Game-Theoretic Pricing for Video Streaming in Mobile Networks

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Abstract:

Mobile phones are among the most popular consumer devices, and the recent developments of 3G networks and smart phones enable users to watch video programs by subscribing data plans from service providers. Due to the ubiquity of mobile phones and phone-to-phone communication technologies, data-plan subscribers can redistribute the video content to nonsubscribers. Such a redistribution mechanism is a potential competitor for the mobile service provider and is very difficult to trace given users' high mobility.

The service provider has to set a reasonable price for the data plan to prevent such unauthorized redistribution behavior to protect or maximize his/her own profit. In this paper, we analyze the optimal price setting for the service provider by investigating the equilibrium between the subscribers and the secondary buyers in the content-redistribution network.

We model the behavior between the subscribers and the secondary buyers as a noncooperative game and find the optimal price and quantity for both groups of users. Based on the behavior of users in the redistribution network, we investigate the evolutionarily stable ratio of mobile users who decide to subscribe to the data plan. Such an analysis can help the service provider preserve his/her profit under the threat of the redistribution networks and can improve the quality of service for end users.

1. Introduction:

The explosive advance of multimedia processing tech- nologies are creating dramatic shifts in ways that video content is delivered to and consumed by end users. Also, the increased popularity of wireless networks and mobile devices is drawing lots of attentions on ubiquitous multimedia access in the multimedia community in the past decade. Network service providers and researchers are focusing on developing efficient solutions to ubiquitous access of multimedia data, particularly videos, from everywhere using mobile devices (laptops, personal digital assistants, or smart phones that can access 3G networks) [1], [2]. Mobile-phone users can watch video programs on their devices by subscribing to the data plans from network service providers [3], [4], and they can easily use their programmable hand devices to retrieve and reproduce the video content. To accommodate heterogeneous network conditions and devices, scalable video coding is also widely used in mobile video streaming [5]–[7]. Video appli-cations over mobile devices have drawn lots of attention

2. Existing system:

In existing system mobile phones are among the most popular consumer devices, and the recent developments of 3G networks and smart phones enable users to watch video programs by subscribing data plans from service providers. Due to the ubiquity of mobile phones and phone-to-phone communication technologies, data-plan subscribers can redistribute the video content to nonsubscribers Such a redistribution mechanism is a potential competitor for the mobile service provider and is very difficult to trace given users' high mobility. The service provider has to set a reasonable price for the data plan to prevent such unauthorized redistribution behavior to protect or maximize his/her own profit.

3. Proposed System:

In proposed system we analyze the optimal price setting for the service provider by investigating the equilibrium between the subscribers and the secondary buyers in the content-redistribution network. We model the behavior between the subscribers and the secondary buyers as a noncooperative game and find the optimal price and quantity for both groups of users.

Based on the behavior of users in the redistribution network, we investigate the evolutionarily stable ratio of mobile users who decide to subscribe to the data plan. Such an analysis can help the service provider preserve his/her profit under the threat of the redistribution networks and can improve the quality of service for end users.

2.1. Feature:

- Easily identified the secondary buyers.
- Only subscriber only watches the video from service provider.
- Only authorized user only downloads the videos

4. Implementation:

In this section, we will introduce the channel, transmission, and video rate-distortion models for the transmission of video streams over wireless networks.

Step 1: Game theory:

Game theory is the formal study of conflict and cooperation. Game theoretic concepts apply whenever the actions of several agents are interdependent. These agents may be individuals, groups, firms, or any combination of these. The concepts of game theory provide a language to formulate structure, analyze, and understand strategic scenarios.

Step 2: Subscriber Module:

In this module subscriber choose video and download the video from service providers. Subscribers pay the amount to service provider.

Service provider provides that video key to subscriber. So subscribers watch the video using video key. Also subscriber, redistribute the video to another user such as using blue tooth or Wi-Fi technologies.

Step 3: Secondary Buyers

In this module secondary buyers easily getting the video from subscriber using Wi-Fi or blue tooth technologies. Secondary buyers don't pay the amount to service provider. And same time secondary buyers don't have a video key. But same time secondary buyer does not possible to watch that video.

Step 4: Admin module

In this module admin upload the video to database. Also view the subscriber details and user details. Admin find the redistribute details. Also who send the video and receive the video.

5. Conclusion and future work:

We have investigated the optimal pricing for mobile video data by analyzing the video redistribution network between data-plan subscribers and nonsubscribers. We have first analyzed the equilibrium price of the video stream redistributed by the subscribers given the number of subscribers and secondary buyers. Consequently, the results provide a guideline for the content owner to prevent the redistribution behavior and to maximize the service provider's payoff.

The redistribution behavior has been modeled as a Stackelburg game, and we have analyzed the optimal strategies of both subscribers and secondary buyers. From the simulation results, a secondary buyer will tend to buy more power from subscribers with better channel to maximize his/her utility. If the total number of the subscribers increases, a secondary buyer can obtain a larger utility value, and the payment to each subscriber is reduced due to a more severe competition among the subscribers. Also, when the mobile phone network is crowded, a secondary buyer tends to purchase the video stream from fewer subscribers, and the price for the streaming service can be higher. Nevertheless, the service provider should always offer high-quality video stream to prevent the illegal redistribution of video via such redistribution networks.

Next, we have extended the model by including the content owner in the game and letting the mobile phone users decide whether to subscribe to the data plan. In the extended model, we model the dynamics between the content owner and the users who are interested in the video content, and study how the content owner (the service provider) sets the price for the data plan to maximize his/her overall income. We have used the evolutionary game theory to analyze the evolution of the mobile users' behavior and have derived the evolutionarily stable equilibrium, which leads to

the optimal pricefor the content owner to maximize his/her total income.

6. Referances:

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