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INFORMATION DISSEMINATION THROUGH SOCIAL NETWORKS USING SHEEPDOG ALGORITHM

Karthika.A
PG Scholar, Department of Computer Science, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India
Raja sundari.K
Assistant Professor, Department of Computer Science, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India
Sharon nisha.M
Assistant Professor, Department of Computer Science, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India

Abstract –**Social network is a network which is made for social interactions and personal relationships. It is a website or application which allows the users to communicate with each other by sharing the information, comments, messages, images, videos etc. These networks are in need of spreading the information to the users of their network without any loss, in order to satisfy their clients like ad-agencies, politicians etc. For this purpose, gossip protocol is utilized as a gateway for information dissemination which is simple, efficient and robust. For efficient transmission of information, Dynamic Threshold algorithm is used. It is also used for transforming the information to the users under some constraints and parameters. It uses Time Division Multiple access to avoid time consumption. Their main goal is information diffusion among users with security, so SHA1.8 algorithm is utilized for secure transmission of information by using data integrity checking methods. It is also used to send the alert message to the users when someone embezzles their data. By using these approaches, information diffusion in social networks can be done in an efficient and reliable manner. Sheepdog algorithm is used to increase the number of users in the network.**

Keywords: Dynamic Threshold Algorithm, Pontryagin's Maximum principle, Gossip protocol, Sheepdog algorithm.

I. INTRODUCTION

Wireless Sensor Network (WSN) is a network consists of wireless devices, which can communicate with others, without any wired infrastructure. These devices also called sensor nodes, allows the communication through radio signals. Though it does not consist of any static infrastructure, it can form dynamic infrastructure based on any parameters like areas, IP addresses etc. These IP addresses are assigned to each device in the network, which is unique and used for node identification. It is used for monitoring, controlling and tracking of nodes in various applications. Social network is one of the rapidly raising applications of Wireless Sensor Networks. Social network is a network which connects people by allowing the users to share their information, messages, images and videos with others. Examples of social networks are Facebook, twitter, LinkedIn etc. Social Networking Service is a platform which builds social networks or relationships among users through internet, such as messenger, e-mail. Depends on this platform, members may communicate with others. It provides social connection, learning, political and social change in a variety of forms. It acts as an important medium to spread news and instructions about political elections, environmental issues, gossips etc. among people. So information diffusion in social network

is considered more important to connect people. For this purpose Dynamic Threshold Algorithm is used to spread the information in Social Networking Sites. Social networks are very powerful in many situations like elections, emergency situations and environmental issues. The information is spreaded based on the user's interests, topic of information and the reasons behind it. Gossip protocol acts as a gateway which is used for information dissemination. It is simple, powerful and robust to benign failures. With hundreds and millions of users, these social networks allow the users to stay in touch with their friends and relatives. Though it is useful sometimes it causes trouble to information security.SHA1.8 algorithm is used to protect the information. It sends alert messages to the user when someone embezzles their data. Sheepdog 0.6.0 algorithm is used for connecting many nodes by allocating one Zeta byte for each node. It allows SHA 1.8 algorithm for secure transmission.

II. RELATED WORK

In Reference [1] , two problems were addressed for concerning information propagation in a population a) the spread of a given message in the population was maximized within the stipulated time b) creating a given level of buzz measured by the fraction. Adjoin condition is very low and the step-size were fixed arbitrarily. Optimal strategy is to recruit for some initial duration till the budget is spent and then stop. This idea was get the population infected and also time consuming. In Reference [2], a broader framework was proposed that simultaneously generalizes two models, independent cascade and linear threshold models. It uses greedy algorithm for influence in social networks. The optimization problem cannot even be approximated NP hard to within a non-trivial factor. In Reference [3], the Optimal control techniques were applied for allocating campaigning resource over i) time ii) degree classes for maximizing the spread of a piece of information over social networks. The solution uses Pontryagin's maximum principle and forward-backward sweep algorithm for numerical computations. Information security was not considered during information dissemination. In Reference [4], the optimal control problem was solved by using Pontryagin's minimum principle and Forward Backward Sweep Algorithm. It maximizes the spread of information under a fixed campaigning budget constraint. Its goal is to reach as many people as possible within the campaign deadline. In Reference [5], the optimal control problem was solved by using Forward Backward Sweep Method (FBSM), Runge-kutta and Maximum principle. The time interval must be short to detect errors. In Reference [6], the problem to devise incentive strategies were addressed for viral marketing over a finite time horizon using optimal strategies, influence-and-exploit and exploit-and-influence. In some cases it may optimal for the seller to deploy incentive programs for low degree nodes. The problem was formulated as a continuous–time deterministic optimal control problem. The seller has good reputation in the market, *exploit-and-influence* strategy can be optimal whereas if social influence is strong in the population. In Reference [7], the epidemic spreading processes in large networks was considered. The spreading is controlled by external agents, where infection speed can be increased by these external agents. Based on the spreading time, upper and lower bounds were derived. The optimal spreading is done randomly for spatially constrained networks. In Reference [8], the nonlinear programming and simulation tools from MATLAB and SIMULINK were used to solve the problem of optimal control .It is based on single link manipulator, used to design fast and robotic algorithms. In Reference [9], the nonlinear differential equations were applied for the dissemination of messages in networks. It minimizes the cost function which is based on states and resources. It is optimal when the fractions of the disseminators were activated and the resource consumption must be irregular. In Reference [10], the epidemic spreading on network using SIS/ SIR dynamics were considered. External infection strategy allowed for sustaining the epidemic for lifetime, which is polynomial in number of nodes. Random external-infection strategy, with increasing rate of infected nodes allowed sustaining the epidemic for lifetime.

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III. SYSTEM MODEL

WSN allows the wireless devices to communicate with each other. These devices can sense other devices and can communicate with it. Social network is one of the rapidly rising applications of Wireless Sensor Networks. Examples of social networks are Facebook, twitter, LinkedIn etc. Information diffusion places a major role in these networks. For this purpose, Gossip protocol is used as a gateway to connect all the nodes in the network for information dissemination. It is simple, efficient and robust to benign failures and sensitive to attacks. Dynamic Threshold Algorithm is used to maximize the spread the information among users in the network. DTA algorithm is also used to assign unique threshold value to each node in the network for node identification. Time Division Multiple Access is used for rapid information diffusion. It is also used for sending acknowledgement for sender after the receiver receives the packet. Omega technique is used for selecting particular nodes in the network to send messages.

Genetic protocol is used for combining all the nodes of the network. For secure information dissemination in network, SHA1.8 algorithm is used. It performs automatic encryption and decryption processes in the sender and receiver respectively. In SHA1.8 algorithm, decryption is based on the threshold value and the TDMA process. It protects the users from third party access by sending notification of the user and automatic blocking of the hacker.

A. Request Analysis Module:

The user sends the data request to the database through the aggregation node. This request is analyzed by the scheduler before it reaches to the database. This helps to avoid overloading of user's request to server, by checking the type of file the user needs. The type of file may be text, image or video.

B. Server Load value Module

The server load value is identified for job allocation. To reduce the over load, different load values are assigned to the server based on the type of processing file. If the requested file is text, then the minimum load value will be assigned to that file by the server. If it is a video file, then the server will assign high load value for that file. If it is an image file, then it will assign medium load value to that file. Sheepdog algorithm is used for memory allocation for each node in the network.

C. Server Allocation Module

The server allocation task will take place in this module. To moderately manage mixed workloads, the job scheduling algorithm is utilized. In this, scheduling depends upon the nature of the request that the dynamically assigned load values of each file. The server will give the first priority to minimum load value file request than the high load value file request, while processing it. High load value file request will get the low priority by server and accessed next to the minimum load value file.

D. Degree Based Compartmental Module

As suggested by all the problem formulations, they only need degree distribution of nodes in the networks for presenting numerical results. Maximum degree in the scale free network is chosen for the following Dunbar's number which states that most humans only maintain 100 to 230 stable relationships at a time. It is also used for node activation and node acknowledgement.

E. Cryptography Module

In this module, both encryption and decryption is done automatically in sender and receiver side respectively.SHA1.8 algorithm is used for secure transmission of information i.e. it performs both encryption and decryption. Encryption is the process of converting ordinary information called plaintext into unrecognizable text called cipher text. Decryption is the reverse process of encryption, in other words, moving from

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the unrecognizable cipher text back to plaintext. A cipher is a pair of algorithms or key that creates and controls the encryption and the decryption process. The key is a secret parameter which is known to the sender and receiver of the network.

Fig. 1 shows the system design which represents the secure and efficient information diffusion in social networks using SHA1.8 algorithm and Dynamic Threshold Algorithm respectively. DTA algorithm is used for secure data transfer and recovery.

F. System design

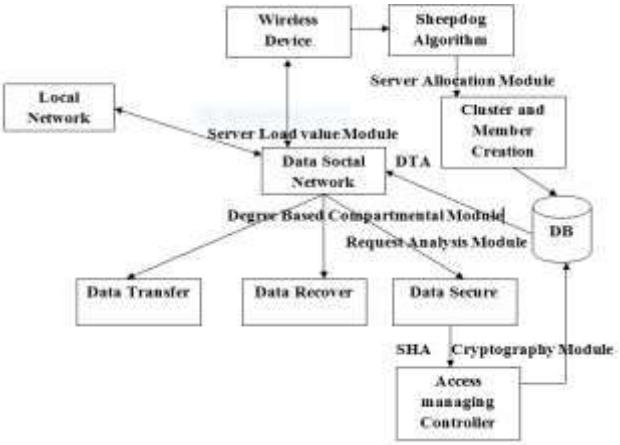

Fig. 1.System design

IV. PERFORMANCE ANALYSIS

The information diffusion in social networks can be done by request and response processes. The data request is send to the database by the user through the aggregation node. Then the request will be analyzed by the scheduler. Each data is assigned with the load value by the server, based on that load value; the data will be send to the requested user. If the node does not use aggregation node to send the request, then it will be infected and it also infects the neighbor node, which results in data loss for the infected nodes.

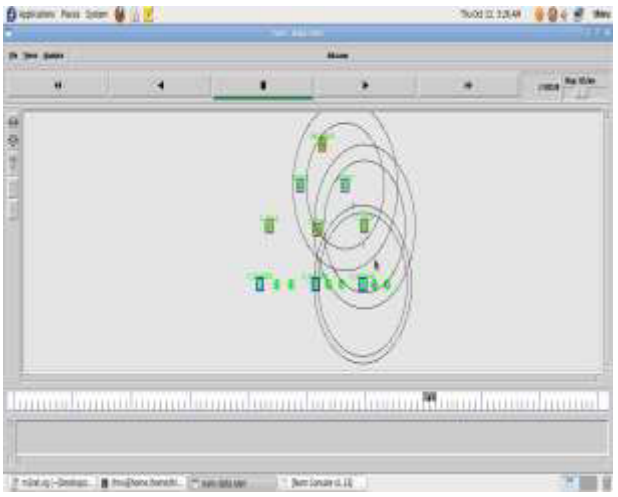

Fig. 2. Client's request for data

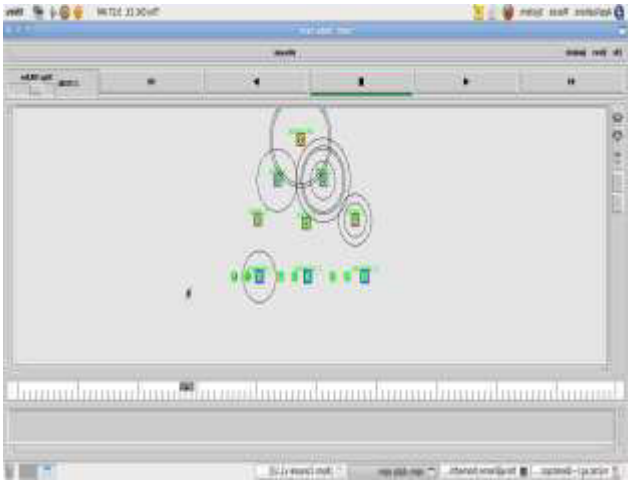

Fig. 3. Server's response with data

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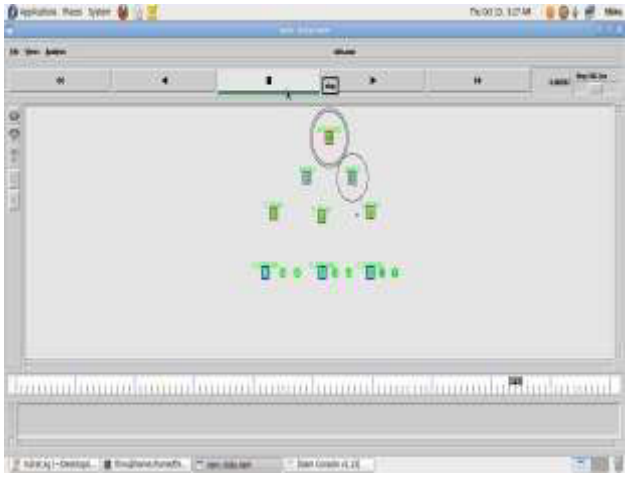

Fig. 4. Infected nodes

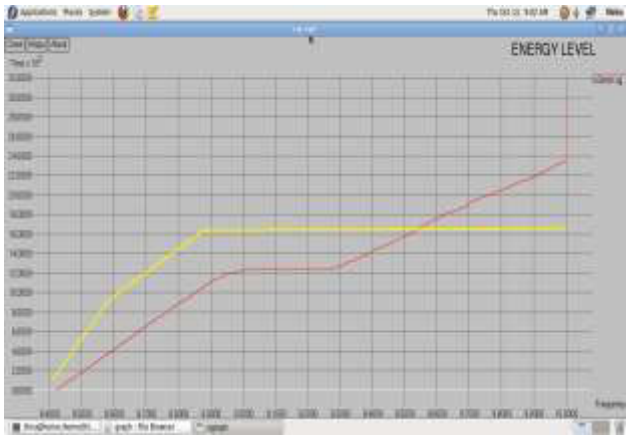

Fig. 5. Comparison of energy level

In Fig. 5 the energy level of a transmission in a particular group of nodes is specified. It is based on the frequency range and time of that transmission. The beginning and ending of the line represents the source and destination of the data transmission respectively. If traffic occurs during the transmission then the data may get corrupted. To avoid this, immediate recovery from the traffic is needed.

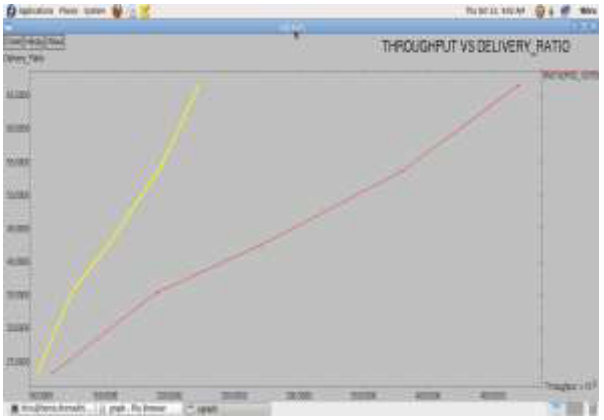

Fig. 6. Throughput versus Delivery ratio

In Fig. 6 the delivery ratio of the data is specified. If the delivery time of the data is increased gradually then the delivery ratio will be low and it leads to latency reduction, which affects the overall network performance. In Fig. 7 the delay of the data transmission is specified. In the existing work the delay is high, but in the proposed work the delay is comparatively low, which improves the overall performance of the network.

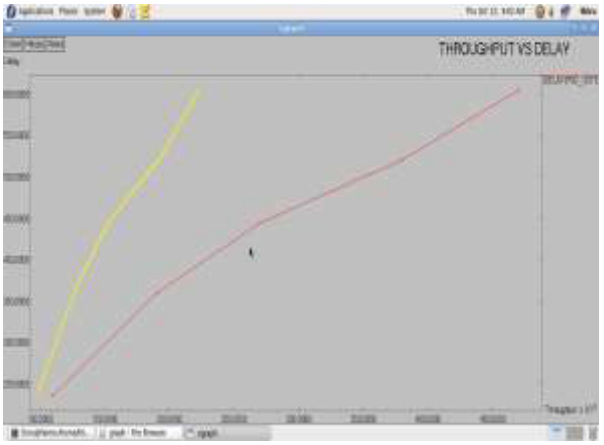

Fig. 7. Throughput versus Delay

V. CONCLUSION

Social Networking Site (SNS) is one of the essential parts of today's lifestyle and have large number of users; many of them use these sites in their daily practices. There are hundreds

of SNSs, where each site supports a different technique and interests. Social networks place a major role in information diffusion. Information can be disseminated in social networks; the information can be product ads, political news, etc. Information diffusion can be more efficient by using the Dynamic Threshold Algorithm than the existing forward backward algorithm. DTA algorithm supports various techniques for efficient information diffusion. In social networks, privacy risks may occur during their information diffusion. To protect the information from security threats like packet modification and third party access, SHA 1.8 algorithm is used. This algorithm is used to compress the data at the sender side to improve the speed of network. The number of users of the network can be increased by extending the area and minimizing the parameter constraint. Using the Sheepdog 0.6.0 algorithm, the speed of the network is increased by allocating memory for each node.

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