Performance Analysis of a Hybrid Information Sharing System Designed by Humans Networks

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Abstract: **As the current world is running through mobile devices for communication between each other, a lot of internet usage is also increased in order to process the data. Now a day's mobiles devices plays a very vital role in each and every human life, as there was increase in population day to day the usage of mobile devices also increased to a high extent. As the mobile users access the internet for processing their activities through mobiles there was a lot of problems that occur during their communication. If any of the intermediate nodes becomes in active while data is been transferred the remaining nodes cant able to take the data of previous node and carry to the destination automatically. This will lead to a major problem called as Data Loss or Attack.So in this paper we have implemented a hybrid network which was created by human that enable the information sharing between mobile devices through direct inter device communication also known as HHUNET.In this we have design a B-SUB network for inter-driven information sharing between HHUNET nodes. By conducting various experiments on this HHUNET, we finally came to a conclusion that this is the first time to implement such a HHUNET and it is very efficient and useful for almost all mobile users for data communication.**

Keywords: **Data Communication, Bloom Filter, Hybrid Network, Intermediate Nodes.**

1. Introduction

Now a day's almost all the mobile devices or remote terminals are used for sharing the data between each other within the limit or far distances. If we take an example of information sharing between limited distance ,we need to use the Wi-Fi as the source for communicating between two remote terminals, so if any node who wish to communicate between each other they need to reside within that limit and then start sending the data. This will be with no problem until a minimum number of nodes reside between the boundary regions, if there was any increase in number of remote relay nodes between that boundaries regions, this architecture fails [1].

Also in the current days a lot of users try to access delay-tolerant networks (DTN) as a medium to communicate the data in heterogeneous manner. By using these DTN networks there was a lack of work property. Samples of such networks are used in measuring those in operation in mobile or extreme terrestrial environments, or planned networks in house. Recently, the term disruption-tolerant networking has gained currency within the United States of America owing to support from Defense Advanced Research Projects Agency that has funded several DTN projects. Disruption might occur owing to the boundaries of wireless radio vary,

sparseness of mobile nodes, energy resources, attack, and noise.

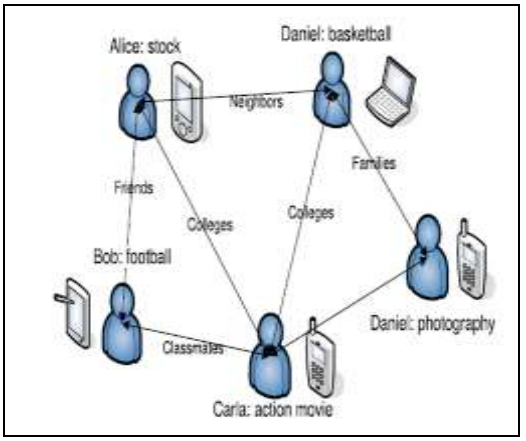

Figure 1.Represents the Architecture of High-Level Novel Human Networks (HHUNET)

As there was a lot of new application demands and therefore the limitations of the present architecture, we have a tendency to envision a replacement variety of dynamic networking service known as a Hybrid Human Network (HHUNETs). Physically, a HHUNET consists of human-carried mobile devices, which have an equivalent structure as DTNs. These devices use short-range wireless communication technologies, such as WiFi or Bluetooth, to speak with one another. Functionally, HHUNETs change info sharing between users in a very utterly suburbanized /De-centralized manner without the help of any sparse or dense wireless communication infrastructure. A high-level illustration of this design is conferred in Figure. 1. The figure shows a HHUNET composed of 4 users, each of which carries a mobile device. Users share info they are interested in with close peers through direct inter device wireless communication.

In the above figure 1, each and every user is equipped with a mobile device. Every user has his/her own interests, which is represented as a name: interest pair. Messages are forwarded between users via (Multihop) store-carry-forward guided by the user interests.

2. Related Work

In this section we will study the related or background work that was carried out in order to implement this current paper. This section will describe the work that is related to design and implementation of hybrid human networks (HHUNET) for improving the information sharing between a set of mobile users.

A) Information Sharing System (IIS) based on User Area of Interest

In this section we will define the best interest driven information sharing system in order to share the information effectively without any disturbances. In this paper we have implemented a new filter called as B-SUB which stands for the Bloom-filter-based publish/SUBscribe. This is mainly designed for communication of small or medium sized networks which contain a dozens of nodes connected at a time in order to participate in data sharing. Generally the proposed B-SUB is interest driven information sharing system which is designed for a network which has interdevice communication opportunities abundantly.

B) Parallel Computing

Distributed systems are groups of networked computers, which have the same goal for their work. The terms "concurrent computing", "parallel computing", and "distributed computing" have a lot of overlap, and no clear distinction exists between them.

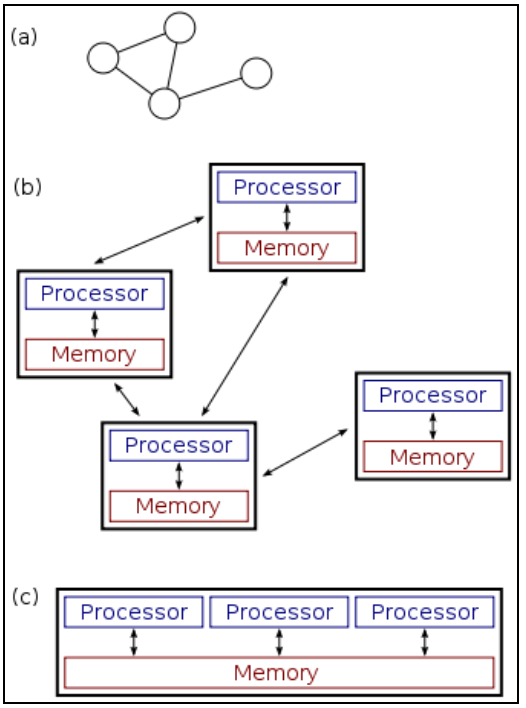

Figure 2. Difference between Distributed and Parallel Systems for Information Sharing

The same system may be characterized both as "parallel" and "distributed"; the processors in a typical distributed system run concurrently in parallel. Parallel computing may be seen as a particular tightly coupled form of distributed computing, and distributed computing may be seen as a loosely coupled form of parallel computing. Nevertheless, it is possible to roughly classify concurrent systems as "parallel" or "distributed" using the following criteria:

1. In parallel computing, all processors may have access to a shared memory to exchange information between processors.
2. In distributed computing, each processor has its own private memory (distributed memory). Information is exchanged by passing messages between the processors.

3. Distinctive Features of Bloom Filter (B-SUB)

In this section we will find out the distinctive features of B-SUB. They are as follows:

Initially, B-SUB employs content-based networking [2], [3] to attain infra structureless communication. B-SUB routes and forward messages based on their content rather than addresses, which enables autonomous access to interested info for users while not associate end-to-end addressing mechanism. Secondly, B-SUB is way a lot of economical than ancient content-based publish/subscribe. Mobile devices have weak processors and are power-driven by batteries. Their computational capability is very restricted. In addition, the memory capability and information measure of the nodes in a very HUNET also are scarce. Ancient content-based networking systems [4], however, are advanced and consume excessive memory and information measure. B-SUB employs a tag-based content description model and uses Bloom filters [5] to compress content and user interests. We tend to invent the temporal counting/enumeration Bloom filter (TCBF), associate extension of the Bloom filter, to write in code tags, which achieves economical content routing. However, the TCBF has false positives in their query that causes useless messages to be forwarded to nodes that aren't really inquisitive about their content. We analyze, in theory, several parameters that are associated with the false positive probability of the TCBF and their impacts on B-SUB's performance. The analysis is verified through intensive simulation studies.

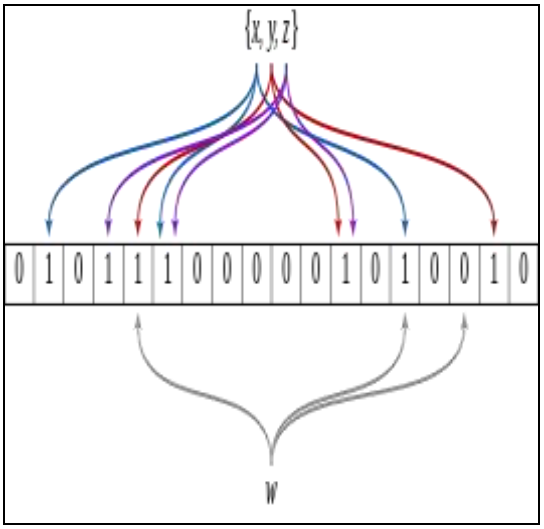

Figure 3. Represents the Example of Bloom Filter

From the figure 3, we can find a set which represents with three elements like {x, y, z}.Here the colored lines are used to represent that positions in the bit array that each and every set element is mapped to. And we can also find a new element **w**, which was not available in the set {x, y, z} as it hashes or mapped one –bit position to zero.

4. Proposed Hybrid Human Network (HHUNET)

In this section, we describe a HHUNET which comes under a tag-based content description model.

A) B-SUB Model Overview

In this section we will discuss about the model and it's detailed over view about the tag based content description model.

B-SUB has 2 components: content illustration and pub/ sub routing. B-SUB employs the tag-based content description model. The contents of messages and therefore the interests of users are known by tags, that area unit strings that summarize the topics of the message. They will keep in TCBFs, which are then used as probabilistic hints for forwarding messages. The pub/sub routing provisions 2 functions: interest propagation and message forwarding. Each supposes the TCBF to achieve low storage and machine complexities. B-SUB limits the dimensions of messages to a couple of quite a hundred bytes [11]-[13].

Large volume content distribution is ill-natured fascinating, but is difficult to provision given the existing infrastructure. It is also true in existing social networking applications that users tend to publish several small-sized messages. For example, Twitter [9], a preferred micro blogging application, limits the most size of every post to one hundred forty bytes [6] – [8].

B) Tag Based Description Model

The tag-based content description model is employed in B-SUB. To justify its effectiveness and pertinence, we have a tendency to conduct an experiment: users may have same tags to summarize the content of the given news titles. In this experiment, ten news titles area unit extracted from the websites of major news agencies throughout the last week of Dec2010.As delineate in Figure. 4, given a news title, completely different users may select distinct tags. So as for the tag-based approach to figure, completely different users shall have a standard view, i.e., same tags, for constant message, i.e., a news title in this experiment. We have a tendency to outline agreement to live a user's ability to seek out the common tags. It's calculated as follows:

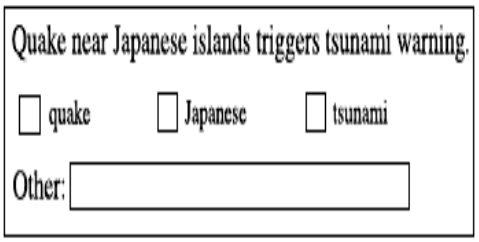

Figure 4. Represents a sample question based on tag based content description model

For the tag that's chosen by the foremost users, denote N because the number of users who selected that tag. The quantitative relation of N to the total variety of users is that the price of the agreement of this news title. The upper the agreement of a message, the more likely its tags match those of alternative users who have an interest in the message. An agreement of one indicates that each one user have a minimum of one common tag that describes the content of the news title. For instance, if a message contains a terribly low consensus, this suggests that each user contains a completely different tag for it. If it's labeled as "blue" by user A, and "red" by user B, and user B is fascinated by "red," then user A ought to send the message to user B as a result of its label applied by B is "red," that is that the same as his/her own interest. However, user A won't forward the message as a result of user A applies a different tag to the message and determines that user B is not fascinated by it [9], [10].

5. Implementation Modules

Implementation is the stage where theoretical design is turned out into a practical model. Generally in this implementation stage we will divide the application into number of modules, where each and every module has individual functionality. In this paper we have mainly 3 important modules. They are as follows:

1) Network Setup Module
2) B-Sub Initialization Module
3) Routing and Forwarding Module

Now let us look at each and every module in detail.

1) Network Setup Module

In this module we will initialize a HHUNET network which contains one producer node and multiple consumer nodes. Once if any consumer becomes in active state from active then immediately the system should convert any of the two nodes alternately as broker nodes or agent nodes. All these factors are represented in the first module. In this module the producer will generate the resources and consumers will utilize the resources.

2) B-Sub Initialization Module

In this module the consumers who wish their own interest for searching a specific data is stored on B-SUB. Once if the consumer interest is matched in the producer node, then it will be send that resource for the consumer. During this request and response if any consumer becomes inactive from its original state, then the B-SUB will store the user interest in the agent node. Now the Agent node will verify the content request which was asked by consumer in the producer storage area and if it is found matched the resource can be utilized by the consumer. If that resource is not available in the producer storage area then it will send an alert message for that requested consumer.

3) Routing and Forwarding Module

In this module, the data request which is send by the consumer will be received by the producer either in direct way or through the agent /broker node. Once the data request has been received it will verify the IPAddress and requested query in its storage node, if the query is matched by the producer data resources, it

will be forwarded directly to the requested consumers in a direct way. During the response or request if any of the consumer becomes in-active the requested resource will be send to the consumer via relay node I.e. Agent node .Here there is a chance of meeting multiple agent nodes for some resources in order to forward the resource to the requested consumer. If any attack is occurred during the request or at response time, the B-SUB engages in content routing ,in which it will collect the users interest from that disconnected node and it forwards that data request via relay node to the producer and in turn brings the data as a response for the requested consumer.

6. Conclusion

In this paper we have implemented a hybrid human network in order for efficient data sharing between a set of nodes. Here we have used B-SUB as a major Bloom Filter where this will be used to Publish or subscribe the information based on content based filtering. Also we have implemented a tag based contention model in order to identify the status of nodes based on the tags like active or in- active. By implementing the B-Sub we can able to design an infrastructure less filter over mobile devices. As an extension we have implemented privacy over B-Sub by introducing a new mode of status like Agent/Broker node at the times of failure. By conducting various experiments on our proposed system, our application has very rich facilities in terms of message sharing and privacy preserving compared with all the existing networks.

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