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# ABSTRACT

The application of Location-based social networks has been increased in today's world rapidly. Thus POI recommendation has become very popular service in this Location-based social net-works. Location-Based social networks mainly consists of Point of Interest(POIs) where POIs and the check-in behaviors can be greatly influenced by the following. One is his/her friend and the other is the user's behavioral habit. This is called social influence. This social influence in the social networks help the merchant to publicize their quality work and this attracts many users. Each user have their self- interest and thus this affect the recommendation of POI in the social networks. Our project works on selected list of POIs that has greatest influence on the places to recommend to the users. The main goals of this project are the target user's service need, and promote businesses' locations (POIs). Thus the paper define a problem for the location promotion using POIs. To solve the optimization problem, the study also use sub-modular properties. When conducted the comprehensive performance evaluation, the experimental results showed that this method proposed achieves significantly superior POI recommendations.

Keywords: Location-based social networks, LBSN, Point-of- Interest, POI, Recommendation, Influence.

## INTRODUCTION

Location-based social network applications are increasing day- by- day. One of the major services present in Location-based social networks is POI (Point Of Interest). The important thing in LBSNs are check-ins. These can be referenced as the behaviors of the users. The check-in behaviors are generally affected by their friends and by the user's personal habits. This can mostly help business people to attract many customers and promote their business.

The main objective of this project can be said to as reduction of fake reviews. In a LBSN, a user can have services like, posting comments, upload photos, share check-in locations on the locations in which users are interested with their friends The locations where users go and react on are called POIs. These POIs are location aware services in Location-base social networks. These POI services' main work is to recommend a user some of the locations. These locations will be places where the users are personally interested in. These will be mainly based on user's behavioral habits, preferences and friends. In general, the POIs explore check-in records to attract more users. The recommendations for a user will be greatly influenced by the number of friends of user that visited the POI. This will also influence the business man to maximize their location promotion. Main goals of recommendation system are to satisfy user's service demands and merchant's advertising needs. Now the main aim will be, providing the user a recommendation maximizing the number user's that are influenced by the friends POI in K. [1][10], [2][11], In the previous study the authors formulated a location-aware influence maximization problem to find a set of seed users in social network for maximizing influence spreads, and it does not apply to the POI recommendation problem. The output result of the problem will be a set of POIs that suit the interest of the user. Existing POI recommendations are categorized based on the data source used as follows [3]: user profiles; user location histories; and user trajectories. POI recommendations are categorized by the methodologies employed as follows[3][12]. 1. Content-based; 2. Link Analysis-Based; and 3. collaborative filtering (CF)-based. Some researchers [4][5][9]have calculated the similarity between users according to the regions in which users lived, then researchers have made the similarity the input of traditional CF. The existing researches mainly take the accuracy of the recommendation as the key. This is important for the users and the business people generally merchants. It helps to attract morecustomers.

It also helps recommending the users only the places where the users are interested in. This helps in removing fake review recommendations. Social Survey by Marketing Letter stated the following: when accessing to information in the real world, people are more likely to obtain it from their friends. Marketers also use social relations to improve their business influence and to improve their profit. It plays an important role in providing better location based services in location based social networks. Both LBSN users and POI owners are expected to have elective POI recommendations. The behaviors of the users of every LBSN are intrinsically spatio- temporally related. A POI is usually associated with categories and tags to describe the POI. Even two POIs with similar or even the same semantic topics can be ranked different if they are in two dierent regions. The proposed method allows to electively exploit the textual information associated with POIs to better prole users and POIs, as well as to take into account of context awareinformation.





In Figure. 1, the pink line connection successfully influences user5 with POI 3. Let us consider a user set = user1, user2, user3, user4, user6, user7, user8, user11, the IS of the user (let us consider user5) in social network of a POI (let us say user5) and the number of users who get influenced here are 8. However, user 5's IS about POI3 is not the maximum. Here every user consists of individual POI category. Thus, POI3's IS is the above user set, and its influence scope gain (ISG) without considering user5's friends is user7, user8, user11. According to the right side of Figure.1, POI5's IS is greater than that of POI3, and its ISG is user7, user8, user9, user11, user12. Considering promoting businesses' products and services, the system should recommend the target user with the POI5. Thus this project propose a method of recommendation for promoting POI. This is used to promote products and attract more customer. Here the project also recommend users with some POIs that satisfies user preferences. Major contributions: The major contributions of this project can be said to as follows. Proposing a novel point of interest recommendation method, Defining user's social influence of the user special categories in a social network. Because of overlaps between IS under different POI categories, now then propose a POI recommendation algorithm. The algorithm eliminates the overlaps effectively. At last, conducting comprehensive experiments on two massive real datasets, and experimental results show the algorithm on accuracy is the consistency as state-of-the-art techniques. In terms of location promotion, this method has significant advantages. Social Survey by Marketing Letter stated the following: "when accessing to information in the real world, people are more likely to obtain it from their friends." Social media is an important venue for interaction and conversation among America's youth. Fully 76 percentage of all teens use social media. Facebook is the dominant platform, with 71percentage of all teens using it. Instagram and Snapchat also have become increasingly important, with 52 percent of teens using Instagram and 41 percent using Snapchat. Onethird of teens use Twitter and another third use Google Plus. Fewer teens use Vine or Tumblr. Social media plays a critical role in connecting teens to new friends, allowing teens to learn more about new friends and get to know them better. Nearly two-thirds (64 percent) of teens who have made a new friend online say they have met new friends on a social mediaplatform.



Fig2. Influence fact graph on purchasing decision

Two-thirds (62 percent) of teens say they've shared their social media username with a brand new friend as a way to stay in touch. Beyond making new friends, social media is major way that teens interact with their existing friends. More than nine-in-ten teens (94 percent) say they spend time with friends on social media. Fully 30 percent say they spend time with friends on social media every day, and another third (37 percent) say they do so every few days. When asked to rank the ways they communicate with friends, social media sites like Facebook or Twitter are one of the top ways of communicating with friends for two-thirds (66 percent) ofteens.

#### **LITERATURE SURVEY**

The application of Location-based social networks has beenincreased in today's world rapidly. Thus POI recommendation has become very popular service in this Location-based social networks. Location-Based social networks mainly consists of Point of Interest(POIs) where POIs and the checkin behaviors can be greatly influenced by the following. One is his/her friend and the other is the user's behavioral habit. This is called social influence. This social influence in the social networks help the merchant to publicize their quality work and this attracts many users. Location- based social network applications area unit increasing day-by-day, one among the most important services in Location-based social networks is POI (Point Of Interest). The vital issue in LBSNs area unit check-ins. This is highly effected because of the behaviors of the users. These are usually affected by user's behaviors. This could principally facilitate business individuals to draw in many shoppers and promote their business. The main objective of this project is same to as reduction of fake reviews. In aLBSN, a user will have services like, posting comments, transfer photo share arrival locations on the locations during which users have an interest with they, and their friends. The locations wherever users go and react on area unit referred to as POIs. These POIs area unit location-aware services in Location-base social networks. These POI services' main work is to advocate a user a number of the locations. These locations are places wherever the users area unit in person inquisitive about. These are principally supported user's behavioral habits, preferences and friends. In general, the POIs explore arrival records to draw in additional users. The recommendations for a user are greatly influenced by the quantity of friends of user that visited the POI. This may additionally influence the business man to maximize the promotion of location Main goals of advice system area unit to satisfy the user's service demands merchant's advertising wants. The output results of the drawback are a collection of POIs that suit the interest of the user. Existing recommendations area unit classified supported the information supply used as follows [3]: user profiles; user location histories; and user trajectories. The recommendations area unit classified by the methodologies used as follows [3]: content-based; link analysis- based; and cooperative filtering (CF)-based. Some researchers [4][5] have calculated the similarity between users per the regions during which users lived, then researchers have created the similarity index of the user and their friend. The existing researches principally take the accuracy of the advice because the key. this can be vital for the users and also the business individuals usually merchants. It helps o draw in additional customers. It additionally helps recommending the users solely the places wherever the users have an interest in. This also helps user in removing pretend review recommendations. Social Survey by promoting the letter explicit the following: once accessing to data within the planet, individuals area unit additional possible to get it from their friends. Marketers additionally use social relations to enhance their business influence and to enhance their profit. It plays a crucial role in providing higher location primarily based on the services in location based social networks. each LBSN users and POI house owners area unit expected to own to own

recommendations. The LBSN user behaviors [7][8][14] area unit per se spatio-temporally correlative. Even two POIs with similar or perhaps constant linguistics topics is hierarchal totally different if they're in two dierent regions. The planned methodology permits to permits exploit the matter data related to POIs to higher to higher and POIs, further on take under consideration of context aware data. Although recommender systems have been widely studied and successfully adopted by many ecommerce web sites. POI recommender systems have just emerged recently. Differing from traditional recommender systems, POI recommender systems havethe following unique characteristics. Unique Characteristics of POI Geographical Influence. As the Tobler's First Law of Geography re- ported that "Everything is related to everything else, but near things are more related than distant things". For LBSNs, the Tobler's First Law of Geography implies that users prefer to visit nearby locations rather than distant ones and users may be interested in POIs surrounded a POI that users prefer. Geographical Influence is the most important characteristic that distinguish POI recommender systems from traditional recommender systems and heavily effect users' visiting behaviors, Frequency Data and Sparsity. In traditional recommender systems, user generally expressed their preferences by explicitly providing ratings for items, which are converted to user item rating matrix. The ratings are often numerical values and fall into a numerical range. The higher rating corresponds the better satisfactory. Unlike to traditional recommender systems, a user's preferences are reflected by the frequency of check-in for locations, which are often transformed to user-location check-in frequency matrix. The frequency data have a large range compared with rating.

Social Influence. Based on the assumption that friends are tend to share more common interests and users often tend to their friends for suggestions, traditional recommender systems combine social relationships with ratings to improve the quality of recommendation. Several studies have showed that social relationships are demonstrated to be beneficial for recommender systems. However, In POI recommender systems, previous studies shown that around 96 percent of users share less that 10 percent common visited interests, indicated that a large number of friends share nothing in terms of POI. Hence, social influence contributes limited effects on users' check-in behaviors. The recommender systems recommend the items using mainly three basic methods which use the algorithms from data mining, information retrieval and machine learning. These are content based filtering, collaborative filtering and hybrid filtering. In addition to these approaches, new methods have been proposed like context based methods, social network based methods and soft computingmethods.

## **EXISTING SYSTEM**

**Content Based Filtering:** Content based recommender systems are the earlier recommender systems that have been developed. The items similar to the ones which are positively rated or liked by the user in the past are recommended. The user and item profile consists of attributes or features of user and item respectively. For example, a movie attributes can be movie id, title, genre, actor and director. The user attributes can be user id, user address, age, user purchases, user rating and user reviews. In this above example of user and item profile, if a user likes the horror movies, the horror movies are recommended to the user, which are not yet liked by him. The main steps of content based filtering are, Extract the item attributes to generate item profile for all items. Generate the user profile for each active user. Compare the item profile with user profile. Recommend the items which match the user profile more and which are not seen by the user. The classification is used to build the user profile and its updation in content based filtering before. In this method thedecision tree C4.5 algorithm is used to classify only old sellers as trustworthy and untrustworthy using seller attributes and customer transactions. Top K sellers who are most similar to user are recommended.

**Collaborative Filtering:** In collaborative filtering the recommendations aregivento a user who is currently using an application and is called as an active user. The collaborative filtering works on the assumption that the active user will prefer the items liked by the users who have the tastes same as him/her. The similar users of an active user can be found by considering the ratings given by the users for the same items. This isknown as user based collaborative recommendation. The main steps of collaborative filtering are: For all users U and items I and ratings R of users on items, form U X I matrix containing ratings of user on item as elements. Find the similarity of the active user u, with all other users of the system. Find the k most similar users from above which form k nearest neighbors of active user u. Predict the ratings of user u on item i, which is not seen by the user u. Repeat the step 4 for all items which are not seen by user u. Select the top N items from the predicted ratings for recommendations foruser

u. The user based or memory based collaborative filtering uses the whole user item matrix to generate the prediction of ratings by the active user. The item based collaborative filtering computes the item similarity instead of user similarity For item based collaborative filtering, the accuracy in terms of mean absolute error (MAE) is better than user based algorithm and the online computation of similarity isreduced.

**Hybrid Filtering:** The hybrid approach combines collaborative and content based methods to overcome limitations of both methods. Different ways in which the hybrid system can be combined are: By combining the predictions of content and collaborative filtering after separately implementing both. By using content based properties in collaborative approach or reverse. By modeling content and collaborative approachtogether.



Fig3. Existing Recommendation Platforms

## **PROPOSED METHODOLOGY**

The application of Location-based social networks has been increased in today's world rapidly. Thus POI recommendation has become very popular service in this Location-based social networks. Location-Based social networks mainly consists of Point of Inter- est(POIs ) where POIs and the check-in behaviors can be greatly influenced by the following. One is his/her friend and the other is the user's behavioral habit. This is called social influence. This social influence in the social networks help the merchant to publicize their quality work and this attracts many users. Each user have their self-interest and thus this affect the recommendation of POI in the social networks. The project works on selected list of POIs that has greatest influence on the places to recommend to the users. Existing researches [4][5][6] use social relationship to help solving the sparsity and cold-start problem in recommendation systems. Through the detailed analysis above, one can observe tradition. This project mainly focus on how social relationship effects business location promotion through recommendation process. Compared with existing works, now thus consider example, as shown in Fig.3.1, in which there is a heterogeneous network that includes users and POIs. Because people's influence and authority under different information categories are different, the social influence about different POI categories is also different. When user5 is the target user, traditional recommendation approaches analyze users' checking-in behavior to infer the individual preferences and character. Then, the system's recommendation result is a list of POIs in which the user may be interested in the guarantee of recommendation accuracy. Because friends are directly affected by each other, this paper supposes friends of the target user is influenced by the target user under certain POI category/POI successfully. Basic idea ofFormulation:

To formulate the drawback (POI recommendation problem) as: Given a 1. target region 2. dataset within the region 3. a relentless K, Now, aim is to, providing the user a recommendation increasing the quantity user's that area unit influenced by the behavior and location in K. [1] [2], In the previous study the authors developed a location- awareinfluencemaximizationdrawbacktosearchoutacollection of users in social network for increasing influence spreads, and it does not apply to the POI recommendation to social user based on his friends and friends of friends instead of unknown recommendation. Thus here mainly consider geo properties by collecting the check-in data. user move from his own location to POI. PGu,v(1) semantic influence b/w u andv

POI recommendation approaches mostly involve recommending users with some location in which users may be interested in basedon user's characters, preferences. Like Facebook the project suggests people with some business locations according to their interests.

## **Point-of-interest algorithm for Location Promotion:**

Input: POI data P

An LBSN G, C, the targetuseruT, TuT, K, POIuT= {a1, a2, ...}

*Output* :*POI rerecommendation Alist of POIs, P OIre, and the corresponding recommended POI categories RC re,* 

 $\|POIre\| =$ 

actually, compared to the strangers, people are more edkGly = K

Initialization:

Recommended POI categories RCre

 $^{J}u^{J}$  is the target user,  $^{J}v^{J}$  influences the user. Let RC re

*let POI uT=a*(1),a(2), ..... a(k);

whereuTinfluencescopeofsocialnetworkComputePOILPforeachPOIuT(1tok) Pu

-v(l) = PGu, v(l) + (1-)PTu, v(l), (3.1)

where -Pu - v The user u influences user v(uisnotv)

- ([0, 1])avg0.5

- PGu,y(l)trade off between geographical influence
- PTu, v(l) semantic influenceb/wuandv. RCre < -RCreUPu > v(l); SortRCre;

Return RCre;

**Point-of-Interest recommendation problem in Location Promotion: Definition. (LBSN)** A Location-Based Social Network with a set G and C consisting of a social network G, where G is a set containing U and E, where, U is users set,E

= (ui, uj )-one social connection from ui to uj, ui, uj U, ui

= uj, and check-in records C = (u, l, t), (u, l, t) represents one check- in record where user u checks during a location l at time

t. l = (lon, lat, a), lon is longitude, lat is latitude, a is one POI category, POI set during a given region POIregion = 1, 2, , M, POI category set during a given region POICregion = a1, a2, , am.

**Top-N Influential POI category Extraction** Definition. (Top-N IPOIC) Given a LBSN i G, C  $i_{,}$  the target user uTU and his/her POI category preferences set POIuT= a(1), a(2), ..., a constant N, this problem is to select a list of POIs pre, pre POIuT. The number of the expected influenced users (uT ,ai) by uT(as information source) is the maximum under POI category ai pre. Then, select topN POI categories pre = a(1), a(2), ..., a(N)according to the arrangement of the size of (uT ,ai).

Learning influence between users There can be two types of influences that affect the recommendations for the user. They are: geographical influence; topic-aware influence. Geographical influences are one altogether the factors which have a decent impact upon the businesses. Geographic influences regard the results which the natural features, population, industries of a piece have upon a business. They're supported the ultimate and specific location and placement of a business. The geographicalinfluence

[8] between users denotes P G u,v() =l p(v) l f(v) (d(l, )), wherein f(v) (d(l, )) = 1 (d(l,)+1), The estimated value of is  $\hat{} = ni \ln(d(li,)+1)$  based on MLE. p(v)l denotes the probability of user being v at location l. f(v) (d(l, )) represents the probability density function of user vmoving from visited locational to the location in Rtarget, and d(l, ) is Euclidean distance between l and the topic-aware influence between users denotes P T u,v() = aiPOIu ai Pai u,v. For each POI category ai, the influence on ai denotes Pai u,v = u,v · Pai u · Pai v . Pai u is the probability of POI category ai. ai = P(T = ai—). Moreover, for each in LBSNs, have a probability distribution covering the POIcategories.

**Computing User's Influence Scope** This project focuses on user's IS under special POI category. Thus, the definition of computing user's IS problem is that given a LBSN, user, and which

Path denotes the set of users who u can arrive at the goal is to compute user's influence scope under special POIcategory.

Influenced by friends. Path (uT, S). This also represents the user uT influence scope of social network without considering POI category preferences, is the results of the ideal state. Considering the influence between users in Path (uT, S), firstly identify users that are successfully influenced. This paper supposes each user has an activated threshold value uniformly at random from. Now regard this situation as ujis affected completely. In thispaper, set uj as the probability expectation based on uj's history check-in POI categories recorders in advance. This paper selects the influenced users satisfying the path into the user set. Next, select POI category a with the maximization IS about POIuT.Then, select topN based on the order ofIS.

**Solving User Overlaps Problem** Since each user has different influence scopes in social network under different POI categories, these different influence scopes have overlaps. The overlaps result in these top-N POI categories' ISG is not the maximum. The key is that how to design an appropriate objective function F(UauT) to eliminate these overlaps.

## **EXPERIMENTAL RESULTS**

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Fig4. A POI RecommendationWindow

A learn Influence() method has been provided which actually calculates the influence score of user "u" on user "v" based on the distance Calculate() method which calculates the distance between the users and based on the value, user "u" is "direct friend" or "indirect friend" of user "v". Where,

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Fig5. Influential score of user u on user v

Direct friend gets semantic influence PTu,v(l) b/w u and v as 2 and Indirect friend gets semantic influence PTu,v(l) b/w u and v as 1.

## CONCLUSION

During this project implementation, the process have a tendency to addressed on the situation promotion problem in LBSNs. however most of all, the matter is developed as one optimization downside, and ISG maximization downside below special dish class. The experimental analysis shows the technique used here achieves considerably superior dish recommendation examination with different progressive strategies in terms of location promotion.

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