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Mobile Search Engine Personalization Enhanced with Recommendation System with an Impact of Affect Analysis

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ABSTRACT

As the amount of web information grows rapidly, we propose a personalized search engine with an affect analysis. In this paper, we propose a new web search personalization which recommends the user with the additional information about the content they searched. It gives the user knowledge about the content which they never knew. The user preferences are organized in ontology based, multifacet user profiles, which are used to adapt a personalized ranking function for rank adaptation of future results. To recommend the users with additional information we have to analyse the other user's click through data. Based on the client - server model, we also present a detailed architecture and design for implementation of personalized mobile search engine with an impact of affect analysis. We prototype PMSE on the google android platform. Experimental results show that PMSE significantly improves the precision comparing to the baseline.
Keywords: Personalization, ontology, rank adaptation.

I. INTRODUCTION

Search engine is the interface between the database and the user. It will retrieve the data queried by the user from the database. As the form factors present in mobile is very small and the web search among people grows rapidly there emerged a technique known as personalized mobile search engine. PMSE uses two different techniques such as content concept and location concept. The user profile will be updated according to the weight of the concepts. Based on the user search behavior the reranking will be done. We have proposed an additional feature which is based on the recommendation system. Recommendation system will provide the user with the additional information for their knowledge. Based on the click through data of different user from the past activities the recommendation will be given. For example: If an user search for a hotel in a particular area it will gives the information about the hotels in that particular area which the user have not tried .The recommendation is grouped according to the age. In order to implement the recommendation system we have used the content based filtering algorithm. This algorithm constructs a recommendation on the basis of a user's behavior. For example, this approach might use historical browsing information, such as which blocks the user reads and the characteristics of those blocks. If a user commonly reads articles about Linux or is likely to leave commands on blocks about software engineering, content based filtering can use this history to identify and recommend similar content.

Literature Survey

[1] This paper explains that user profiling is a fundamental component of any personalization applications. Most existing user profiling strategies are based on objects that users are interested in (i.e., positive preferences), but not the objects that users dislike (i.e., negative preferences).

[2] In this paper, we focus on search engine personalization and develop several concept-based user profiling methods that are based on both positive and negative preferences. Experimental results show that profiles which capture and utilize both of the user's positive and negative preferences perform the best.

[3] In this paper they explained ontology as a model for knowledge description and formalization is used to represent user profile in personalized web information gathering. While representing user profiles many models used a global knowledge bases or user information for representing user profiles.

[4] In this paper they implemented Rank Net to learn users clicking and browsing behavior from the click through data. And some authors proposed a spying technique on data, which combines with a novel voting procedure to determine user's document preferences from the click through data.

[5] A natural approach is to incorporate implicit feedback features directly as features for the ranking algorithm. During training or tuning, the ranker can be tuned as before but with additional features. At runtime, the search engine would fetch the implicit feedback features associated with each query-result URL pair.

[6] In this paper they proposed to automatically extract a user interested topics from the user's personal documents (e.g. browsing histories and emails). The extracted topics are then organized into a Hierarchical User Profile (or simply called HUP in subsequent discussion), which is to rank the search results according to the user's topical needs.

[7] This paper tells that Support vector machine (SVM) is used for learning retrieval functions. The can effectively adapt the retrieval function of a meta-search engine to a particular group of users, outperforming Google in terms of retrieval quality after only a couple of hundred training examples.

II. METHODS AND MATERIAL

A. System Architecture

The system architecture is shown in Fig 1.
It comprises six modules:

1) User Information Settings Module.
2) Ontology and Location Information Feeding.
3) Spatial Information Search Module.
4) Ontology Search Module.
5) User Feedback Amend Research Module.
6) User Preference Search Module.

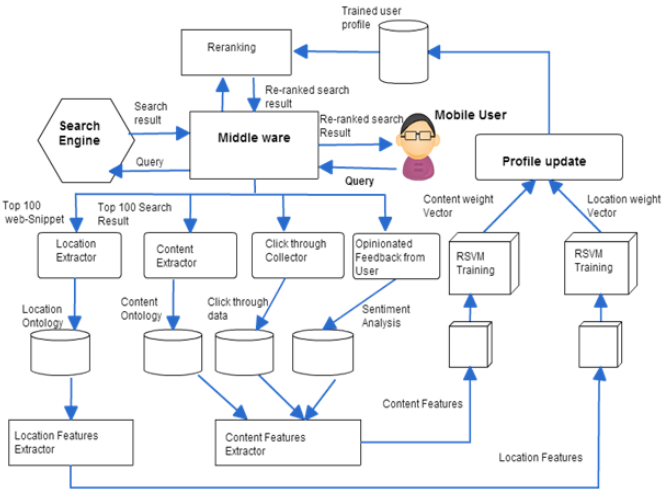

Figure 1: The system architecture is shown in

B. System Description

The major functional components are briefly described below:

1. User Information Settings Module

In this module, the basic profile information of the users such as name, age, gender, location is received.
This information is considered mining the user interest as well as to prefer future user of the personalized search engine. The User Information List stores information about a user by having some metadata set up for the user. Some examples are Picture, Email, Display Name, Login Name etc. User profile is one among the four context profiles managed by proxy client. Device profile, environmental profile and data profile are the other context profiles.

2. Ontology and Location Information Feeding Module

Ontology is a grammatical vocabulary defined as a set of words that drives similar meanings. In this module, a set of ontological information is fed into the system in order to satisfy the user request efficiently. It tracks the similar and relevant words based on the ontological algorithm, and stores in the database for fetching the results to the request of the user. Spatial information for the business data is also gathered in this module and location information of the business data is stored in a database.

3. Spatial Information Search Module

Spatial search allows taking data that has a geographic location & enhancing the search results by limiting them

to a physical area. In this module, the geographical locations are searched and it provides the user's habitat location preference results.

Spatial data known as geospatial data or geographic information it is the data or information that identifies the geographic location of features and boundaries on Earth, such as natural or constructed features, oceans. For the requested query this search will fetch the content details of those location details are nearer to the user location.

4. Ontology Search Module

Ontology is a grammatical vocabulary defined as a set of words that drives similar meanings. In this module, the search results are produced according to the similar meaningful word of the search keyword.

The link provided is according to the meaning of the keyword requested as well as the ontological meaning of the keyword.

5. User Feedback Amends Research Module

User feedbacks are often known to be the opinion of the individual person on individual products or service. In this module, the feedback from the users are gathered in order to analyse the opinion of the individual about the product or service thereby to map it with other users with similar interests and comes under same age and gender category. Were the search result is based on the opinion of the already used individual comes under the same category of age and gender.

6. User Preference Search Module

This module retrieves more relevant information for the users, personalized search engines by creating user profiles, recording the user's preferences which are used to adjust the search results according to the users' needs.

III. RESULTS AND DISCUSSION

A user runs the PMSE app implemented in the android mobile and registers an ID with his/her user name & password. Once the registration procedure completed and the submit button is pressed the user is moved to login window as shown in Fig 2.The user who complete the authentication procedure after the login button is pressed is moved to the activity screen where the user can search for his/her personalized information as shown in Fig 3 The search input window shown in Fig 4 allows the user to utilize different types of search options like Ontology search, spatial search, user preference search and user feedback search for his/her query.

Ontology search: To retrieve ontology information for the search query.

Spatial search: Search result is based on spatial coordinates

User preference search: Result based on the feedback of the same user.

User feedback search: Result based on the feedback of the same category users.

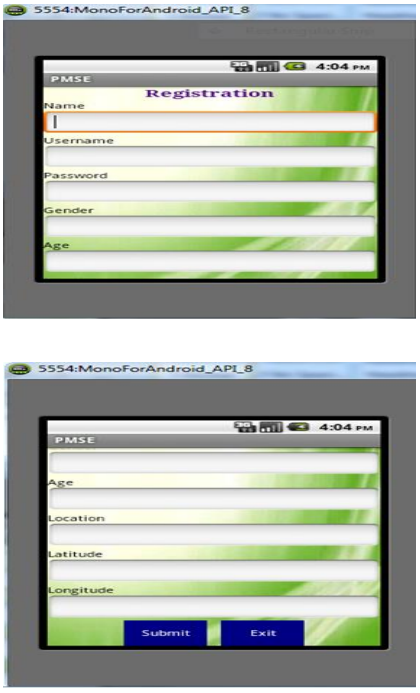

Figure 2: User registration window

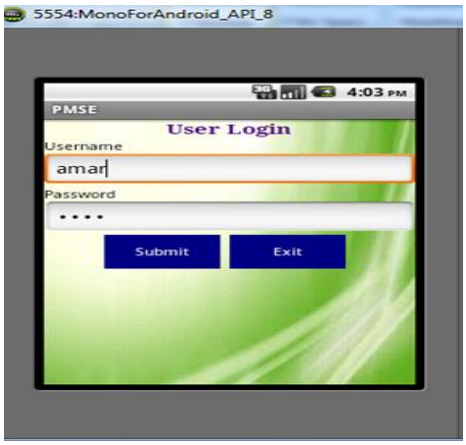

Figure 3: User Authentication window

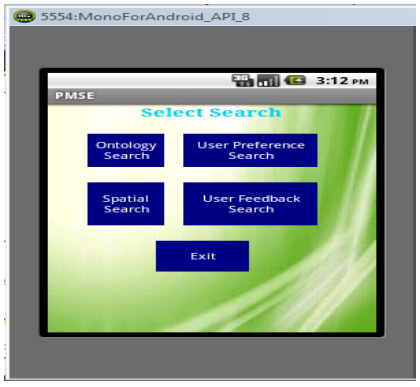

Figure 4. Different search window

Result Scenario:

The Location details of this example scenario are based upon Chennai region, which is in the southern part of India.

Table-I: Profile, details of two PMSE users from Same Location

User name	Age	Gender	Current location	Location Coordinates
John	28	Male	Anna Nagar (Chennai)	13.0846Lat /80.219 Lon
Sham	26	Male	Anna Nagar (Chennai)	13.0846Lat /80.219 Lon

John a PMSE (Personalized Framework) user his profile details are shown in Table-I is searching for a hotel from a new location he travels to example Anna Nagar (Chennai). But their available only restaurants in the majority, generally a typical search engine will display any other restaurant information located somewhere else from its current location because it can't classify ontology information in the web database. Were as an ontology search option in PMSE can Understand the relationship between restaurants and hotel and it will display both the restaurant details and hotel details closer to his/her current location as shown in Fig 5. Similarly, john search for theatre and shopping mall, etc. using other search options and allowed to give feedback in the form of ratings from (1-5) as shown in Fig 6.

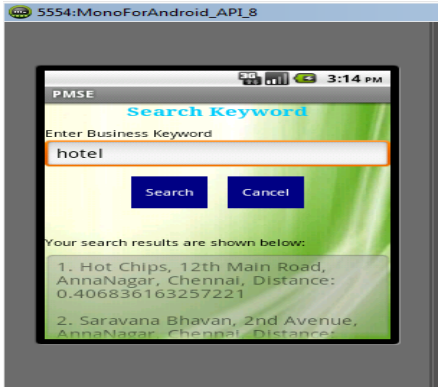

Figure 5. Ontology Search Result

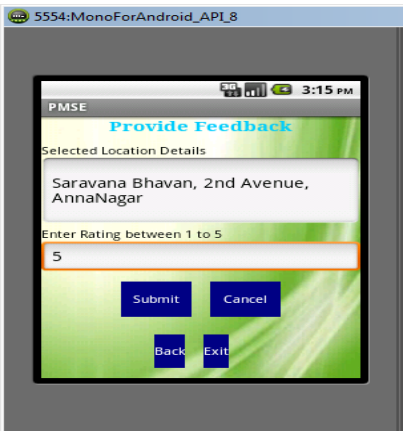

Figure 6. Rating for the search result

If John prefers spatial search he will get the result based only on location preference, i.e. the result will focus only on the coordinates of the user and location details of the query result. By calculating relative distance between these coordinates, shortest distance data is fetched for the user.

Table-II: User john's search result for his queries and his ratings for the search result

User	Search Query	Search Result	User ratings
John	Hotel	Hotel Saravana Bhavan (Anna Nagar) KFC Restaurant (Anna Nagar) Marry Brown (Villivakkam)	- **5** -
	Theatre	PVR cinema (Anna Nagar) AbiramiTheatre (Purasaiwalkam) AGS Cinemas (Villivakkam)	- - **5**
	Shopping Mall	SKY WALK (Anna Nagar) BIG BAZAR (Nungambakkam) MEGA MART (Arumbakkam)	**5** - -

Table-II shows user john's search interest and the corresponding ontological result of his search based on his current location. Since John is interested in KFC restaurant located in his current location he rated 5 for it's similarly he is interested in a theatre in villivakkam is the place near to his current location and he rated 5 for it and same for shopping mall too. With this rating Johns' interest is gathered in user profile and used for future queries. Next time when John login for a hotel search he can prefer user preference search which shows the information that John rated already with the top score.

Table-III: Opinionated result on top based upon the interest of the same category user

User	Search Query	Search Result	User ratings
Sham	Hotel	KFC Restaurant (Anna Nagar)	**5**
		Hotel Bhuari (chrompet)	-
		Hotel Saravana Bhavan (Anna Nagar)	-
		Marry Brown (Villivakkam)	
	Theatre	AGS	-
		cinemas(Villivakkam)	**4**
		Inox (Mylapore)	-
		EA pictures (Parris)	-
		Raki(Chrompet)	-
		Mayajal screens(OMR)	

As shown in Table-III sham, another user from Johns location is using the feedback based search option for his search query. This time sham will get opinionated results for his hotel query based on the opinion of already used individuals who come under the same category such as age and gender.

IV. CONCLUSION

This research work proposed a user feedback mechanism with the existing personalized mobile search engine. The categories such as Ontology based mining, location based mining used in the existing system are also used in this proposed work to full fill the user request. Using the feedback and rating of already used individuals the information will be provided in the request of the user after mining under categories. Hence the proposed system provides users with feedback based search were opinionated result is obtained based on the feedback of the similar interest user comes under same age and gender category. Experimental results confirmed that the user feedback mechanism in the proposed work can provide users with best and valuable information.

As a future enhancement clustering the similar interest users based on ratings can be made more accurate by grouping them under categories like similar degree, hobbies, Car or Bike owned etc. This additional information is gathered in user profile during user registration. Along with the opinionated result a recommendation system can be developed which predict the item set the user may interest (On the assumption that user with same opinion may have same interest) for a particular search.

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