Utilization of peer assisted video streaming network with social reciprocity

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***Abstract* - Now a day's online video streaming and social networking are rapidly crossing each other. So content sharing on social networking users is increased, but the operational challenges are still continues like the huge amount of server cost required climbing the system. In this paper, efficient social media streaming network must be developed social relationships in the system, and introduced the two give and take ratios designed to exploit social reciprocity. It intend efficient Peer to Peer mechanisms for video streaming using the two ratios, where each user optimally decides which other users to seek relay help from and help in relaying video streams, respectively, based on combined evaluations of their social relationship and historical reciprocity levels. This scheme achieves effective incentives for resource contribution, load balancing among relay peers, smooth playback, high accuracy and efficient social responsive resource scheduling.**

***Index Terms*— Peer to peer network, Resource allocation, social reciprocity, video streaming.**

I. INTRODUCTION

A video streaming application is becoming a convergence trend between the systems. More and more media contents are uploaded and shared among users on social network sites. These type of application mostly use peer to peer technology has been supported to ease the server load in video streaming applications such that users directly send video streams to each other, with less dependence on the dedicated servers. So here this system users peer to peer video streaming with social reciprocity. In social networks, one of the important relationships between people is reciprocity. Reciprocity can be defined as the action of returning of similar acts. Reciprocity plays an important role in economic and social relations. Peer incentive means something that motivates to do something. Incentive mechanisms are essential components of peer to peer systems for file sharing. Since they enforce peers to share their resources and to participate.

In this paper, we design a social media sharing system which utilizes social reciprocity to incentivize effective bandwidth contribution and scheduling at the users, and employ peer assisted design to distribute video streams with low server cost and also short startup delay and high prefetching accuracy can be accomplished. Maintaining security to isolate cheaters and motivate users to cooperate great.

II. LITRATURE SURVEY

In 2013, Shen [5] implemented SocialTube, a novel peer-assisted video sharing system that explores social relationship, interest similarity, and physical location between peers in (online social network) OSNs. Specifically, SocialTube incorporates four algorithms: a social network (SN) based P2P overlay construction algorithm, a SN-based chunk prefetching algorithm, chunk delivery and scheduling algorithm, and a buffer management algorithm.

In 2012, in Wang's study [6] they verify that large-scale measurement of a real world online social network system to study the propagation of the social video contents. They shortened important characteristics from the video propagation patterns, including social locality, geographical locality and temporal locality. Motivated by the measurement insights, they intend a propagation based social aware replication framework using a hybrid edge cloud and peer assisted architecture, namely PSAR, to serve the social video contents. This replication strategies in PSAR are based on the design of three propagation based replication indices, including a geographic influence index and a content propagation index to guide how the edge-cloud servers backup the videos, and a social influence index to guide how peers cache the videos for their friends. By incorporating these replication indices into system design, PSAR has signicantly improved the replication performance and the video service quality.

In 2010, Recently Liu [8] carry out private (peer to peer) P2P file sharing systems with three contributions. First measurement study on a representative private Bit Torrent site provides more incentive for users to contribute and seed. Second, Liu developed a game theoretic model and analytically show that the ratio mechanism indeed provides effective incentives. But existing ratio incentives in private sites are at risk to collusions. Third, to prevent collusion, proposed an upload entropy scheme, and show through analysis and experiment that the entropy scheme successfully limits colluding, while rarely affecting normal users who do not collude.

In 2010, Liu [10] proposed a new incentive paradigm, Networked Asynchronous Bilateral Trading (NABT), which can be applied to a broad range of P2P applications. In NABT, peers belong to an underlying social network, and each pair of friends keeps track of a credit balance between them. There are only credit balances maintained between pairs of friends. NABT allows peers to supply each other asynchronously and further allows peers to trade with remote peers through intermediaries.

In 2009 Cheng [12] and Liu addressed NetTube, a peer to peer delivering framework that discovers the clustering in social networks for short video sharing, including a series of key design issues to realize the system, and a bi-layer overlay, an efficient indexing scheme and a prefetching strategy leveraging social networks.

In 2006, Pouwelse and Wang [16] implemented TRIBLER P2P file-sharing system, it's an as a set of extensions to Bit torrent. TRIBLER helps to automatically build a robust semantic and social overlay on top of Bit torrent, one of the most popular P2P file-sharing systems. They have shown how various TRIBLER components can yield good performance with respect to existing solutions. In particular, Pouwelse and Wang have presented evidence that collaborative downloading yields a significant speedup when used in a real Bit torrent swarm

In 2005 X. Zhang [18] presented Coolstreaming DONet, a Data-driven Overlay Network for live media streaming. The fundamental operations in DONet are very simple like every node periodically exchanges data availability information with a set of partners, and retrieves unavailable data from one or more partners, or supplies available data to partners.

III. SYSTEM ARCHITECTURE AND DETAILED DESIGN

In this paper main aim is to design peer to peer network for video streaming with social reciprocity. This scenario involves the source peer algorithm to select relay and relay algorithm for effective resource allocation. Detailed incentive design for relay resource contribution, through a social reciprocity index that defines, and efficient strategies that peers apply to schedule their resources. The system architecture of proposed system is shown in Fig 1. It consists of three phases as Source, relay and viewer. Detailed algorithms and rationale discussions follow in the next two sections.

A Mathematical Model of System:

Relevant Mathematics Associated with the Dissertation:

Set Theory:

1) Identify users

I = {i1, i2, i3, i4….}

Where I is main set of users

2) Identify their Registration

R = {r1, r2, r3, r4….}

Where R is main set of Registration

3) Identify Servers

S = {s1, s2, s3, s4….}

Where S is main set of servers

4) Process:

We define a security property. To ensure the correctness of user uses the application we propose login-password protection. Identify the processes as P.

P= {Set of processes}

P = {P1, P2, P3, P4……Pn}

P1 = {e1, e2}

{e1 register user}

{e2 identify user during login}

P2= {e1, e2, e3, e4}

{e1= Incorrect Password}

{e2= Erroneous Password}

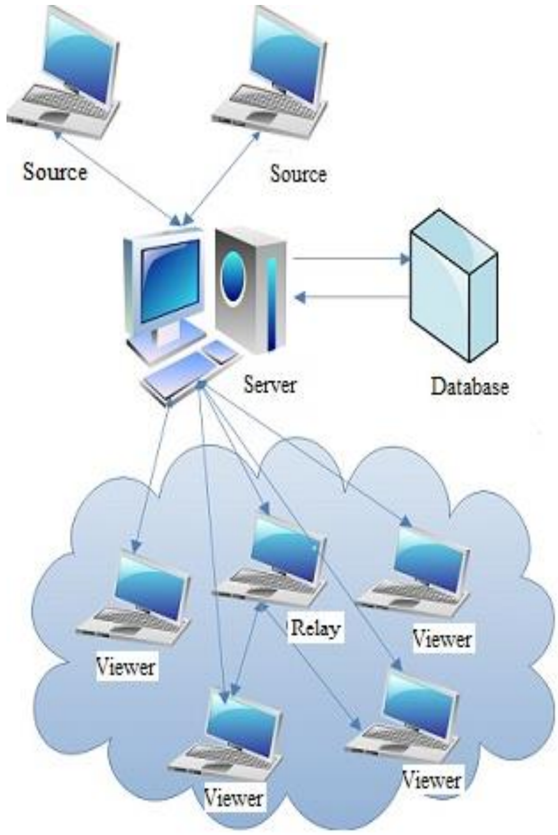

Fig. 1 System architecture of the proposed system

B Social Reciprocity Index (RI):

A social reciprocity index for each peer to evaluate its perceived contribution level from another peer, based on the two give-and-take ratios and the strength of social relationship between them two, as follows:

Social Reciprocity Index (RI): (1- closeness between first peer and j second peer)*SCR of second peer + (closeness between first peer and second peer * PCR)

Peer contribution ratio (PCR): total number of bytes peer first gave for second peers video / (total number of bytes peer first gave for second peers video+ total number of bytes peer second peer gave for first peer's video)

System contribution ratio (SCR): total number of bytes of first peer shared / (total number of bytes of peer first shared +total number of bytes other peers shared first peers Video)

This index is used in two effective algorithm for each source to choose which other peers to seek relay help from, and for each relay to optimally decide which source peers to help, respectively. Specifically, each source will choose peers with smaller RI values it evaluates as relay helpers, and each relay be likely to help sources with larger RI values it has evaluated.

C Source algorithm:

The function of source algorithm is to select relay. When the number of viewers of the video source peer produces exceeds its upload capacity, peer search for relay helpers. Three steps are involved: (1) Selecting Relays: When a source peer asks the server for candidate relays, the server will assign it with the relay peers that are socially closer to its friends. (2) Estimating Relay's Available Upload Bandwidth: Each candidate relay peer, which has unused bandwidth, may possibly help multiple other source peers. (3) Assigning Viewers to Relays: After relay peers are selected, the source peer decides which viewers to be served. The main algorithm working is as follows:

- Start with function called relay schedule called periodically.
- Check the upload capacity of relay peer is greater than or equal to viewer set of source peer and stream rate capacity.
- If the capacity of relay peer is sufficient, the stream will delivered to the viewer, If not the sort relay of source peer in ascending order of social reciprocity index (RI).
- Then denote the number of viewers to the served by relay peers to a variable.
- Next do all relay peer in sorting order by selecting the relay helper that have minimum reciprocity index.
- Check if the source peer is able to distribute to the viewer or its upload band with is smaller than terminate the IF statement.
- Then check number of viewers that relay peer is to server for source peer in a previous round of time slot is equal to number of viewers that source peer asks for relay to serve in time slot. The previous round of time slot then increment the number of viewers that asks relay to serve.
- Otherwise update the previous round of number of viewers that relay is to server for source peer to the number of viewers that ask relay to server. Above two steps will help to assign the number of viewers according to their upload capacity.
- Find out minimum viewers are assigned to relay peer and send to relay the video stream with assigned list of viewers.
- Check minimum viewers sets upload capacity of source peer.
- Once done, send video stream to remaining viewers and resort to the server for the information for helping remaining viewers.

D Relay algorithm:

This relay algorithm is used for resource contribution. First a peer has extra service capacity it may roll itself as a relay with the server, and may take itself down from the candidate list when its upload bandwidth is fully used. The steps of algorithm is as follows:

- First upload the allocations of resources as per source. Next Relay determines its upload bandwidth then allocates it to source peers according to their reciprocity index.
- Once completed sort requesting source set of relay peer in descending order according to reciprocity index.
- Then find number of viewers that relay is to serve for source peer and check relays upload capacity as per number of viewers.
- Then send allocation list to source peer and send video stream to the corresponding viewer.

Here source peers are allocated to upload slots according to how much help they have provided historically. This incentivizes a peer with spare upload resource to contribute relay help, such that when it needs relay help for distributing its own video streams, its social reciprocity indices can rank high at other peers, and it can easily receive relay help in return.

E Prefetching strategy:

This prefetching strategy is help to improve efficiency. A prefetching strategy to enable high worth streaming. By prefetching the prefix chunks of a video that is likely to be viewed by a user, a short startup delay and smooth playback can be achieved. This Prefetching strategy is based on users preferences gradually learnt from their historical video access patterns. In the online social network, user's preferences of videos are predicted by:

Choosing Videos to Prefetch: In the social video streaming, a viewing user has to choose among many videos to Prefetch. In our design, the viewing user's video preference is predicted by, Historical Selection of the Source User. For example In the online social network, viewing user i chooses videos shared by multiple source users in set Y_i, which is the set of source users whose shared videos are likely to be viewed by user i. Y_i contains all i's friends, and strangers whose shared videos have been watched by i before. We define a pairwise index h_{ij} to evaluate i's historical selection level of source user j as

$$h_{ik} = C_{ij} \;/\; \sum K \in Y_i C_{ik} \qquad (1)$$

Where j ∈Yi and Cij is the number of historical views that peer i watches videos shared by peer j. Large hij indicates that user i prefers videos shared by user j, such that user i can still choose videos shared by user j in the future.

Social Closeness between the Viewing User and the Source User: Users are more likely to watch videos shared by their friends. Such social preference between friends is evaluated by a straightforward metric, which is the fraction of their common friends over their total friends. The social closeness fij between user i and user j is defined as

$$F_{ij} = \left| f_i \cap f_j \right| / \left| f_i \cup f_j \right| \qquad (2)$$

Where intuitively, larger fij indicates stronger social closeness between i and j.

Preference of a Source User: According to our observations, both historical selection and social closeness predict a viewing user's future preference of source users. A source preference index eij to evaluate how much viewing user i likes to watch videos shared by source user j as

$$e_{ij} = w_i f_{ij} + (1- w_i)\, h_{ij} \qquad (3)$$

Where w_i is a parameter for a peer to adjust the weights of historical selection and social closeness. Larger w_i indicates that i selects videos more according to friend links.

Video Popularity: Source preference index e_{ij} evaluates viewer i's preference to choose source user j. However, a source can share multiple videos; while for a viewing user, only being able to select the best source users is not enough to do the prefetching. We next give the video rank scheme based on video popularities and source preference indices. The popularity of a video reflects how much viewing users like the video. The popularity of video k is defined as pk, which is the number of views that users watch the video. When a user logs in his account, he is provided a list of unwatched videos shared by his friends and other users. The number of these videos can be very large for a viewing user.

After that, the user (peer) downloads prefix chunks of the ranked videos in order. When prefetching a video, a peer actively downloads the prefix chunks of that video, i.e., the first several chunks prefetching strategy is carried out by a peer locally when the buffered chunks for the current video can be played. The startup delays thus can be reduced when the user plays videos that have been prefetched.

F Advanced encryption standard (AES)algorithm:

AES comprises three block ciphers, AES-128, AES-192 and AES-256. Each cipher encrypts and decrypts data in blocks of 128 bits using cryptographic keys of 128-, 192- and 256-bits, respectively. Symmetric or secret-key ciphers use the same key for encrypting and decrypting, so both the sender and the receiver must know and use the same secret key. All key lengths are deemed sufficient to protect classified information up to the Secret level with Top Secret information requiring either 192- or 256-bit key lengths.

The constructed Advanced encryption standard (AES) encryption is generally used for encrypt the videos. AES is a feasible solution to secure real time video or video on demand transmissions. AES provides Complexity, High speed, Very Low memory, key type Private, key length of 128, 192, 256 bit, High security.

IV. CONCLUSION

This supports utilizing social reciprocities among peers for efficient contribution incentivization and uploading scheduling, to enable efficient social media sharing with low server costs. It exploit social reciprocity with two light weighted give and take ratios at each peer, which record peer's contributions to social friends and to the entire system, respectively. It also used to design efficient peer-to-peer mechanisms for social media video streaming based on a combination of peers social relationship and historical contribution levels. Through analysis assumes that this design is able to achieve effective incentives for resource contribution, load balancing among relay peers, as well as efficient social aware resource scheduling. All these achieves that high-quality, less startup delay, high accuracy, security large-scale social video streaming can be achieved based on this design.

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