Location prediction in location-based social networks

Mucahit Baydar*,

Department of Nanotechnology, Anadolu University, 26470 Eskişehir, Turkey.

Songul Albayrak, Department of Computer Engineering, Yildiz Technical University, 34220 İstanbul, Turkey.

Suggested Citation:

Information Technology: Emerging Technologies 7

Global Journal of

©

Abstract

popularity, place popular time range, place distance to user's home, user's past visits, category preferences and friendships

---

*

Mucahit Baydar,

68/5 Yıldırım/Bursa, 16350 Eski

E-mail address [_____](#)

1. Introduction

more than ever, social networks are adapting and evolving according to people's needs. Recently, a based social networks' starting point and main focus is users' locations. These networks help their mobility of users, which helps them in making good assumptions about users' b network providers earn their users' and commercial advertisers' trust. While users' loyalty and mercial advertisers' investments are becoming strong

2. Problem Definition

3. Data Analysis

While we don't have any information about users' home locations, we assume that the most

prediction. The features are users' previous visiting places and categories, friendship, place popularity, time range frequencies, and users' distances between home and all other places.

4. Check-in Prediction

4.1. Problem Formulation

$$U = \{u_1, u_2, \dots, u_n\}$$
$$P = \{p_1, p_2, \dots, p_m\}$$
$$C = \{c_1, c_2, \dots, c_k\}$$
$$F_u = \{f_{u_1}, f_{u_2}, \dots, f_{u_n}\}$$
$$Ca_u = \{ca_{u_1}, ca_{u_2}, \dots, ca_{u_n}\}$$
$$p \in P$$

4.1.1. Prediction Using Individual Features

•

$$Score_p = \sum \{u, p\} \mid \forall u \in U$$

•

user as the user's most visited

$$u_{home}$$

$$u$$

$$Score_{u,p} = \frac{1}{\text{dist}\{u_{home}, p\}}$$

•

feature. First, we found the top 1,000 closest places to each user's home location, then we ranked them according to their popularity.

$$Score_{u,p} = \left(\sum \{u, p\} \mid \forall u \in U \right) \square p \in \text{close}(u_{home}, 1000)$$

- Former place visits: We use the user's former visited places for prediction problem. The score of

$$Score_{u,p} = \sum \{u, p\} \in C_u$$

•

$$Score_{u,p} = \sum \{f, p\} \mid \forall f \in F_u$$

- Category preference: We use the user's category preference for prediction. We

$$u$$

$$r_{u,ca}$$

$$u$$

$$ca$$

$$Score_{u,p} = \sum_{i=1}^n \{u, p\} \mid \forall u \in U \square p \in List_i \square List_i \subset ca_i$$

$$\text{size}(List_i) \propto r_{u,ca_i}$$

•

4.1.2. Prediction Using Proposed Method

t simply gives us an opinion about the user's preference.

user's forme

$$\begin{aligned}
 & List_A \quad List_B \quad p_t \\
 & p_c \\
 & Score_{u,p1} = \sum_{i=1}^n \{u, p_i\} \mid \forall u \in U \wedge p \in List_{A_i} \wedge List_{A_i} \subset ca_i \wedge p \in close(p_c, 1000) \\
 & size(List_{A_i}) \propto r_{u,ca_i} \\
 & Score_{u,p2} = \sum \{u, p\} \mid \exists u \in U \wedge p \in close(p_c, 1000) \\
 & List_A = rank(norm(Score_{u,p1})) \\
 & List_B = rank(norm(Score_{u,p2})) \\
 & List = List_A + List_B \\
 & rank(List)
 \end{aligned}$$

4.2. Methodology and Metrics

in's place. If none of our predictions is correct, then hit is counted

$$Hit = \begin{cases} 1, & p \in L \\ 0, & p \notin L \end{cases}$$

k

$$Precision = \frac{|N| - k + 1}{|N|}$$

5. Results

While the prediction list size increases, every feature's average hit value gets better. On the other

6. Conclusion and Future Works

stable and bigger datasets. Using the user's comments and ratings, we can learn the user's

References

Proceedings of the 4th Workshop on Social Network Systems

Privacy, security, risk and trust (PASSAT), 2012 international conference on and 2012 international conference on social computing

Data mining (ICDM), 2012 IEEE 12th International Conference

ICWSM, 11

based recommendation system using bayesian user's International Conference on Ubiquitous Intelligence and Computing

Proceedings of the 21st ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems

Proceedings of the 2013 SIAM International Conference on Data Mining

Proceedings of the 18th SIGSPATIAL international conference on advances in geographic information systems