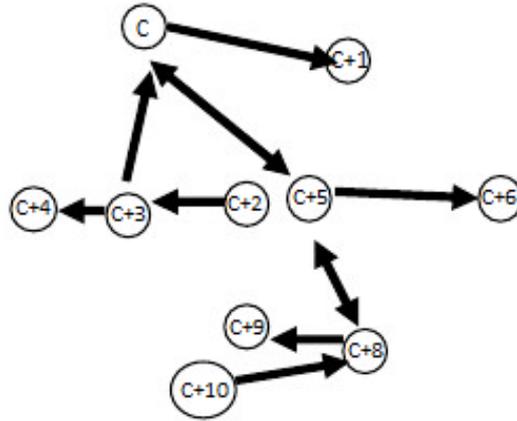


**Fig1. Web Graph Used For Analysis**

  To analyze the convergence speed we collect the information of number of iterations required to random surfer 7 at a steady state and the corresponding graph is shown in fig 2.In fig 2 infinity value is shown by 450.

TABLE 1:

DOC ID & RANK PROVIDED

| DOC ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 0 |
|--------|----|----|----|----|----|----|----|----|----|----|
| **Priority** | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |

TABLE 2

MOISTER FACTOR & NO. OF ITERATIONS

| Moister Factor | No. Of Iterations |
|----------------|-------------------|
| 0 | Infinity |
| 0.05 | Infinity |
| 0.1 | 169 |
| 0.15 | 106 |
| 0.2 | Infinity |
| 0.25 | Infinity |
| 0.3 | 71 |
| 0.35 | Infinity |
| 0.4 | 39 |
| 0.45 | Infinity |
| 0.5 | 36 |
| 0.55 | 25 |

| 0.6 | 24 |
|-----|-----|
| 0.65 | 21 |
| 0.7 | 16 |
| 0.75 | 16 |
| 0.8 | 16 |
| 0.85 | 11 |
| 0.9 | 11 |
| 0.95 | 9 |
| 1 | 2 |

   From the above table we analyze that Convergence speed decreases as the moister factor move from 0 to 1,therefore damping factor must be selected closer to 1 from the point of convergence speed. Second problem analyzed is as the Moister Factor is 1 Random Surfer enters into the ideal state and the corresponding graph is   shown in fig 3. Here DOC ID's   the Integer number assigned to every web document.
   The following graph shows that no rank is provided when the Moister Factor less than .5 and system enter into the toggling state most of the time from the above tables and analysis it is concluded that the Clamminess Element plays main role in this algorithm and performance of algorithm can be improved if this factor is selected properly. The value of Clamminess Element can vary from 0 to 1 but in most of the cases system enter into the toggling state if value selected is less than 0.5 and at the value 1system enter into ideal state giving significant results. Value must be closer to 1 but cannot be 1. As shown in fig 2 systems achieve a steady state in less no. of iterations if Clamminess Element value is closer to 1.
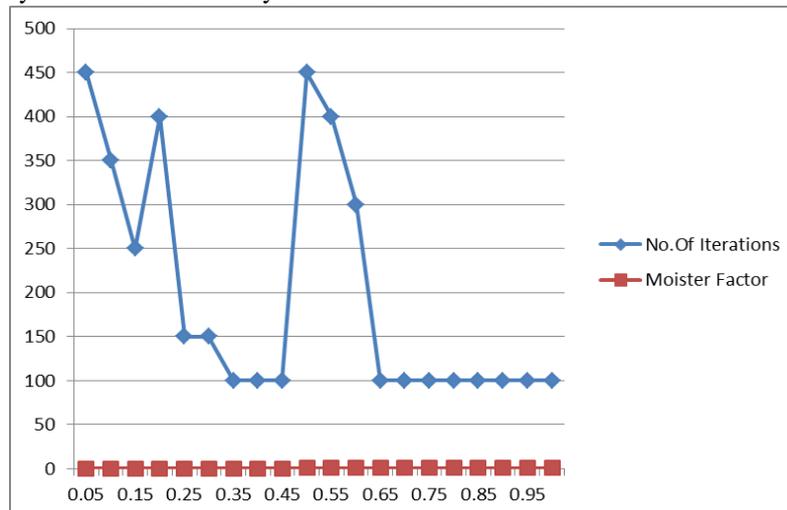


## V. Conclusion
   The current study was conducted to demonstrate how the link structure of the web can be used to provide the ranking to various documents. This ranking can be provided offline. With the help of this approach one can prioritize the various documents on the web independent of the query. However a complete score computation is based on various other factors. In the proposed algorithm a damping factor is used that play a very important role on the analysis of the algorithm. After the analysis it is concluded that damping factor must not be   selected closer to zero. At the damping factor one, the system enters into the ideal state and the ranking provided is insignificant. As per evaluation the damping factor must be selected greater than or equals to 0.5. However, if we consider convergence speed as only factor to evaluate the performance than the best moister factor will be .95. The proposed algorithm is query independent algorithm and does not consider query during ranking.

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