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Collaboration of Road Network and Social Network to Instigate kNN Search

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Abstract: Although kNN search on a road network Gr, i.e., finding k nearest objects to a query user q on Gr, has been extensively studied, existing works neglected the fact that the q's social information can play an important role in this kNN query. Many real-world applications, such as location-based social networking services, require such a query. In this paper we study a new problem: kNN search on road networks by incorporating social influence (RSkNN). Specifically, the state-of-the-art Independent Cascade (IC) model in social network is applied to define social influence. One critical challenge of the problem is to speed up the computation of the social influence over large road and social networks. To address this challenge, we propose three efficient index-based search algorithms, i.e., road network-based (RN-based), social network-based (SN-based) and hybrid indexing algorithms. In the RN-based algorithm, we employ a filtering-and-verification framework for tackling the hard problem of computing social influence. In the SN-based algorithm, we embed social cuts into the index, so that we speed up the query. In the hybrid algorithm, we propose an index, summarizing the road and social networks, based on which we can obtain query answers efficiently. Finally, we use real road and social network data to empirically verify the efficiency and efficacy of our solutions.

Keyword: Road Network, kNN Query, Social Influence.

I. INTRODUCTION

With the ever-growing popularity of mobile devices (e.g., smartphones), location-based service (LBS) systems (e.g., Google Maps for Mobile) have been widely deployed and accepted by mobile users. The *k*-nearest neighbor (*k*NN) search on road networks is a fundamental problem in LBS. Given a query location and a set of static objects (e.g., restaurant) on the road network, the *k*NN search problem finds *k* nearest objects to the query location. Alone with the popular usage of LBS, the past few years have witnessed a massive boom in location-based social networking services like Foursquare, Yelp, Loopt, Geomium and Facebook Places. In all these services, social network users are often associated with some locations (e.g., home/office addresses and visiting places). Such location information, bridging the gap between the physical world and the virtual world of social networks, presents new opportunities for the *k*NN search on road networks.

The aforementioned example motivates us to consider the social influence to a user when processing the *k*NN search on road networks. Specifically, a query user *q* would like not only retrieving *k* geographically nearest objects *{o}*, but obtain a large social influence from *q*'s friends who have been to *{o}*. Therefore, in this paper, we study a novel query: *k*NN search on a road-social network (RS*k*NN), and propose efficient query processing algorithms. Specifically,

Given *Gs*, *Gr* and *q*, the RS*k*NN search finds *k* nearest objects (*Aq* = *{or}*) to query *q*'s location on *Gr*, such that the social influence *SI* (*or*) to *q* through *q*'s friends, who have been to *or*, is at least a threshold.

II. OBJECTIVE

A. To achieve the speed in query processing by RSkNN.
B. To recommend location/area by reviews.
C. To achieve the speed in query processing by RSkNN.
D. To recommend location/area by reviews.
E. Reviews of the friends to be provided efficiently.

III. PROBLEM STATEMENT

A. We can search for some reviews of the places in specific category on social media network, any other user from our friend list who had posted the reviews for same category of places will be shown as the result but, this result contains random location of data so, it is difficult to filter that result for specific location.

B. In Google API we can provide location and search the places with reviews. But, we cannot find those reviews from people which are well known to us.

C. So, we need a system that combine above mentioned both system and may provide expected result.

IV. LITERATURE SURVEY

Influence maximization, defined by Kempe, Kleinberg, and Tardos (2003), is the problem of finding a small set of seed nodes in a social network that maximizes the spread of influence under certain influence cascade models. The scalability of influence maximization is a key factor for enabling prevalent viral marketing in large-scale online social networks. Prior solutions, such as the greedy algorithm of Kempe et al. (2003) and its improvements are slow and not scalable, while other heuristic algorithms do not provide consistently good performance on influence spreads. In this paper, we design a new heuristic algorithm that is easily scalable to millions of nodes and edges in our experiments. Our algorithm has a simple tunable parameter for users to control the balance between the running time and the influence spread of the algorithm. Our results from extensive simulations on several real-world and synthetic networks demonstrate that our algorithm is currently the best scalable solution to the influence maximization problem: (a) our algorithm scales beyond million-sized graphs where the greedy algorithm becomes infeasible, and (b) in all size ranges, our algorithm performs consistently well in influence spread --- it is always among the best algorithms, and in most cases it significantly outperforms all other scalable heuristics to as much as 100%--260% increase in influence spread.

Influence maximization is the problem of finding a small set of most influential nodes in a social network so that their aggregated influence in the network is maximized. In this paper, we study influence maximization in the linear threshold model, one of the important models formalizing the behavior of influence propagation in social networks. We first show that computing exact influence in general networks in the linear threshold model is #P-hard, which closes an open problem left in the seminal work on influence maximization by Kempe, Kleinberg, and Tardos, 2003. As a contrast, we show that computing influence in directed a cyclic graphs (DAGs) can be done in time linear to the size of the graphs. Based on the fast computation in DAGs, we propose the first scalable influence maximization algorithm tailored for the linear threshold model. We conduct extensive simulations to show that our algorithm is scalable to networks with millions of nodes and edges, is orders of magnitude faster than the greedy approximation algorithm proposed by Kempe et al. and its optimized versions, and performs consistently among the best algorithms while other heuristic algorithms not design specifically for the linear threshold model have unstable performances on different real-world networks.

The proliferation of GPS-enabled mobile devises and the popularity of social networking have recently led to the rapid growth of Geo-Social Networks (GeoSNs). GeoSNs have created a fertile ground for novel location-based social interactions and advertising. These can be facilitated by GeoSN queries, which extract useful information combining both the social relationships and the current location of the users. This paper constitutes the first systematic work on GeoSN query processing. We propose a general framework that offers flexible data management and algorithmic design. Our architecture segregates the social, geographical and query processing modules. Each GeoSN query is processed via a transparent combination of primitive queries issued to the social and geographical modules. We demonstrate the power of our framework by introducing several "basic" and "advanced" query types, and devising various solutions for each type. Finally, we perform an exhaustive experimental evaluation with real and synthetic datasets, based on realistic implementations with both commercial software (such as MongoDB) and state-of-the-art research methods. Our results confirm the viability of our framework in typical large-scale GeoSNs.

In this paper, we propose a novel hybrid genetic algorithm (GA) that finds a globally optimal partition of a given data into a specified number of clusters. GA's used earlier in clustering employ either an expensive crossover operator to generate valid child chromosomes from parent chromosomes or a costly fitness function or both. To circumvent these expensive operations, we hybridize GA with a classical gradient descent algorithm used in clustering, viz. K-means algorithm. Hence, the name genetic K-means algorithm (GKA). We define K-means operator, one-step of K-means algorithm, and use it in GKA as a search operator instead of crossover. We also define a biased mutation operator specific to clustering called distance-based-mutation. Using finite Markov chain theory, we prove that the GKA converges to the global optimum. It is observed in the simulations that GKA converges to the best known optimum corresponding to the given data in concurrence with the convergence result. It is also observed that GKA searches faster than some of the other evolutionary algorithms used for clustering].

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A. Architecture

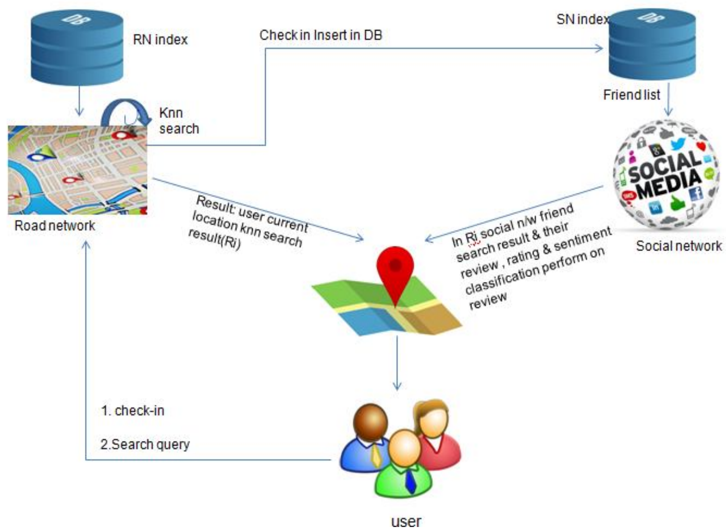

Fig.1 Architecture of Social and Network

B. Mathematical Model

Input-I

C_S - Category

H_L- Check-in hotel location

L_q – Location near by H_L

Query – Q

User – u

Friend list – F_L = {A, B, C, D}

R_A – Review for H_L from user A & for check in

R_B – Review for H_L from user B

Sentiment analysis on (R_A, $R_{B)}$ performed and save in database.

User U submits query Q – on location L_A for searching of category C_S

RN_S - perform RN Index with L_A for category C_S

$P_{(RN)}$ – perform knn to select nearest places of category CS on (RN_S)

$S_{(Pr)}$ – perform SN Index search on (P_r)

$S_{(Pr)}$ – { R_A, R_B }

Final Result –

F_R – {Ra, R_B }

C. Outcomes

In this paper, we have studied a new problem: Knn search on road-social networks (RSkNN). To achieve high efficiency, we first propose a road network-based indexing algorithm In this algorithm, we employ a filtering and verification framework to answer the RSkNN query. Next, to improve the query performance, we design social network-based and hybrid indexing algorithms, namely ISN and IH Our most efficient algorithm relies on the hybrid index, IH that provides tight bounds for the road-social search space.

V. FEATURE AND APPLICATION

To get the reviews about places from trusted people who has visited that places previously.

To use it in e-commerce system to give the ensured product quality to customers.

VI. CONCLUSION AND FUTURE SCOPE

In this paper, we have studied a new problem: kNN search on road-social networks (RSkNN). To achieve high efficiency, we first propose a road network-based indexing algorithm. In this algorithm, we employ a filtering and verification framework to answer the

RSkNN query. Next, to improve the query performance, we design social network-based and hybrid indexing algorithms, namely ISN and IH. Our most efficient algorithm relies on the hybrid index, IH that provides tight bounds for the road-social search space. Experiments on actual road-social networks demonstrate that our solutions are highly scalable and robust. A direction for future work is to use the techniques in to speed up query. Another future work is joint social and road processing on networks stored in a distributed manner.

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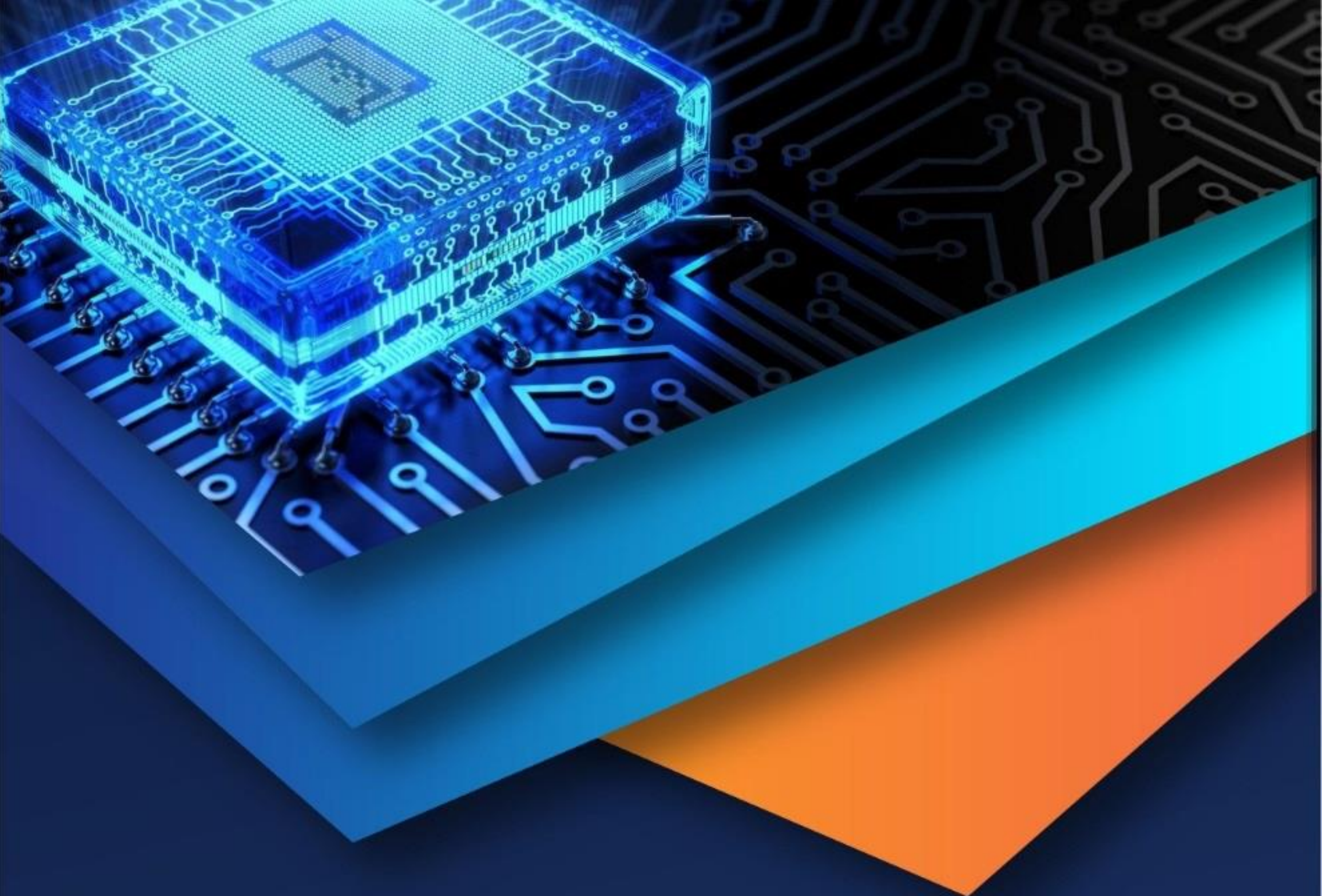

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