iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** XII **Month of publication:** December 2019

DOI: http://doi.org/10.22214/ijraset.2019.12047

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue XII, Dec 2019- Available at www.ijraset.com

A Survey on Dynamic News Recommendation System via Social Media using Machine Learning Framework

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Abstract: ***Now-a-days people can read news from several sources around the world. This paper investigates a novel user profile model to express users' preferences from different aspects. Then, considers the scope of the user's preferences for historical news, and propose a method to calculate the desire weight of historic news consistent with the user's analysing behaviour and the popularity of news. This method may want to assemble user profiles greater correctly. Additionally, represents a dynamic technique for news recommendation, wherein each short-term and long-term user preferences are taken into consideration. The contribution work is to implement location-aware personalized news recommendation with explicit semantic analysis (LP-ESA), which recommends news using both the users' personal interests and their geographical contexts. The experimental consequences show that BAP technique and LP-ESA technique can fundamentally increase the recommendation outcome.***
Keywords: News Recommendation, Personalization, User Profiling Method, User Behaviour, Location-Aware News Recommendation.

I. INTRODUCTION

The purpose of research is to introduce new ideas through scientific discourse. As more and more journal articles and conference papers are published year by year, it becomes increasingly difficult to identify research articles that are related to one's field of interest. With the digitization of research publications, there has been a move to use computers to augment the search for related news which are relevant to a researcher's field of interest. Such systems are known as research news recommendation systems. A recommender system can be taken as a black box which takes in a profile of a user and matches it against a candidate set of items in order to suggest previously unseen items for a user. These items are considered to be the most relevant recommendations for that user. The existing news recommendation systems can be divided into three categories: content-based recommendation, recommendation based on collaborative filtering, and hybrid recommendation. Content-based recommendation: the recommendation system tries to find news with similar content to the news that the user has read. Content-based recommendation systems are usually easy to implement. However, in some scenarios, the profile of the user with a bag of words is not sufficient to accurately capture the user's preferences. Recommendation based on Collaborative filtering: the system recommends news by users' news ratings, and generally they are content free. Many users do not have sufficient historical behaviours, or the number of users in the system is not high enough, which is known as a cold-start problem. Hybrid recommendations: as discussed above, content-based and collaborative filtering recommendation systems can provide meaningful results, but they have some drawbacks.

This paper proposes a new news recommendation system that extends the user profile to three stages. And we proposed a novel method called BAP [Behaviour And Popularity] to build the user profile. The method gives each historical news a corresponding weight based on user's reading Behaviour And the Popularity of news, instead of 0, 1, or some fixed value. Furthermore, when dealing with short-term profiles, we propose a time function to adjust the user's preferences for all historical news rather than some of it. This helps us construct a more objective and comprehensive short-term profile of the user. The system consists of four main components: news collection and processing, user profiling method, personalized news recommendation and location-aware personalized news recommendation [LP-ESA]. There are some challenges of existing system which are solved in this paper. First, many news recommendation systems, the user profiles are one-sided, and user modelling from a single perspective cannot reflect the real preferences of users. Second, there is not yet a way to assess the degree of users' preferences for historical news. In reality, users' preferences for news are quite different. Thus, treating these historical records equally to analyse a user's preferences is not reasonable. Third, when building a short-term profile, most research studies abandon the relatively early browsing records, or use only a few recent browsing records. This may cause many contingencies and an incorrect understanding of the user's preferences, or the recommendation results will be too similar to what the user just read.

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II. LITERATURE REVIEW

The paper [1] proposes a hybrid method called location-aware personalized news recommendation with explicit semantic analysis (LP-ESA), which recommends news using both the users' personal interests and their geographical contexts. Further proposes a novel news recommendation method, called LP-DSA, to solve the huge dimensionality, sparsity, and redundancy problems in LP-ESA by deep semantic analysis. LP-DSA uses recommendation oriented deep neural networks to extract dense, abstract, low dimensional and effective feature representations for locations, users, and news. Advantages are: LP-DSA overcomes the huge dimensionality, sparsity, and redundancy problems in LP-ESA by using deep neural networks. Increase the news recommendation performance in terms of both effectiveness and efficiency. Reduces the computation cost. Disadvantages are: Need to learn a more effective abstract feature space, to further improve the performance of LP-DSA. In [3] paper, proposes personalized news recommendation, a hybrid recommendation model encompassing content-based (i.e., CB) and collaborative filtering (CF, for short) algorithms that leverages multi-dimensional domain-specific features resided in news to make recommendation. To the best of our knowledge, this is the first work to exploit simultaneously domain- specific and general news features for news recommendation. Proposes a new CB algorithm, utilizing trends feature (domain-specific feature from news) which means that different news categories have different lifecycle and play different roles in acquiring user profiles, and popularity effect (general feature) to improve news recommendation accuracy. Advantages are: The benefits of leveraging domain-specific features from news domain to improve news recommender systems. The hybrid strategy using deviation does better in terms of accuracy and stability than both individual methods and benchmarked hybrid strategies. The improved CF recommendations called FereBSP and FereRBML perform better than corresponding benchmarks. Disadvantages are: Limits the applicability of the proposed method to publishers who manage to track their readers over longer periods of times. A hybrid recommender based on both, user content and collaborative filtering Wesomender framework. Wesomender [7] is comprised of two main components, a collaborative-filtering component and a content-based component. Each component evaluates the news the user has not seen or rated yet, and produces independent recommendations. Advantages are: To generate context-aware recommendations in the journalism field. A context-aware adaptive recommendation engine can fulfill the needs of journalists' daily work when retrieving timely. Disadvantages are: The workload of the other component can need to reduce by using heuristics like eliminating very old news or those where the action occurred too far away to affect the user.

The paper [2] presents a rough set based collaborative filtering approach to predict a missing news category rating values of a user, and a new novelty detection approach to improve ranking of novel news items. An end-to-end system prototype that can take a collection of news articles and the user interest as input and then re-rank the news articles based on novelty and CPCC similarity between the user profile database and common news articles database to provide a personalized news recommendation to the users. Advantages are: Automatically detect the novelty of news items. Efficient approach to automatically detect the missing rating value of an active user. Disadvantages are: Does not work on dynamic community detection. The paper [4] analyzes web server access logs of a large online news publisher to identify readership patterns on the web. In particular, the analysis is done by first developing a model, which can be used to predict most likely articles to be read by a particular user, followed by analyzing what are the most important features and interpreting the learned model. Advantages are: Time window selection can have a significant impact on the accuracy of predictions. Disadvantages are: The inclusion of Users feature, which is computationally the most expensive. In [6] paper, proposes PENETRATE, a novel Personalized News Recommendation framework using ensemble hierarchical clustering to provide attractive recommendation results. Our proposed framework is beyond content-based methods and collaborative filtering, in which individual user behavior and user group behavior are simultaneously considered for recommendation. Advantages are: Improved accuracy and efficiency. Disadvantages are: Time consumption is high. The paper [5] represents the effect of user interest evolution when modelling user profiles, and represents the user's reading preference with seamless integration of long-term and short-term user profiles. Construct a two-stage news selection strategy, where the long-term profile is firstly utilized to differentiate news groups with specified preference, and then the short-term profile is applied to filter specific news articles to individual users. Advantages are: The short-term one is able to capture the recent/current user preferences over fine-grained news topics. To introduce more diversity in order to expand the user's reading interest.

The paper [8] proposes a scalable news recommendation method to solve the problems, including the multi-dimensional similarity calculation method, the Jaccard–Kmeans fast clustering method and the Top-N recommendation method. The multi-dimensional similarity calculation method computes the similarity between users combining abundant content feature of news with the behavior and time feature of users, solving the data sparsity problem in traditional collaborative filtering. Advantages are: The proposed scalable recommendation method can solve the scalability problem effectively. It reduces the negative effect of data sparsity, and increases the quality of news recommendation. Disadvantages are: This paper represents only content based recommendation not

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collaborative filtering. The paper [9] is to develop a Web content recommender system. A user's long term interest and preference models are constructed based on the user's navigational history and integrated with the recommender system. The similarity between Web content and the user's models is used to determine whether the content will be provided to the user. Advantages are: It provides an autonomous navigation model that is able to relieve Web users from repetitive and tedious Web surfing, auto-classifying Web pages and improves the efficiency. In [10] paper presented two approaches that take into account the meaning of words. The methods are based on concepts and their semantic similarities, from which derive the similarities between news items. First method, Synset Frequency - Inverse Document Frequency (SF-IDF), second method, Semantic Similarity (SS). The proposed approaches to news item recommendation have been implemented as Ceryx, an extension to the Hermes News Portal news personalization service. Advantages are: Performs statistically better than TF-IDF.

The existing news recommendation systems can be divided into three categories: content-based recommendation, recommendation based on collaborative filtering, and hybrid recommendation. Content-based recommendation: the recommendation system tries to find news with similar content to the news that the user has read. Content-based recommendation systems are usually easy to implement. However, in some scenarios, the profile of the user with a bag of words is not sufficient to accurately capture the user's preferences. Recommendation based on Collaborative filtering: the system recommends news by users' news ratings, and generally they are content free. Many users do not have sufficient historical behaviours, or the number of users in the system is not high enough, which is known as a cold-start problem. Hybrid recommendations: as discussed above, content-based and collaborative filtering recommendation systems can provide meaningful results, but they have some drawbacks.

A. *Disadvantages Are*

1) First, many news recommendation systems, the user profiles are one-sided, and user modeling from a single perspective cannot reflect the real preferences of users.
2) Second, there is not yet a way to assess the degree of users' preferences for historical news. In reality, users' preferences for news are quite different. Thus, treating these historical records equally to analyze a user's preferences is not reasonable.
3) Third, when building a short-term profile, most research studies abandon the relatively early browsing records, or use only a few recent browsing records. This may cause many contingencies and an incorrect understanding of the user's preferences, or the recommendation results will be too similar to what the user just read.

III. PROPOSED SYSTEM OVERVIEW

This paper proposes a new news recommendation system that extends the user profile to three stages. And we proposed a novel method called BAP to build the user profile. The method gives each historical news a corresponding weight based on user's reading *B*ehaviour *A*nd the *P*opularity of news, instead of 0, 1, or some fixed value. Furthermore, when dealing with short-term profiles, we propose a time function to adjust the user's preferences for all historical news rather than some of it. This helps us construct a more objective and comprehensive short-term profile of the user. The system consists of four main components: news collection and processing, user profiling method, personalized news recommendation and location-aware personalized news recommendation

A. *Recommendation Frameworks*

1) *News Collection and Processing*: There are three phase profile model for news. First phase, crawl the news from the Twitter API and extract keywords from news using vector space model. Second phase, extract topics by using NLP model with the help of LDA algorithm. Third phase, to identify the named entities.
2) *User Profiling*: The profile of user is composed of four stages with help of user's browsing or reading history. The first stage represents some of the news keywords in which the user is interested. The second stage represents the topic distribution of the user's preferences. The third stage represents the named entities in which the user is interested. And fourth stage represents the users' news preferences usually includes with the change of their Geo-graphical locations. In this paper, the user's reading behavior is divided into several types by analysis. User's reading behaviors, popularity and location wise weight of the news calculated.
3) *Dynamic Personalized News Recommendation using BAP*: Recommend news by using the long-term and short-term preferences of users. A time-sensitive function is proposed to construct the short-term profile by adjusting the long-term profile of the user. After calculate the similarities between every news and profile of the user. And finally, the rank results of the long-term and short-term preferences, the news recommendation of the long-term and short-term profiles are retrieved.

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4) *Location-Aware Personalized News Recommendation With Explicit Semantic Analysis [ESA]*: A hybrid news recommendation method, called LP-ESA, which takes into account both the user's current location and also his/her personal interests. LP-ESA collects a set of geo-tagged documents for a given location, and estimates a local topic distribution using *given location's* geographical topics. LP-ESA models a localized user profile for each user at location according to both general user profile and local topic distribution. Finally the news recommendation provides to the user.

B. Advantages Are

1. The profiles of users can be constructed more accurately with BAP method.
2. This system provides a high quality of dynamic recommendation results with the short-term and long-term preferences of users.
3. LP-ESA significantly outperforms the state-of-the-art topic-based location-aware news recommendation methods.

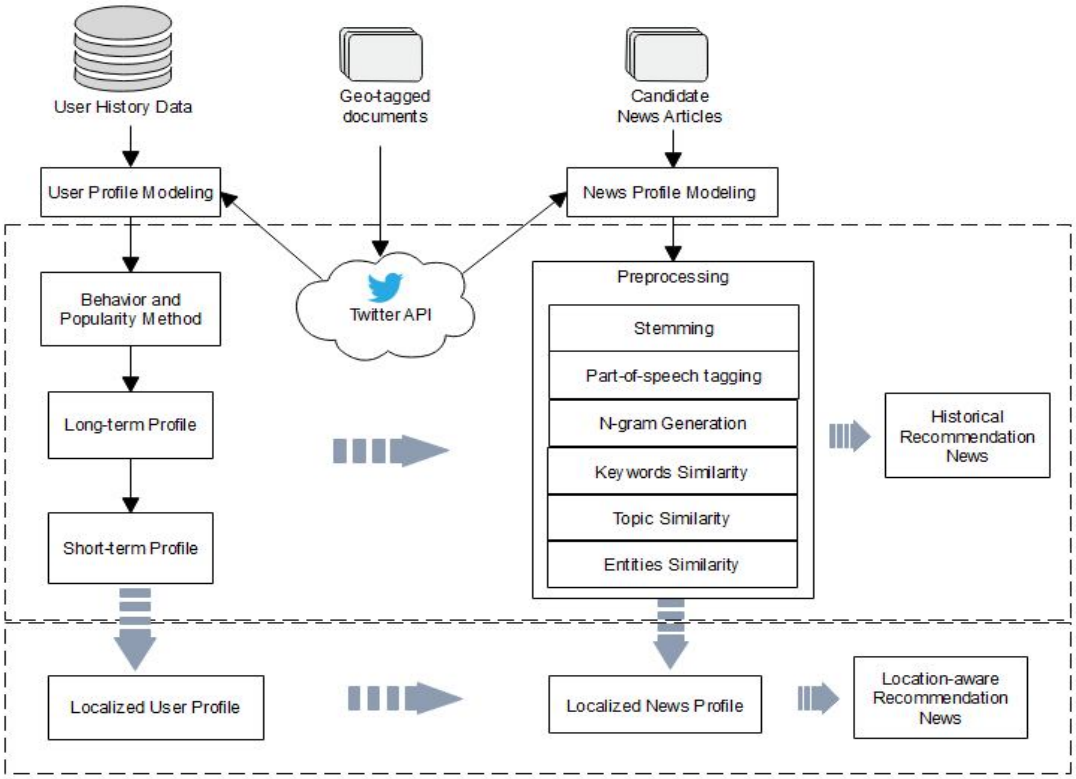

Fig.1 Proposed System Architecture

IV. CONCLUSIONS

In this paper, the BAP user profiling method is proposed to calculate the user's preference for the news based on user behavior and news popularity. The profiles of users can be constructed more accurately with this method. This system can provide a high quality of dynamic recommendation results with the short-term and long-term preferences of users. The contribution work is a location-aware personalized news recommendation with explicit semantic analysis (LP-ESA) which considers both the users' location information and personal interests for news recommendation. Experimentally, performance analysis of both BAP method and LP-ESA news recommendation system performs well. For future work, to increase heterogeneity of the recommendation outcomes and elaborate more preferences of users and also improve the quality of user experience.

V. ACKNOWLEDGMENT

Express my true sense of gratitude, sincere and sincere gratitude to my guide to the project Prof. Pathan N. J. Sir for his precious collaboration and guidance that he gave me during my research, to inspire me and provide me with all the laboratory facilities, this it allowed me to carry out this research work in a very simple and practical way. I would also like to express my thanks and thanks to our HOD S. R. Tandale sir and all my faculty members as well as friends who, knowingly or unknowingly, helped me during my hard work.

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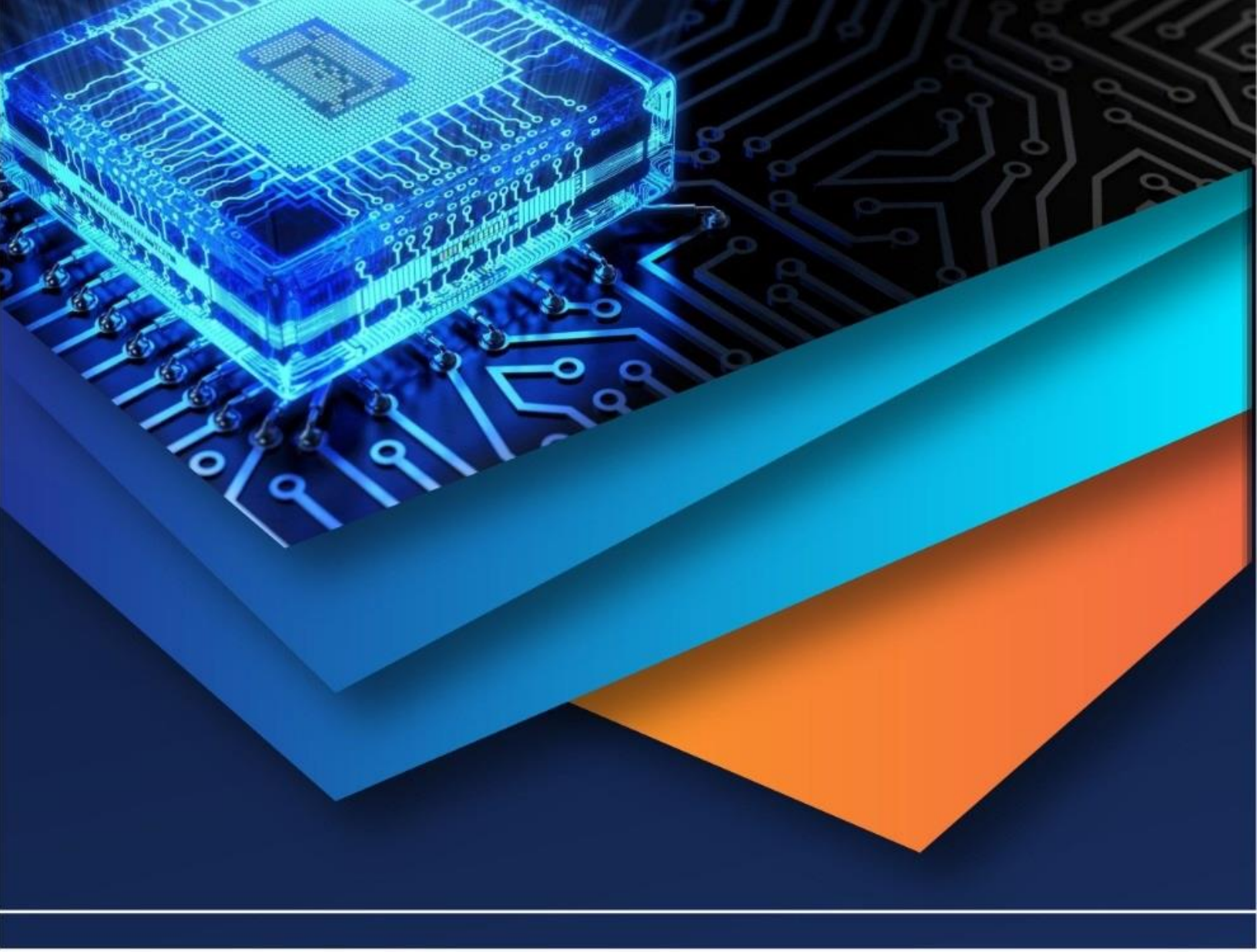

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