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Review of data forwarding schemes in Mobile Social Network

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Abstract

As mobile devices have become more ubiquitous, mobile users increasingly expect to utilize proximity-based connectivity, e.g., Wi-Fi and Bluetooth, to opportunistically share multimedia content based on their personal preferences. Many practical problems on Mobile networks, such as routing strategies in MANETs, sensor reprogramming in WSNs and worm containment in online social networks (OSNs) share a ubiquitous, yet interesting feature in their organizations: community structure. Knowledge of this structure provides us not only crucial information about the network principles, but also key insights into designing more effective algorithms for practical problems enabled by Mobile networking. However, understanding this interesting feature is extremely challenging on dynamic networks where changes to their topologies are frequently introduced, and especially when network communities in reality usually overlap with each other. In this paper, we have focus is on various techniques or methods are described used for data forwarding in MSN**.**

Keywords— Data forwarding, mobile social networks, Social Network

1. Introduction

Rendering to various fundamental network designs, MSNs (Mobile Social Networks) can be categorized into two comprehensive types as shown in Fig.1 (1) Centralized MSNs and (2) Distributed MSNs.

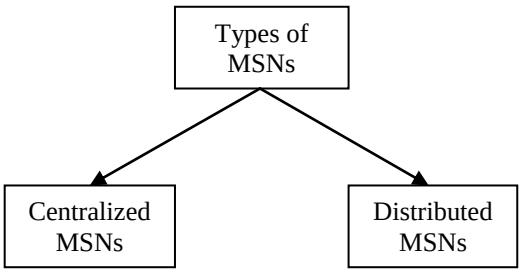

Figure 1.Types of MSNs

The previous, modern online social networking service areas (MySpace, Facebook, etc.) transfer their central social presentations or portal web sites toward mobile devices. It is nothing but an extension lead of web-based social networks. Cellular networks make available the most prevalent network infrastructure to provision centralized MSNs [1]. The former, users of mobile broadcast data in a dispersed way which is based on the opportunistic contacts. Therefore, the ad-hoc networks are adequate for the distributed MSNs, like proximity-based applications via Bluetooth. The decentralized MSNs have a much actual underlying network construction for mobile social networks, in the aspects of privacy preservation, presentation bottleneck and geo-location request application. A very significant research drift of this area is to examine how to accomplish improved data dissemination efficiency (bring share and throughput-delay tradeoff) by mining of data and utilization of the social relationship. Meanwhile connection in between users present in an MSN is existent only during a very small contact period, a well-oganized information forwarding techniques that plans when to forward which objects expressively determines the overall utility that can be carried to all mobile operators. Instinctively, a mobile user can forward substances (objects) simply rendering to the preference of his recent contacts. It is yet a suboptimal approach since, in an MSN, a user who obtains the objects from the forwarder be able to further allocate those substances to his future contacts up until the objects expire. Hence, to exploit the usefulness donated by every object forwarding, the forwarder should also take into account the utility that could be gained by future contacts.

Numerous MANET and certain DTN routing algorithms offer object forwarding by constructing and apprising routing tables each time when mobility occurs. In Delay Tolerant Networks (DTNs) [7], mobile users contact every other unscrupulously in commercial surroundings, like conference sites and university campuses. Due to small node density and impulsive node movement, end-to-end influences are difficult to maintain. On the other hand, node movement is oppressed to let mobile nodes actually carry information as conveys, and forward content unscrupulously upon contacts. The key issue is in what way one can determine suitable relay selection approach and data forwarding standards [5]. Current trace-based learning on campus wireless networks demonstrations that different nodes consume heterogeneity in their contact patterns, besides such heterogeneity validates the usage of Social Network Analysis (SNA) for content forwarding in DTNs. There are two vital ideas in SNA methods: (1) Communities: which are certainly formed rendering to publics' social relationships. Social communities are derivative from the "small-world" occurrence, which is

principal inspected by Milgram's research, and is future dignified as a random graph problem. (2) Centrality: which illustrates that certain nodes in a community are the mutual connections of further nodes and turn as communication centers? Meanwhile social relationships among mobile users are supplementary to be long-term characteristics also a reduced amount of volatile than node mobility; social-based forwarding systems outstrip modern methodologies based on unaware heuristics or predictions based on mobility [5].

Delay Tolerant Networks (DTNs) have the exclusive feature called as intermittent connectivity, which creates routing relatively different from further wireless networks. For instance, meanwhile an end-to-end association is difficult to setup, store-carry-and forward is used to deliver the packets to the purpose. Though numerous routing algorithms have been projected to raise data delivery dependability, they are virtuously based on contact opportunity; i.e., they are deliberate without considering operators' willingness and indirectly accept that all nodes are willing to forward packets for others [6].

In the real world, extreme persons are selfish. As a consequence, in civilian DTNs like PeopleNet and Pocket Switched Network, a node might not be enthusiastic to forward packets for others. Formerly, preceding algorithms could not willing well meanwhile certain packets are forwarded to nodes unwilling to convey, and will be released. Though numerous researchers have intended incentive arrangements to motivate selfish nodes on the way to forward packets within mobile ad hoc networks, they drive to another thrilling; i.e., they rely on that users are selfish and users are not willing to forward packets for anybody other [6]. The Social selfishness will distress node performances. By way of a forwarding service provider, a node will not forward a packet which is received from those with whom it has no social draws, and it provides liking to packets received from nodes with tougher draws when the supply is restricted. Therefore, a DTN routing algorithm should yield the social selfishness into deliberation [6].

2. Literature Review

In this section survey on literature is addressed

In [1] Zhong Li et al. propose a data forwarding structure LASS by examining the local action for mobile social networks. The local activity is distinct to define diverse levels of node interior activity. It is a numbers of encounter possibilities in a node's communities. Formerly, rendering to the community discovery results, activity vector is moulded by using the native activity. Temporarily, the social similarity is also calculated by the vector inner product technique for resolving data forwarding issue. In this paper self-adaptive weighted dynamic community detection algorithm (SAWD) is represented to gain community constructions and the node local activity for LASS.

In mobile social networks (MSNs), greatest information furthering algorithms are "encounter-based". In recent times, people have invent social information has big impact on data forwarding. Therefore, certain "social-aware encounter-based" forwarding systems are received huge attention, [3], [10].

In paper [4] Hui et al. subsidized a milestone effort BUBBLE RAP to the data forwarding system through innovatively manipulating node local importance and social community arrangements. In paper [5] Gao et al. inspected the multicast with identified community constructions for delay tolerant networks. Nguyen et al. [7] projected a new effective scheme called Nguyen's Routing that delivers data to nodes consuming more mutual communities to improve a high data delivery ratio.

Epidemic [26] and Spray-and Wait [28] are "simple encounter-based" algorithms used as most data forwarding algorithms for mobile social networks. Afterward, certain studies of papers [14], [29], [31] use the node contacts history, spatial info or contextual info to forecast the future come across probability. These heuristic approaches objective at finding suitable relay nodes who similar to meet the terminus nodes. Now a days, people have originate social information has large influence on data forwarding. As certain social relationships can imitate people's preference, which is significant in node encounter prediction. Hence, certain "social aware encounter-based" algorithms arise. The algorithms can be categorised into two types. Firstly, certain researches have shown that abusing social relationships can accomplish improved data forwarding presentations. Daly and Haahr [3] projected SimBet data forwarding algorithm in delay tolerant MANETs. It usages betweenness importance and social similarity to improves the probability of an effective data forwarding. Authors illustrates that SimBet achieves well, especially when the connectivity is much low. Nevertheless, it does not deliberate contact occurrences amongst node pairs.

Hui et al. [4] projected an algorithm called BUBBLE RAP in DTNs, by using node criticality and weighted k-clique communal structure to improve delivery performance. Its best than Daly and Haahr [3]. But, it requirements to give a priori value of k to recognise meaningful communal structure, which is unfeasible in mobile social networks. Moreover, it has the similar difficult with [3], i.e., consuming between-ness to analyse global and local significance, not considering node encounter probability.

Gao et al. [5] studied multicast in DTNs from the public network viewpoint. With known community structures, an author expresses the relay assortment as a united knapsack problem. But this technique undertakes that community structures previously recognised and some parameters' optimization requires world-wide info to support. Fan et al. [32] studied geo-community-based broadcasting systems for mobile social networks by abusing node geo-centrality and geo-community.

Nguyen et al. [7] suggested an overlying community grounded data forwarding algorithm, called Nguyen's Routing. An effectual community discovery system is designed for tracing progress of the overlapping communities in mobile networks. Taking benefit of the overlapping community structure, Nguyen's Routing usages number of

mutual interests as social correspondence to design data forwarding scheme. However, it only emphases on the binary graph and does not deliberate the node local activity. On the other hand, from another viewpoint, certain studies have demonstrated the social relations limit the freedom conduction between two nodes.

Li et al. [6] presented informally self-centred properties into data forwarding scheme in delay tolerant networks, where protocol SSAR deliberated both users' forwarding readiness and their contact occasion.

Li et al. [8] studied a joint rate control, direction-finding, and volume allocation scheme to achieve optimal mutilate multicast in dynamic wireless networks, which speak to social selfishness of users by distinguishing relay costs in the direction of dissimilar destinations.

Lin et al. [9] proposed a PrefCast algorithm. It deliberates users' dissimilar partialities for different content objects in mobile social distribution, and in the meantime produces the maximal total utility for all users.

Wu et al. [10] projected a social feature based multipath routing scheme in DTNs. It is founded on the idea that the social features will play an essential role in data forwarding in social contact networks. Finally, the scheme creates the routing problem become a hyper cube centred feature matching process.

3. Coparetive Analysis

TABLE 1.COMPARISION OF DATA FORWARDING TECHNIQUE

sr. No.	Research paper	Type of network	Technique	Algorithm
1.	Applications, architectures, and protocol design issues for mobile social networks	Mobile social network -web based network - decentralized network	- Community detection -Content distribution -Context awareness.	-Heuristic measure -Influence Maximi-zation.
2.	Social network analysis for routing in disconnected delay-tolerant manets	-Wireless network -with or without infrastructure	-Social network analysis technique	-Simbet routing algorithm
3.	Bubble rap: Social-based forwarding In delay-tolerant networks	_Pocket switched network -Without network infrastructure	K-clique community detection technique	Bubble rap Algorithm
4.	Community mining on dynamic weighted directed graphs	-Synthetic network -Real network	-Random walk with restart.ModularityData mining. Community mining	-spectral partition - hierarchical -Cluster markov clustering - information Theory based algorithm
5.	Fast unfolding of communities in large networks	-Mobile Social Network. -Hierarchical community structure	-Maxima Modularity	-Divisive algorithm -Agglom-erative Algorithm.
6.	Detecting the overlapping and hierarchical community structure in complex networks	-real and artificial networks -without infrastructure	hierarchical clustering technique for social network analysis	-Epidemic Routing algorithm
7.	Epidemic routing for partially connected ad hoc networks	-Mobile sensor network -partially ad-hoc network -Without any pre-existing infrastructure	-monarch extension to the NS-2 packet level simulators	-Epidemic Routing Algorithm.
8.	Epidemic Algorithm	-Mobile Social network	-Monarch network	Susceptible infective susceptible - Susceptible infective removed ,Shenker's min Counter algorithm
9.	The one simulator for DTN protocol evaluation	-Delay tolerant network -fixed or mobile infrastructure	-GUI use for GPS map data -Working day movement model	-Prophet routing algorithm -Epidemic routing algorithm

10.	Dynamic Groups Based Adaptive DTN Routing Algorithms in Social Networks	-Delay tolerant network -Hybrid infrastructure	-local activity in social group mode. -global activity	Epidemic -Prophet -Bubble rap

4. Data Forwarding Approch

A.Local Activity

In data advancing, local movement is significant because if the message is given to a node having low local motion, it will bring about a low competence in terms of transfer ratio. There be existent some other approaches and ideas which essential to be distinguished from our local activity.

In PROPHET [14], they just use the encounter history to guess the future delivery possibility. This algorithm is not as good as community-based guess in social networks. Because in social networks, nodes be appropriate to the same community means they are more unlikely to meet each other. To some degree, it can reflect social predilection. That is to say, community structure is noble at delivery guess. Therefore, using node local movement (related with community structure) to design data forwarding scheme is better than PROPHET.

In Simbet [3] and BUBBLE RAP [4], they use between-ness importance in data forwarding. Betweenness actions the degree to which a node lies on the shortest paths linking other nodes. A node with a high betweenness importance has a volume of facilitating connections between the nodes that it links. However, not only international but also local centrality is just fit for unweighted graphs. In unweighted graphs, there will be an edge if there subsists a contact between two nodes. But in realism, the contact probability may be too low to be used in data forwarding, i.e., betweenness significance can't reflect the come across probability. To some degree, local significance and local activity both can signify the importance of a node in its communities, but, they are not the similar ideas. The former is only with node degrees, the latter is a figure of encounter possibility in a node's communities.

B.Social Similarity

There are numerous kinds social likeness measurements, such as cosine angular distance [15], to model resemblance, arbitrarily place nodes on a circle abstracting the simplest similarity space. That is, the angular distances between nodes model their likeness distances, such as the cosine likeness or any other measure, Hamming feature distance [10], the amount of mutual communities (interesting groups) [7]. However, the above distance-based approaches cannot give expressive clarification in real social networks. The mutual interests-based technique has a problematic that if we select a node having additional common communities with the endpoint as a convey node, the selected node may be a node with low native action in its community.

5. Community Approch

To fix the community structure and gain the value of node local movement, well-organized community detection algorithm is essential in dynamic weighted graph. There have be existent many related algorithms [16], these algorithms all share two conclusive features: first, they comprise iterative removal of edges from the network to split it into communities, the edges removed being identified using one of a number of conceivable "betweenness" measures, and second, these methods are, crucially, recalculated after each removal. In [20] suggest a simple technique to excerpt the community structure of big networks. This signified technique experiential technique that is based on modularity optimization. And some of these approaches associated to community discovery can be transplanted to the dynamic weighted graph, but they have numerous difficulties. For example, K-clique-based algorithms [17], [18] need preceding community information about K as inputs. Paper [18] recommend a density-based clustering technique that efficiently discoveries temporally smoothed local clusters of extraordinary quality by consuming a cost embedding method and optimal modularity. And extra a mapping technique based on info theory that creates orders of smoothed local clusters as close as possible to data-inherent quasi l-KKs. But it is not real for social networks, because in some circumstances can't know the number of communities in advance, i.e., the prior value of K.

Paper [18] attentions on community mining including community finding and change-point detection on dynamic weighted directed graphs (DWDG). In this paper, Stream-Group is projected to solve community mining on DWDG. For community discovery, a two-step approach is offered to discover the community structure of a weighted directed graph (WDG) in one time-slice: (1) The first step builds compact communities according to each node's single density which designates the degree of a node belonging to a community in terms of the graph's significance matrix; (2) Second step combines compact communities along the direction of extreme increment of the modularity.

Some modularity-based algorithms [16], [19], [20] have the difficulties of resolve limit and extreme degeneracy [21]. In addition, when meeting the dynamic environment, some algorithms need to repeat identification. The cost of time and computation is very high. Algorithm AFOCS [7] is a newly overlapped and dynamic detection algorithm. It avoids above-mentioned difficulties. But, it is only for unweighted graph and has certain frequent processes on nodes and edges. Because when nodes change, the corresponding edges must also change. When the number of addition or removing nodes is large, the needless repeated work becomes bored.

Like AFOCS [7], authors in [1] also handle the dynamic changes through adding or eliminating nodes or edges, but they categorize them into "out-pool" and "in-pool" cases. The signified algorithm called SAWD algorithm in [1] can save recurrent processes on nodes and edges, which results from the unequal dispensation results of two endpoints for an edge. As soon as finding the social changes, the scattered tracking technique can deal with all nodes and edges changes simultaneously.

6. Conclusion

In this paper there signify reviews of social-based data forwarding scheme for mobile social networks. Algorithms are usually used which measures the social similarity through nodes' dissimilar levels of activity. In this study some papers have algorithms for Delay tolerance Network which are used for data forwarding propose. Diverse meanings of social similarity, acting as the standards of relay selection, produce various forwarding schemes; and the correctness and realism of definitions govern the performance of the schemes indeed.

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