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RECOMMENDATION ENGINE (OPEN SOURCE)

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Abstract:

Research paper recommender systems are software applications or systems that help individual users to find the most relevant research papers to their needs or tastes. These systems use filtering techniques to generate recommendations. These techniques are categorized majorly into collaborative-based filtering, content-based technique, and hybrid algorithm. Content-based filtering technique is adopted because of the availability of contents describing the research papers. The research papers were represented as vectors of weights using vector space model and TF-IDF weighing scheme. Cosine similarity was used as the function to compute the degree of similarity between research papers (represented as vectors of weights). In this paper, we proposed a recommendation algorithm based on the past ratings of an active user. The system does not provide recommendations to an active user based on the past ratings of other similar users. Also, this paper presents an experimental implementation of the proposed algorithm.

Keywords: Recommender Systems, Content-Based technique, TF-IDF, Cosine Similarity, Vector Space Model.

1. INTRODUCTION

The capacity of computers to provide recommendations was recognized fairly early in the history of computing. Grundy [1], a computer-based librarian, was an early step towards automatic recommender systems. Content-based recommender systems provide recommendations by comparing the content describing the items and the content describing the interest of the users. It also works by recommending items that are similar to the items a user has liked in the past [4]. The similarity of items is computed or calculated based on the features associated with the items being compared [5]. For example, if a user has liked a paper in the past, and the paper belongs to data mining research area, then the system can learn to recommend or suggest papers from this area. content-based recommender systems use the knowledge of the user's past experience (e.g. items bought in the past in the case of e-commerce) and the knowledge on items in general (items description). This type of recommender systems does not depend on the past ratings of other users to provide recommendations to an active user. Content-based recommender systems use the past ratings of an active user and an appropriate filtering technique in finding relevant or desired items to the intended user. These systems assist users in overcoming the problem of information overload by suggesting or providing recommendations to the users based on their past ratings. users to watch, based on their film preferences and using collaborative filtering. The website bases its recommendations on what the user provides to the website, including films the user likes, and what films other users with similar tastes prefer. When a user joins the website, they are given several randomly chosen movies and told to rate them from one to five stars, five being the best. The system then compares the user's ratings to those of other

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users with similar tastes, and then accordingly recommends films that the user has not yet seen, designed a paper recommendation system. The author used content-based filtering technique as the recommendation technique. The author used Jaccard similarity coefficient to compute similarity between users' query (users' attributes) and the attributes of the papers. The recommendations suggested by the system were sent via email to the intended users.

2. RELATED WORK

Content-based approach is adopted for the design and implementation of the research paper recommendation system based on the past ratings of an active user. This approach does not depend on the ratings of other users but uses the contents describing the items and the users' taste or needs. The researchers used vector space model (as an information retrieval model) and TF-IDF weighing scheme to represent research papers as vectors of weight.

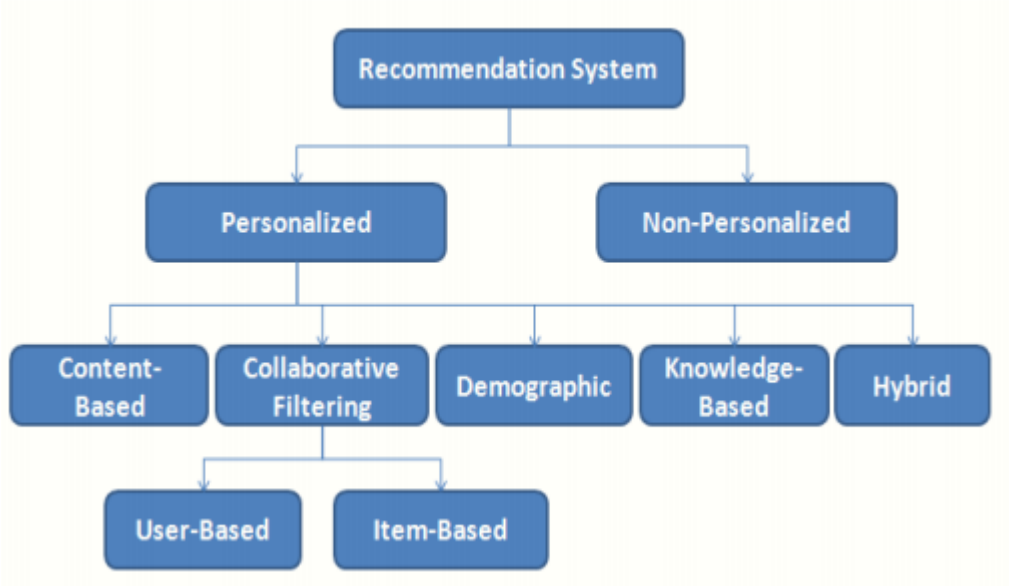

Fig.1.

Cosine similarity was also used to determine the most relevant papers to the papers an active user has liked or rated in the past. designed a paper recommendation system. The author used content-based filtering technique as the recommendation technique. The author used Jaccard similarity coefficient to compute similarity between users' query (users' attributes) and the attributes of the papers. The recommendations suggested by the system were sent via email to the intended users. applied case-based recommendation technique in a restaurant recommender system. The adopted technique was used to select and rank restaurants. It was implemented to serve as a guide to attendees of the 1996 democratic national convention in Chicago and operated as a web utility. designed a group recommender system for Facebook. The authors used hierarchical clustering and decision techniques to suggest or recommend the most suitable Facebook group (s) to Facebook users. He extracted profile information of the Facebook members at University of North Texas and used it as a test data. Most of these techniques are uses approach of Data mining. The process of data mining consist of 3 steps: Data preprocessing, Data analysis and Result interpretation.

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Example of recommendation systems are amazon.com, ebay[2]. Information are retrieve using 2 ways: Search case and recommendation case. In search case used user queries to find out product and in recommendation case used past preference and user purchase history are used to find product.

3. PROPOSED SYSTEM

Content-based recommender systems use the past ratings of an active user and an appropriate filtering technique in finding relevant or desired items to the intended user. These systems assist users in overcoming the problem of information overload by suggesting or providing recommendations to the users based on their past ratings There are two types of users implicit users and explicit users. Implicit users means automatically updates as the user interacts with the system.

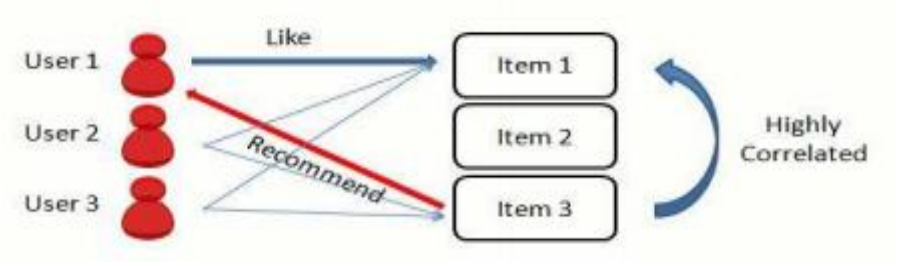

Fig.2

Explicit users means a common feedback technique is the one that allows users to express their opinions by selecting a value of range. The data used by recommendation systems can be categorized into explicit and implicit data. Explicit is all data that user themselves fill into the system. Implicit data source in e-commerce is the transaction data including the purchase information. Implicit data needs to be analyzed first before it can be used to describe user-item ratings. Content-based recommender systems provide recommendations by comparing the content describing the items and the content describing the interest of the users. It also works by recommending items that are similar to the items a user has liked in the past [4]. The similarity of items is computed or calculated based on the features associated with the items being compared [5]. For example, if a user has liked a paper in the past, and the paper belongs to data mining research area, then the system can learn to recommend or suggest papers from this area.

4. ANALYSIS

When a user searches for research papers in the system, the system displays papers based on the query supplied by the user. The user can like or dislike a paper from the ones displayed. When the user likes a paper, a confirmation message is displayed asking the user to confirm the action. If the user clicks on the OK button, the system suggests or generates paper recommendations based on the current paper being liked by the user.Research paper Representation: The research papers are represented by a set of features. These features are: title of the paper, abstract, keywords, publisher, research area, and the authors. Information Retrieval Model: Keyword-based vector-space model (with basic TF-IDF weighing scheme) was used to represent a research paper as a vector of weights, where each weight indicates the degree of association between a research paper and a term or keyword. Cosine similarity is a function that computes the degree of similarity between vectors. This method was used to determine how similar a research paper is to a paper that an active user has liked in the past. Given two research papers pj, pk represented as vectors of weights, The system was implemented using PHP and MySQL technology. MySQl was used to design the database

to store the details of the research papers. PHP was used to implement the above proposed recommendation algorithm.

Fig.3

The proposed recommendation algorithm was implemented in a web-based paper recommendation system. Section "a" presents the test result of the system while section "b" presents how the system works. based on their similarity values. The system displays the recommendations in descending order of their similarity values i.e. the paper that carries the highest similarity value would appear first in the list.

CONCLUSION

In digital libraries, users are presented with too many options from which users choose the ones that are most relevant to their needs or tastes. This leads to information overload i.e. users have too many options. With the help of recommender systems, users are suggested or provided with most relevant recommendations that meet their tastes or needs. This paper presents a paper recommender system that suggests or provides recommendations to the intended users based on the papers the users have liked in the past. This paper adopted content-based filtering technique to generate recommendations to the intended users. The system does not provide recommendations to an active user based on the past ratings of other similar users to the active user.

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