



EFFICIENT FILE SEARCH IN DELAY TOLERANT NETWORKS WITH SOCIAL CONTENT AND CONTACT AWARENESS

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Abstract:

Delay-tolerant networking (DTN) is an approach to computer network architecture that seeks to address the technical issues in heterogeneous networks that may lack continuous network connectivity. This Paper focus on distributed peer-to-peer file search in a delay tolerant network (DTN) formed by mobile devices, the holders of which exhibit certain social network properties. The proposal study is a P2P content-based file sharing system, namely Social Network Group (ESPOON), for disconnected MANETs. The system uses an interest extraction algorithm to derive a node's interests from its video files for content-based file searching. It takes advantage of node mobility by delegating stable nodes, which have the most frequent video. In addition this work uses catch model and web services model used to video file share for mobile ad hoc network environments. In addition, the proposed cache approach maintains the user's query in the cache database services. The proposed web services methods provides the client to client communication for video file sharing effectively.

Key Words: DTN, Social Networks, Tolerance, Peer-Peer & MANET

1. Introduction:

Delay-tolerant networking (DTN) is an approach to computer network architecture that seeks to address the technical issues in heterogeneous networks that may lack continuous network connectivity. Delay and disruption-tolerant networks (DTNs), are characterized by their lack of connectivity, resulting in a lack of instantaneous end-to-end paths. This paper, focus on distributed peer-to-peer file search in a delay tolerant network (DTN) [1] formed by mobile devices, the holders of which exhibit certain social network properties. However, due to sparse node distribution and continuous node mobility, DTNs are featured by frequent network partition and intermittent connections. As a result, packet forwarding is often realized in a store-carry-forward manner in DTN routing algorithms [3] which means that a message is carried by current holder until meeting another forwarder. Furthermore, due to the distributed network structure, it is almost impossible to maintain global file distribution information in DTNs. This means that a file request often does not know which nodes contain the requested file when it is generated. These characteristics lead to significant challenges on efficient file searching in DTNs. Some methods have been proposed to leverage node contacts/interests for content dissemination or publish in DTNs. They either group nodes with frequent contact or forward contents following node interests for file service in DTNs [3]. However, only considering interest/content or contact may lead to a low file searching efficiency. First, a node usually has multiple interests, and few nodes share many interests. This implies that contact based communities may hold files from different interests, leading to frequent inter-community search. Second, same interest nodes may not always stay together due to node mobility. Therefore, purely relying on node interests for file searching may not be able to find the file holder quickly. Our study on crawled Facebook data and a real trace obtained from students on a campus confirms these reasons. Furthermore, file searching is different from data dissemination. First, they have different directions. The former forwards a request to the content holder, while the latter distributes contents to interested nodes. Second, a file request only server's one node, while a data can repetitively satisfy many nodes. Therefore, it would be desired to not replica a request to control the overhead, while a data may be replicated multiple times. To overcome these shortcomings, propose a social aware Content and Contact based file search method, namely Cont2, for DTNs in which the holders of mobile nodes present certain social network properties. Cont2 is a single-copy file searching algorithm that utilizes both node contact and node interest to efficiently locate the requested file in DTNs. [1]

2. Literature Survey:

2.1 Routing in a Delay Tolerant Network: Formulated the delay-tolerant networking routing problem, where messages are to be moved end-to-end across a connectivity graph that is time-varying but whose dynamics may be known in advance. The problem has the added constraints of finite buffers at each node and the general property that no contemporaneous end-to-end path may ever exist. This situation limits the applicability of traditional routing approaches that tend to treat outages as failures and seek to find an existing end-to-end path. They proposed a framework for evaluating routing algorithms in such environments. Then they developed

several algorithms and use simulations to compare their performance with respect to the amount of knowledge they require about network topology. They found that, as expected, the algorithms using the least knowledge tend to perform poorly and also found that with limited additional knowledge, far less than complete global knowledge; efficient algorithms can be constructed for routing in such environments. To the best of their knowledge this is the first such investigation of routing issues in DTNs.

2.2 Exploiting Transient Contact Patterns for Data Forwarding in Delay Tolerant Networks: Effective data forwarding in Delay Tolerant Networks (DTNs) is challenging, due to the low node density, unpredictable node mobility and lack of global information in such networks. Most of the current data forwarding schemes choose the nodes with the best cumulative capability of contacting others as relays to carry and forward data, but these nodes may not be the best relay choices within a short time period, due to the heterogeneity of the transient node contact patterns. They proposed a novel approach to improve the performance of data forwarding in DTNs by exploiting the transient node contact patterns. They formulated the transient node contact patterns based on experimental studies of realistic DTN traces, and proposed appropriate forwarding metrics based on these patterns to improve the effectiveness of data forwarding decision. When applied to various data forwarding strategies, proposed forwarding metrics achieve much better performance compared to existing schemes with similar forwarding cost.

2.3 DTN Routing as a Resource Allocation Problem: Many DTN routing protocols use a variety of mechanisms, including discovering the meeting probabilities among nodes, packet replication, and network coding. The primary focus of these mechanisms is to increase the likelihood of finding a path with limited information, so these approaches have only an incidental effect on routing metrics such as maximum or average delivery delay. They presented rapid, an intentional DTN routing protocol that can optimize a specific routing metric such as worst-case delivery delay or the fraction of packets that are delivered within a deadline. The key insight is to treat DTN routing as a resource allocation problem that translates the routing metric into per-packet utilities which determine how packets should be replicated in the system. They evaluated rapid rigorously through a prototype deployed over a vehicular DTN tested of 40 buses and simulations based on real traces. Their results suggest that rapid significantly outperforms existing routing protocols for several metrics and also show empirically that for small loads RAPID is within 10% of the optimal performance.

3. Proposed System:

In this proposed system is a new mobility model founded on social network theory. The model allows collections of hosts to be grouped together in a way that is based on social relationships among the individuals. This clustering is then mapped to a topographical space, with movements influenced by the strength of social ties that may also change in time. They have validated their model with real traces by showing that the synthetic mobility traces are a very good approximation of human movement patterns. The proposed system contains all the existing system methods. In addition, the file sharing efficiency is increased using cache concept both in server and client nodes. This method supports larger and more disconnected networks environments also.

4. Methodology:

4.1 File Search Method: The proposed system focus on socialaware Content and Contact based file search method, for DTNs in which the holders of mobile nodes present certain social network properties. Content is a single-copy file searching algorithm that utilizes both node contact and node interest to efficiently locate the requested file in DTNs. The work content searching investigates how to stop the content searching in file searching in DTNs so that the number of discovered files and searching overhead can be balanced. By leveraging P2, develop a file searching algorithm that always forwards requests to nodes that are more likely to meet the requested content. On the basis of above components, it also propose advanced components that exploit contact-based sub-communities and parallel forwarding to further enhance file searching efficiency. As a result, both content (i.e., interests) and contact are exploited to find appropriate forwarders for file requests, leading to a high file searching efficiency. Upon receiving a request, the file holder first forwards the file back along the route the request traversed, which is inserted into the request during the file searching. If the route is broken, the intra-community and inter-community searching algorithms are used to send the file back to the requester according to the IDs of the requester and its community. The CCT (Community Contact Table) of neighbor N_i , which records its n-hop ($n=1;2;3;...$) contact frequency with each community. A node's n-hop contact frequency with a community represents its probability of connecting to the community through n hops. A node's probability of connecting to a community equals to its accumulated probabilities of meeting members in the community.

4.2.1 Hop Contact: The search node and query phrase is inputted and if the searching process is implemented within the same community and its neighbors. A file request is forwarded to the node with the highest 1-hop contact frequency with the current community that the request resides in. If no node in the neighbor table has $F_{inC} > T_d$, the active node with the highest 1-hop contact frequency with the current community is chosen. The node N_i 's 1-hop contact frequency with community C represents its direct contact probability with C; N_i 's n-hop ($n > 1$) contact frequency with community C refers to the accumulated n-hop contact frequency of N_i 's current and past neighbors with C. CCT helps inter-community search by selecting nodes with the highest probability of

meeting the destination community as the next relay node. $F_{inCx}(n \geq 1)$ to denote node i 's n -hop contact frequency with community C_x , which is initialized to 0 in the beginning. Node i periodically updates its F_{inCx} with each community after each unit time period T . Specifically, when node i meets a new neighbor j , they exchange their neighbor tables for subsequent periodical table updates. If no node in the neighbor table has $F_{inC} > T_d$, the active node with the highest 1-hop contact frequency with the current community is chosen. The purpose of this strategy is to quickly move the request out of current area. If the node itself is chosen as the next relay node after above steps, it holds the request. While it is moving, it updates its neighbors and repeats the above steps until the request is forwarded to the destination community.

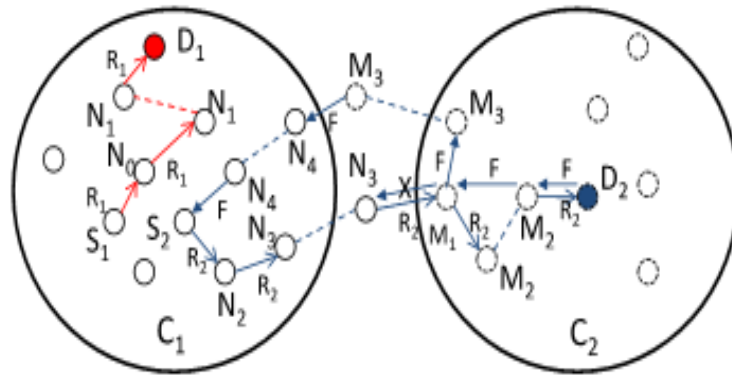


Figure: File Searching and Retrieval Process

For example of file searching between two communities (C1 and C2). Two requests (R1 and R2) are initiated in C1. R1's destination community is C1. The file requested by R2 belongs to community C2. Since the requester cannot find a current neighbor that belongs to C2, it forwards R2 to its current neighbor N2 that has the highest 1-hop contact frequency with C2. N2 forwards R2 to N3. On the way moving to C2, N3 forwards R2 to M1 of C2, which has higher 1-hop contact frequency with C2. Then, intra-community searching is used to forward R2 to destination D2 through M2.

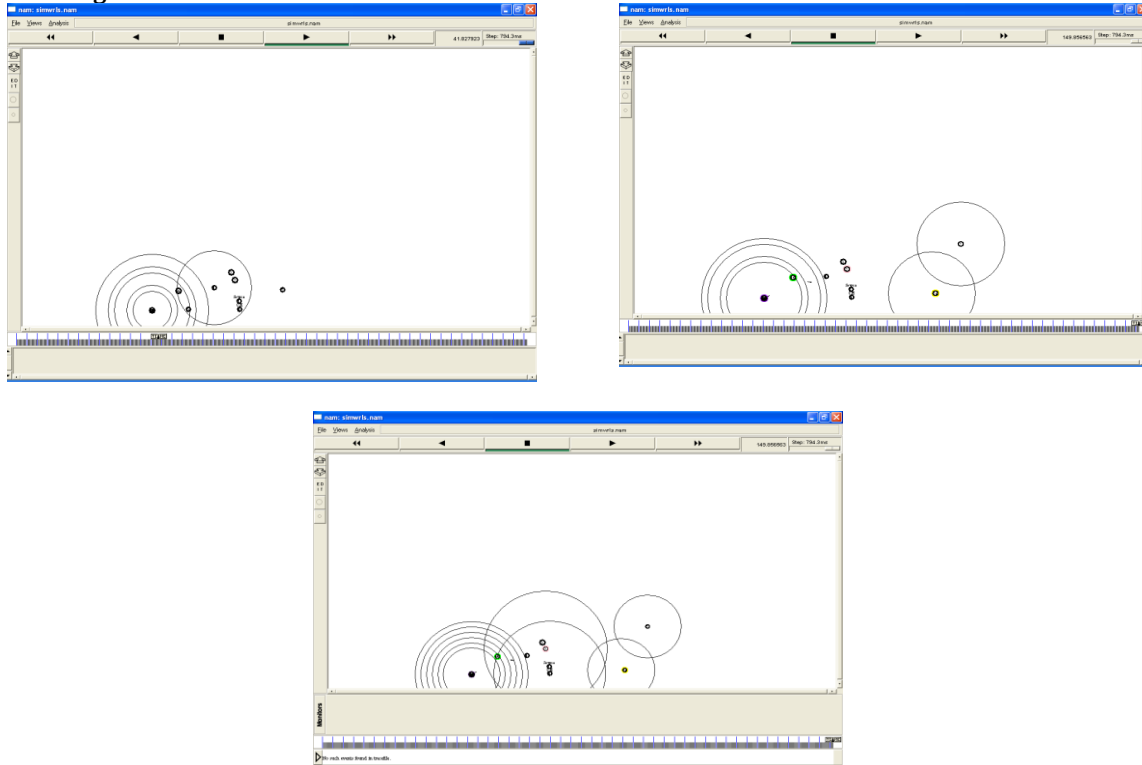
5.1 Social Networking Based Method:

A) Intra-Community File Searching and Retrieval: The requests are forwarded within the destination community to find the file holder. In each forwarding, the request is forwarded to a neighbor node that has more intra-community connections toward the node having the highest similarity with the requested file. Such a method is designed for two reasons. First, the node having a high similarity with a request has high probability of containing the requested file. Second, an interest can usually be further classified into sub-interests, and people in a sub-interest group have a higher probability of meeting with each other than with other members in the interest community. For example, lab members majoring in computer systems tend to meet more often. Thus, if the high similarity node fails to satisfy the request, its frequently met nodes may contain the requested file.

5.2 Content Cache in Client and Server:

Using a web application, the administrator logs in to the web site and uploads the content using a upload form. The content information is keyed in and the file is being uploaded if size is small; otherwise the admin can save the data in web server manually. The content can be downloaded if the P2P application is running in the client machine. The files list is dynamically populated with link labels. If a link label is clicked, then the clients IP Address having that resource are populated in another panel with link labels for each client. When the link label is clicked, the application downloads the content from the selected client to the local folder of the requested client. Hence client to client communication only occurs for content distribution. The download log is stored in server database for future reference and further download by other clients.

Monitoring WSN Node:



Point to Point Communication

6. Conclusion and Future Enhancements:

The content and contact based file search method for DTNs in a social network environment. It exploits the properties of social networks to enhance file searching efficiency. Through the study of a real trace, we found that the interests (content) of each node can help guide file searching. To find that the movement patterns of mobile nodes can more accurately predict the encountering of nodes holding the requested files. Thus, virtually builds common-interest nodes into a community and forwards a file request to nodes with higher meeting frequency with the interest community or the node that has the most similar content with the requested file. Compare with other file search methods using mobility from both realtrace and a community based mobility model on the real world simulator. The proposed system shows superior performance in hit rate, search delay and overall cost. And to investigate how a node's interest weights affect its movement pattern and how to leverage it to enhance file search efficiency.

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