

# Dashboard Design for Happy Hours and Their Deals Recommendation System

Ms. Rashmi Jangale<sup>1</sup>, Prof. Sujata Khedkar<sup>2</sup>

<sup>1</sup>Post Graduate Student, Dept. of Computer Engineering, Vivekanand Education Society's Institute of Technology, Mumbai, India

<sup>2</sup>Professor, Dept. of Computer Engineering, Vivekanand Education Society's Institute of Technology, Mumbai, India

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**Abstract** - Happy Hours is a time-limited offer strategy which attracts people by providing maximum discounts. People are not aware about these offers going in their nearby areas because of their busy schedule. Mobile device is ubiquity available with customers everywhere and all the time which can help in personalizing advertisements with the help of spatial information and various other parameters. Existing systems that provide context-aware personalized information neither determine the limit for the chosen advertisement from the subscriber nor the time at which it must be delivered. Also they use SMS to notify users about advertisements which has a lot of limitations. Traditional systems use request-response pattern where user needs to always submit query which ultimately degrades user experience. Also they do not consider number based coding for POI's on map based on ranking. Our proposed system considers all of the above issues and leverage the strengths of proactive(push) recommendation and context-aware personalized dashboard for Happy Hours and their Deals recommendations.

**Key Words:** Proactive recommendation Model, Context-aware Personalized Dashboard, Visualization.

## 1. INTRODUCTION

Happy Hours is a time-limited offer strategy which attracts people by providing maximum discounts. Although people are benefitted by such offers, most of the time they are not aware of it and also do not get proper information on it. Newspapers, banners, television and radio which are among the traditional mass media for advertising are restricted to be available only in certain areas as banners in streets, televisions at homes, etc.

For that Internet introduced in marketing to solve the issue of one-way communication, customers can interact with service and product providers on the same media. But it is not available everywhere. Internet segment targeted market but it can't personalize advertisement. When mobile market growth and almost every person own one, marketing researchers found that using mobile phones the best solution in marketing. Mobile device is ubiquity, available with customer everywhere and all the time, facilitate feedbacks and the most important thing is that it helps

marketers to personalize their advertisements when spatial information about customer received as location, preferences and attitudes.

Existing recommendation systems usually follow a request-response pattern, where users need to submit queries and the systems, then return item suggestions. As a result of this, users get many results and find it difficult to browse through them which ultimately degrades user experience. In mobile environments, user experience could possibly be improved by delivering recommendations without any user request or query.

Pro-activity means that the system pushes recommendations to the user when the current situation seems appropriate. Thus, how to present recommended items and possibly notify users is a main issue. Some systems use SMS to notify users about advertisements and as we know there are lots of limitations with SMS considering its size and attractiveness.

Existing systems either takes restaurant ratings or the deal ratings as feedback. They even do not provide facility to user to choose distance limit for the recommendations and to set notification time for getting notifications. Also they do not provide color coding based on ranking results for the point-of interest's on map.

Our proposed system for Android mobile application takes care of all of the above issues and not only helps the users to take benefit of the Happy Hours going on in Restaurants but also the deals they are offering. Our approach is leveraging the strengths of proactive recommendation and context-aware personalized recommendation. In addition our application inherits better visualization for recommendation which is more user-friendly.

## 2. RELATED WORK

Mobile Advertising Using Location Based Services (MALBS) System developed based on main mobile characteristics as ubiquity and interactivity[1]. MALBS adopted SMS as the main marketing communication method because all mobile devices support it. However, SMS has limitations in terms of size, attractiveness, etc, people hardly go through the SMS and just ignore it. MALBS uses ranking algorithm for which it considers parameters like distance between subscriber

location and publisher location, subscriber preferences information and the time left till advertisement ends. However, there are even other parameters like ratings, discount which can be considered to improve the accuracy of the results. Also, this model uses liner law for calculating distance between advertisement location and customer's location which does not gives exact distance.

A great variety of research and practical applications exist in the area of recommender systems and context-awareness especially in the mobile guides field[2] or the shopping domain[3]. However, proactivity has not gained much attention in personalization and recommender system research. Most systems require the user to perform some kind of action to trigger the generation or retrieval of recommended items. e.g. Happy Hours India[4] . It is the work of small group of friends who have made it their mission to provide us with the most up-to-date happy hour information with the best deals on happy hours & buffets (Food and drinks )anywhere in our city. User has to select the location and then the application gives details about the restaurants and bars which offers Happy Hours. Also the interface designed for this application is nit user-friendly.

Daniel Gallego et al. [5] in 2011 has designed a two-phase proactive model for mobile recommendation systems. In the first phase, the system determines whether or not the current situation warrants a recommendation. The second phase deals with evaluating the candidate items.

Daniel Gallego et al. [6] in 2011 has designed two options for the user interaction with a proactive recommender: a widget- and a notification-based solution. In addition, our user interface includes a visualization of recommended items and allows for user feedback.

Daniel Gallego et al. [7] in 2012 proposed a model for generating proactive recommendations in e-Learning systems incorporates contextual information to assess whether a recommendation is suitable in a given situation. It also evaluates which learning objects from ViSH are interesting for the user that is being recommended.

K.Kiran Kumar, P. Deepika, R.Jaya Lakshmi, S. Manjunganacitra et al.[8] in 2014 presents an Intelligent Context-based Mobile Advertising System based on the location and priority of the user which will display advertisements based on the location selected by the user and also the priority which is set by the user.

Sonny Pradipta, Sri Krisna Endarnoto, James Purnama, Anto S. Nugroho, Franciscus C. Pawitra et al.[9] proposes an advertisement system integrated to an Android online traffic map mobile application, which utilizes Google Map API. When user uses the RSS reader, the browsing history will be collected and send to server to be analyzed by user profiling engine. User interest will then be extracted and save to database. Once user utilizes the map feature to generate

route, the system will automatically fetch advertisements that are: i) located along the route, and ii) suited user interest.

### 3. PROPOSED SYSTEM

#### 3.1 System Architecture

Our Happy Hours and their Deals Recommendation System for Mobile Advertising basically consist of two 3 parts: 1) Admin who manages the system through Web Application 2)Retailer Web Application where retailers publish the happy hour deals and 3) Customer Mobile Application where customer get the information on happy hour deals through push and pull strategy which uses the recommender system.

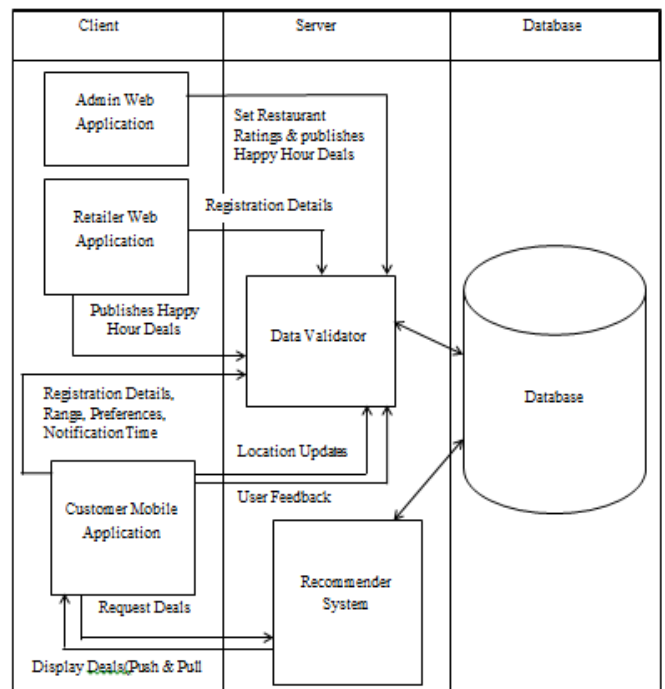


Fig -1: Architecture model of Happy Hours and their Deals Recommendation System for Mobile Advertising

Admin has designed the system for 7 food categories(Indian, Chinese, Refreshments & Drinks, Pizza, Seafood, Fastfood, Desserts) and some subcategories for each category like for desserts, subcategories are ice-cream, cakes, pastries. Amin gives rating to restaurant. Admin can even publish the happy hour deals.

Retailers in the system are the restaurant people who are incharge publishing the happy hour deals. In order to publish the deals each retailer register into the system through system web application. While registration he is required to fill his personal details as well as restaurant details (name, address,etc) and create his account. Retailers add the happy hour deals and its details (start date, end date, start time, end time, days of offer, discount, price).

Customer registers(name, username, password, email\_id, address, mobile no., age, distance range, notification time) into the system through android mobile application which needs to be installed. Through the application, customer sets his preferences for categories and subcategories for recommendation. From the mobile device, location updates of the user are tracked based on which happy hour deals are recommended. In pull strategy, as customer opens the application he can see the happy hour deals based on the distance range specified in the profile, location, current day and time. He can even edit the range if no deals are found. In push strategy, customer gets happy hours deals information via notification based on the notification time specified in the profile. Customer can give feedback to happy hour deal as well as restaurant in terms of quality and service rating.

Customers can view the happy hour deals in List View and Map View. Map View utilizes number based coding for the ranking results. Dashboard tab shows an overview of the current deals in their location within their specified distance in pie-chart and also shows preferred and trending deals.

### 3.2 Proposed Recommendation Algorithm

Our recommendation system consists of push and pull marketing strategies. Push Strategy consists the following 3 phases while pull strategy consists of only 2 phases (phase 1 and phase 3).

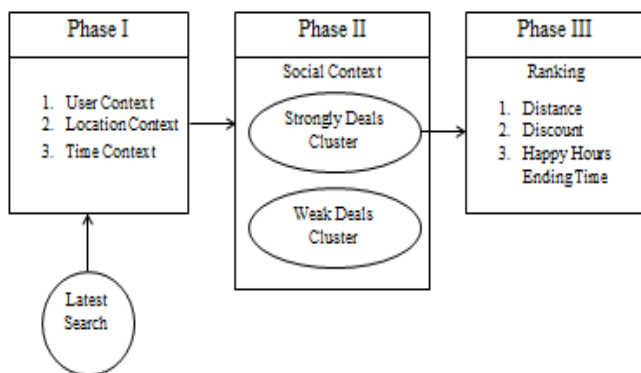


Fig -2: Happy Hours and Deals Recommendation System for Mobile Advertising

#### PHASE I:

In this phase, we have three context i.e., User Context, Location Context and Time Context.

- **User Context:** Preferences of the customer which they have set in mobile application are considered. Also preferences based on their latest search for past 1 month and through demographic filtering which considers age parameter are identified.

- **Location Context:** The range set by the user, i.e. the distance between the restaurant place and the customer's place is considered.

- **Time Context:** Happy Hour deal's validity and current day is taken into account.

To some extent we can say that our system uses knowledge based filtering.

#### PHASE II:

In this phase, Social Context i.e., the ratings given by customer to restaurant in terms of food and service quality, rating given by admin to restaurant and rating given by customer to happy hour deals are considered. Strong Deal and Weak Deal Clusters are formed based on the scores obtained from the following equation:

$$\text{Score(S)} = \text{Restaurant(AminRating)} + \text{Restaurant(avg(Customer Food Quality Rating))} + (\text{Customer Service Quality Rating}) + \text{Deal(Customer Rating)}$$

K means algorithm is applied on the scores obtained and we get Strong Deals and Weak Deals Clusters. Results of Strong Deals Cluster go to the Phase III.

#### PHASE III:

This is a Ranking Phase, where the results of Phase II are ranked based on Distance, Discount & Happy Hours Ending Time. The distance between the restaurant and customers is calculated. The results are then ranked based on smallest distance. Then if deals are at the same distance then they are re-ranked based on largest discount and if deals are having same distance and discount the again they are re-ranked based on ending time of happy hours.

### 4. EXPERIMENTAL SETUP AND RESULTS

Dashboard Design for Happy Hours and Deals Recommendation System consist of Web Application and Android Mobile Application. Web application is implemented in PHP and Android Mobile Application is built on operating system version 4.3.

Retailer registers into the system through web application as shown in fig-3. and publishes the happy hour deals as shown in fig-4.

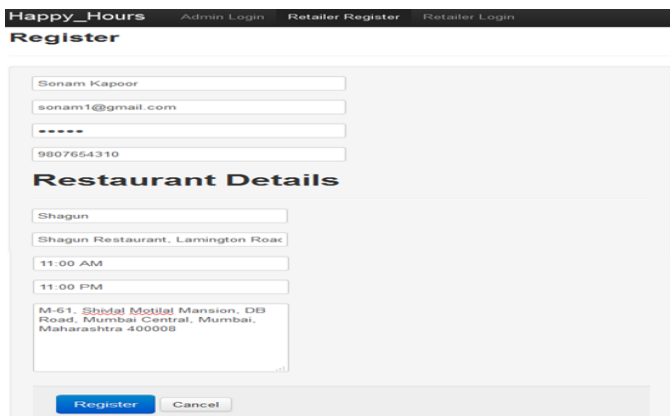


Fig -3: Retailer Registration Screen

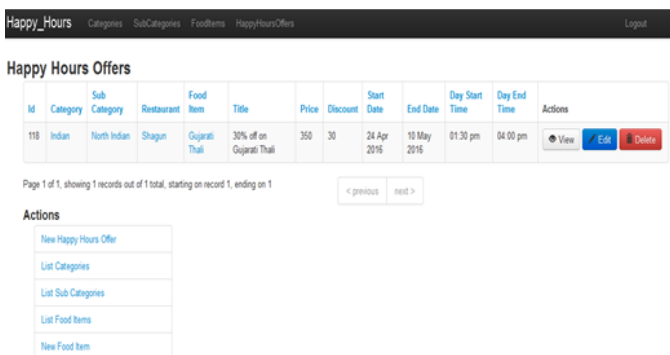


Fig -4 Retailer Happy Hour Deals Screen

Customer registers into the system through android mobile application as shown in fig-5(a) and 5(b).

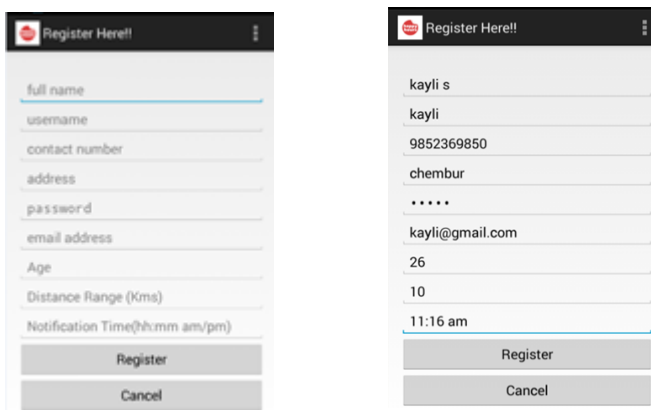


Fig -5(a)&5(b): Customer Registration Form

Customers get happy hours deals recommendation in both push and pull strategy in ranking order as specified in phase 3 of recommendation algorithm (fig-6(a)&fig-6(b))

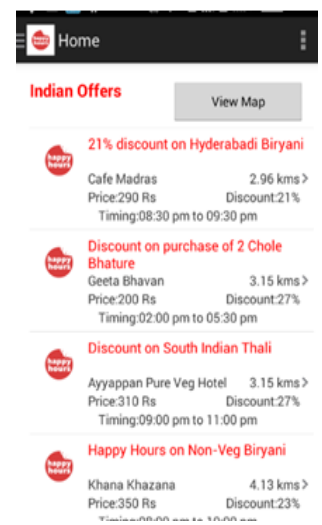
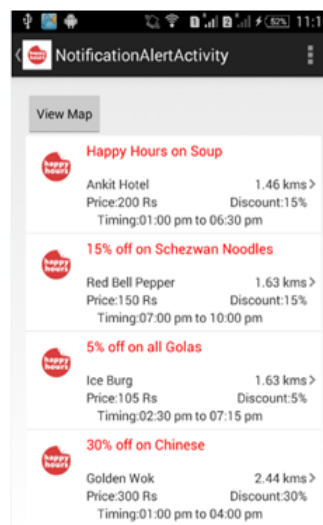


Fig-6(a)&6(b): deals at same distance are re-ranked based on highest discount first & deals having same distance and discount are re-ranked based on less ending time first

Map Visualization utilizes number based coding for the ranked results as shown in fig-7(a) and on-click on any marker, it shows the deal details (fig-7(b)).

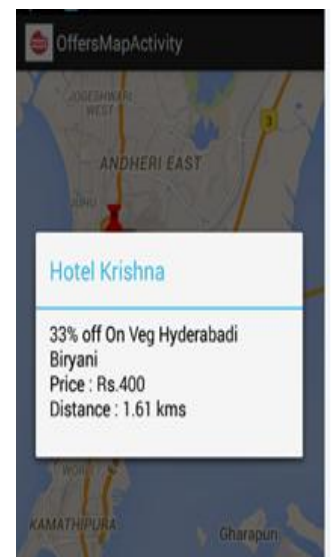
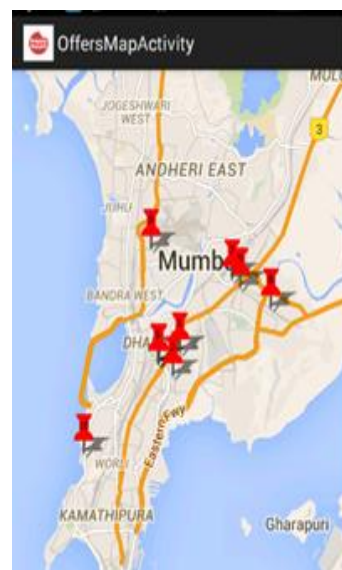


Fig-7(a): marker no. indicate deal ranking order and Fig-7(b): on-clicking any marker, it shows details of that deal.

## 6. CONCLUSIONS & FUTURE WORK

In this paper, dashboard design for happy hours and their deals recommendation system for mobile advertising is presented. Our system provides platform to retailers for publishing Happy Hours Deals. It also provides users to specify and edit the distance limit for recommendation and recommends happy hour deals in application notification

which is more attractive. Our system also provides facility to set notification time which preserves power consumption and does not lead to server overload. Recommendations on map provides good visualization of ranking of deals.

In future work we will provide facility to change notification time. We will include other categories like shopping, entertainment, etc into our system.

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