Video and Audio Recording-based Audience Rating

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ABSTRACT

OTT service provides various content consumption environments such as PC and mobile devices including laptops, smart pads and smart phones. In order to accurately evaluate the value of the content provided by OTT services, it is necessary to conduct an audience rating survey. However, the existing home TV audience rating survey method is not proper for the OTT service environment which is mainly executed on mobile platforms. In this paper, we propose a video and audio recording-based audience rating survey method for the OTT service environment. Experiments in the iOS environment show that the proposed method can extract audio information when watching OTT services. By using the proposed method to aggregate what content users watch, it will be easy to investigate the audience rate in an OTT environment.

KEYWORDS

OTT, Audience Rating, Recording, iOS

1 INTRODUCTION

OTT (Over-The-Top) service provides media content such as broadcast programs and movies over the Internet. Media content consumers are shifting from watching home TV to OTT services such as YouTube and Netflix where they can watch media content at any time they want. The OTT industry and the market have been growing rapidly due to the impact of COVID-19 over the past few years. One of the OTT service providers, Netflix, has announced that its total revenue has increased by 19% between 2020 and 2021[1]. In addition, the global statistics portal Statist predicts that the total sales of OTT will reach 476.71 billion dollars in 2027[2].

Since global OTT service providers, such as Netflix, collect and manage viewing data such as audience rating and user information, they can easily grasp the audience rating on their own. While the audience rating of OTT content is a measure for evaluating OTT media content and a basis for setting advertisement fees, the OTT service providers do not tend to open the audience rating. This monopoly of viewing data and audience rating creates a problem in which media content usage settlement and value evaluation depend on OTT service providers.

For this reason, advertisers or content creators should measure the audience rating by themselves in order to properly measure the advertising costs and content yields.

Currently, the most commonly used method for measuring TV audience rating is a people meter which is a rating survey device. The people meter survey device assigns numbers to panel household members, collects household and individual audience information, and measures audience rating based on this. However, it is difficult to determine the audience rating by applying existing methods because OTT services are used to use various media content consumption platforms such as PC, mobile, smart TV, and different software platforms. In addition, certain OTT service providers blocked the ability to capture video images in other processes on mobile devices for reasons such as copyright issues, making it impossible to use audio watermarking and feature point-based image recognition technology. Therefore, a separate audience rating survey tool is needed for OTT services in consideration of various environments of media content consumption.

In this paper, we examine the characteristics and limitations of the existing audience rating measurement and propose a video and audio recording-based audience rating survey method considering the OTT service environment. The proposed method is implemented in the iOS-based mobile environment, and through experiments, it is shown that the proposed method can accurately extract audio information from OTT service contents. Through the proposed method, accurate viewing information for each content can be collected in various OTT service environments.

The remainder of the paper is organized as follows. Section 2 examines the characteristics and limitations of the current audience rating measurement. Section 3 describes the proposed method and evaluates its functions. Finally, concluding remarks are provided in Section 4.

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Table 1: Measuring Methods for Audience rating

Country	Survey Method	Measuring Method
South Korea	People meter	Meta tag, Audio feature matching
United States	People meter	Meta tag, Audio feature matching, Audio Watermarking
Canada	Diary, People meter	Audio Watermarking
Norway	People meter	Meta tag, Audio feature matching, Audio Watermarking
United Kingdom	People meter, Software	Audio feature matching
Germany	People meter, Software	Audio feature matching

2 Measuring Methods for Audience rating

Table 1 shows the overview of major countries' measuring methods for audience rating. The People Meter method is the most used method for audience rating surveys. Some countries are piloting the software method to survey audience rating in PC and mobile environments. Techniques applied to rating measurement include meta tag, audio watermarking, and feature-based matching. The following describes the characteristics and limitations of those three audience rating measuring methods.

2.1 Meta Tag

There are two types of meta tag methods: the method using the <meta> tag of the HTML document[3] and the method of tagging the URL using metadata and identification information. In both methods, metadata having identification information is inserted into the media content. The meta tag method is relatively simple to implement compared to other methods and has the advantage of accurately identifying media content. In addition, since various metadata can be tagged, the efficiency of viewing behavior analysis can be increased.

However, in the meta tag method, information on the meta tag must be delivered in advance to a broadcaster that provides media content or an OTT service provider. Even if the information is provided, if meta tags are not standardized, there is a limit to the investigation of the viewing behavior of media content due to different classification systems. Moreover, when a third party edits and redistributes media content, the meta tag method makes it impossible to identify the redistributed content.

2.2 Audio Watermarking

Audio watermarking converts media content metadata into a frequency band signal that is difficult for the human ear to detect and inserts it into the content[4]. Nielsen, an audience rating research company, inserts an audio watermark into media content in 2-second increments and transmits it in the broadcast transmission stage with the cooperation of broadcasters[5]. The people meter of the panel detects the watermark signal and confirms whether the panel views the media content.

In the case of viewing media content using earphones or headsets, audio with watermark information does not reach the People Meter, so media content consumption using speakers is forced. Furthermore, using this method requires consultation with a media content provider in order to embed a watermark.

2.3 Feature-based Matching

The feature-based matching method analyzes video and audio components of media content extract features and compares them with a database[6]. The extracted features maintain their properties even if the file is intentionally or unintentionally deformed, so that accurate identification is possible even in the deformation of media content. Audio features are used for rating surveys. In order to calculate the viewing record of a panel, a matching operation must be performed, and a reference DB must be established for matching. The reference DB stores the characteristics of each media content source.

The measurement technique using audio features has a disadvantage in that it is impossible to extract features when noise is mixed in measuring devices such as People Meter. For this reason, there is a limit in that the panel is forced to use a dedicated earphone for noise cancellation.

3 Recording-based Audience Rating Survey

In this paper, we propose a video and audio recording-based audience rating survey method to overcome the audio recognition limitation of the People Meter method. The proposed major targets major OTT service environments such as mobile devices and PCs. The proposed method uses provided recording function in each environment to record video and audio while the user is watching media content in an OTT service. Unlike People Meter, the recorded audio does not lose viewing information and the disadvantages of Audio Watermarking and Feature-based matching for the audience rate can be improved. We implement a prototype of the proposed method in an iOS environment where the security policy is strict so that it is hard to access and control other processes' behaviors. We also show the validation of the proposed method in various mobile platforms where OTT services are used.

3.1 Prototype

The proposed method is implemented using the ReplayKit framework[7] provided by Apple. Replaykit includes a broadcast activation function. So, using the ReplayKit framework, users can record video and audio from the app or microphone via broadcast.

Fig. 1 shows the start button for broadcasting. When the user presses the button to start the broadcast, the broadcastStarted() function is called, and the video and audio are written to the BroadcastWriter in the form of a buffer. When the user finishes broadcasting, in the boadcastFinished() function, BroadcastWriter saves the recorded buffer. Fig. 2 shows that the recorded buffer is perfectively saved.

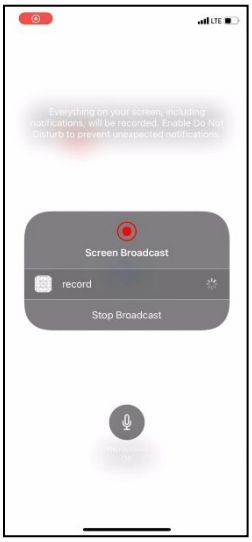

Figure 1: Screen Broadcast

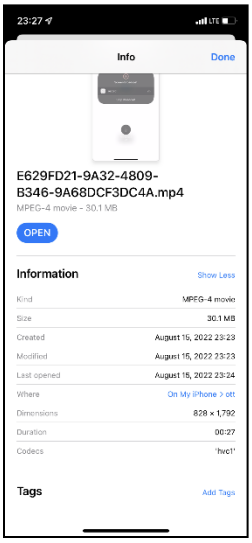

Figure 2: Recorded Buffer

3.2 Experiment and Evaluation

For the evaluation of the implemented prototype, an experiment has conducted in several famous OTT service environments, including Netflix, Disney+, Youtube, and Tving, and the results were checked. The experimental results are shown in Table 2. Experimental results show that the implemented prototype successfully performs audio recording, which is the goal of the proposed method.

Table 2: Evaluation Results

OTT	Video	Audio	Audio (wired)	Audio (wireless)
Netflix	X	O	O	O
Disney+	X	O	O	O
Youtube	O	O	O	O
Tving	O	O	O	O

4 CONCLUSIONS

In this paper, a video and audio recording-based audience rating survey method was proposed to solve the limitations of the existing audience rating measurement techniques. For the evaluation of the proposed tool, a prototype was implemented to record video and audio in the iOS environment using the ReplayKit framework provided by Apple. As a result of testing the implemented prototype in the actual OTT service environment, it shows that the audio recording performed successfully.

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