Sixth International Conference on Emerging trends in Engineering and Technology (ICETET'16)
www.ijera.com
ISSN: 2248-9622, pp.21-23

RESEARCH ARTICLE OPEN ACCESS

Website Recommendation for Anonymous Users Using Domain Ontology

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ABSTRACT
Usage of internet is getting increased day by day. From common man to high level business man are using internet for several applications. Web pages can be said as face of the internet. Most of the application's front end will be the web page. The expected webpage has to be easily found by the user. For this purpose web page suggestions are used. Web page suggestions are given to the user based on the analysis of their interest. Their interest in analysed based on the visited page record. Most visited page category will be considered as highly interested category and the related pages will be suggested to the user. The results of the analysed data are called as website knowledge. The proposed system provides the web page recommendation functionality through semantic enhancement by using the website knowledge.
Keywords: Web page Recommendation, Website Knowledge, Semantic Enhancement

I. INTRODUCTION

Web page recommendations are getting important in terms of easy access to the required web page and marketing of the web page. The first of is fully beneficial to the user and the second one is beneficial to both user and the website owner. Most viewed pages at websites are stored to gather the knowledge about the user requirement. There are few issues present in the knowledge gathering process. The wrong clicking of a web page also will be counted by the knowledge gathering unit. This will cause for wrong predictions and can be solved by considering the complete historical data for the analysis. It has been reported that the approaches based on tree structures and probabilistic models can efficiently represent Web access sequences (WAS) in the Web usage data [1]. These approaches learn from the training datasets to build the transition links between Web-pages. By using these approaches, given the current visited Web-page (referred to as a state) and k previously visited pages (the previous k states), the Web-page(s) that will be visited in the next navigation step can be predicted. The performance of these approaches depends on the sizes of training datasets. The bigger the training dataset size is, the higher the prediction accuracy is. However, these approaches make Web-page recommendations solely based on the Web access sequences learnt from the Web usage data. This paper presents a novel method to provide better Web-page recommendation based on Web usage and domain knowledge, which is supported by three new knowledge representation models and a set of Web-page recommendation strategies. The first model is an ontology based model that represents the domain knowledge of a website. The construction of this model is semi-automated so that the development efforts from developers can be reduced. The second model is a semantic network that represents domain knowledge, whose construction can be fully automated. This model can be easily incorporated into a Web-page recommendation process because of this fully automated feature. The third model is a conceptual prediction model, which is a navigation network of domain terms based on the frequently viewed Web-pages and represents the integrated Web usage and domain knowledge for supporting Web-page prediction. The construction of this model can be fully automated. The recommendation strategies make use of the domain knowledge and the prediction model through two of the three models to predict the next pages with probabilities for a given Web user based on his or her current Web-page navigation state. To a great extent, this new method has automated the knowledge base construction and alleviated the new-page problem as mentioned above [2]. This method yields better performance compared with the existing Web usage based Web-page recommendation systems.

II. DOMAIN ONTOLOGY OF WEBSITE

In order to collect the terms, we will: (i) collect the Web domain ontology is defined as a conceptual model that specifies the terms and relationships between them explicitly and formally, which in turn represent the domain knowledge for a specific domain [3]. The three main components are listed as follows [4]:

1) Domain terms,
2) Relationships between the terms
3) Features of the terms and relationships.

2.1 Domain Ontology Construction Steps

The first step is to collect the terms. In order to collect the terms, we have to

1. collect the Web log file from the Web server of the website for a period of time
2. Run a pre-processing unit to analyse the Web log file and produce a list of URLs of Web-pages that were accessed by users,
3. Run a software agent to crawl all the Web-pages in the URL list to extract the titles,
4. Apply an algorithm to extract terms from the retrieved titles
5. The second step is to define the concepts and the third step is to define taxonomic and non-taxonomic relationships.

III. SCHEMA OF TERM NET WP

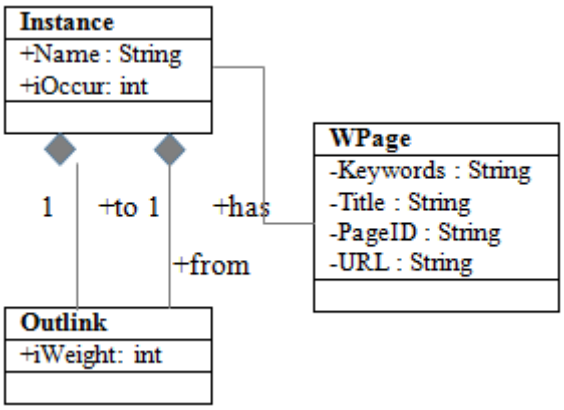

Fig. 1 Term Net WP

As shown in Fig. 1 instance defines domain term. That has two properties, they are name, iOccur and one WPage object property. Occur property defines the number of occurrence. WPage defines Web Page. That has properties like Title, URL, PageID and Keywords in title. Outlink is used to define the in-out relation between two terms.

IV. SCHEMA OF CONCEPTUAL PREDICTION MODEL

In order to automatically construct TermNavNet for a given FVTP, we design the schema of CPM as an ontology schema and implement this schema in the formal ontology language OWL. Its schema consists of classes cNode and cOutLink, and relationship properties between them, namely inLink, outLink and linkTo as shown in Fig. 2, where cNode and cOutLink defines the current state node and the association from the current state node to a next state node, respectively. The class cNode has two object properties inLink and outLink refering to cNode and cOutLink, respectively. The number of occurrence of each cNode object is represented by Occur, i.e. ∂x. inLink represents an association from a previous state node, cOutLink represents an association from the state node to one next state node with a transition probability

V. RESULTS

Consider the following cases to analyse the proposed system. Case 1. Set the threshold of the traditional Web-page recommendation approach using the best Web usage mining (WUM) algorithm, i.e. PLWAP-Mine[5]. The Web-page recommendations are generated based on the PLWAP-Mine algorithm. We refer to this case as the base case. Case 2. Test the effectiveness of the semantic enhanced Web-page recommendation by integrating the domain ontology (Domain onto WP) with Term Nav Net using the first-order CPM. The recommendation strategy is used. Case 3. Test the effectiveness of the semantic enhanced Web-page recommendation by integrating the domain ontology (Domain Onto WP) with Term Nav Net using the second-order CPM. The recommendation strategy is used. Case 4. Test the effectiveness of the semantic

enhanced Web-page recommendation by integrating the semantic network of Web-pages with Term Nav Net using the first-order CPM. The recommendation strategy is used.

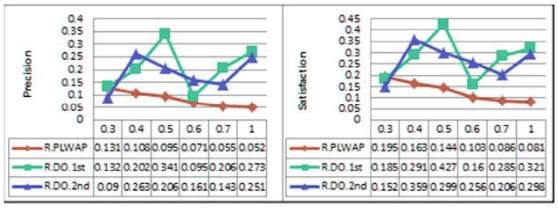

Fig.2. Case 1 - 3 results

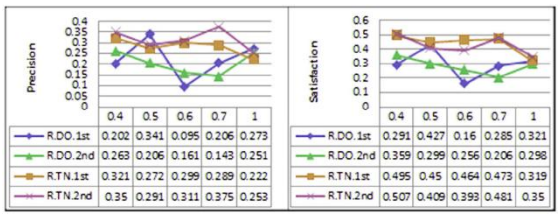

Fig.3. Case 2 - 5 results

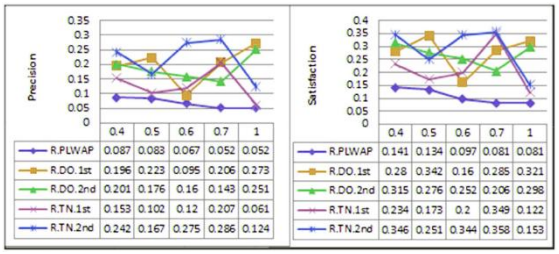

Fig.4. Case 1 - 5 results

Case 5. Test the effectiveness of the semantic-enhanced Web-page recommendation by integrating the semantic network of Web-pages with Term Nav Net using the second-order CPM. The recommendation strategy is used. The results are shown in Fig.2,3 and 4 for the specified cases.

VI. CONCLUSION

The proposed method of this paper suggests a new webpage recommendation method. The recommendations are given by semantic enhancement by knowledge representation method. Two models named ontology based model and semantic network of webpages are used for knowledge representation. The first one is semi-automatic and the second one is automatic. Conceptual Prediction Model (CPM) is also used to integrate the web usage and domain knowledge. As a future work, key extension algorithm can be developed to increase the accuracy of the prediction.

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