INTELLIGENT ADVERTISEMENT SELECTION

Courtney Hampson
Mary Witkowski

Media players may present advertisements to users in conjunction with requested content (e.g., video, etc.). An advertisement presented in conjunction with a requested video might be a video clip that is presented prior to playback of the requested video, or after playback of the requested video, or an “in-stream” video clip that is presented at some point during the playback of the requested video, as is typically done in television broadcasts. Conventionally, a selection of an advertisement for presentation in relation to the requested video is typically done based on the content of the requested video. For example, if a user has requested a music video of a particular singer, an advertisement selected for presentation prior to the requested music video may resonate with fans of that singer, such as an advertisement of a product for which the singer is a spokesperson. However, such an advertisement selection does not take into account the user’s past interactions with other advertisements.

We present a mechanism that utilizes user past interactions with advertisements (“ads”) to intelligently select ads for presentation to users in conjunction with videos. For advertisers, it is desirable for their ads to be presented to users to whom the ads are most relevant. Similarly, it is desirable for a provider of a content sharing platform that hosts videos, as well as the users who view videos. The mechanism can be employed in conjunction with other advertisement selection techniques, or can be employed independently.

In one implementation, when a user submits a request to view a particular video, our mechanism considers behaviors of the user with respect to ads previously presented to that user – perhaps in addition to properties of the currently-requested video (e.g., content of the video, etc.), or instead of such properties. For example, suppose that a user submits a request to view a video
pertaining to a political campaign. Suppose further that an analysis of, say, the past 20 ads that the user has viewed indicates that the user has watched ads with a family theme (e.g., a Disney ad, etc.) all the way through, but did not watch any other ads all the way through. In view of this analysis, the user might be presented with a family-themed ad, rather than an ad pertaining to politics – the motivation being that the user will more likely engage with the family-themed ad, based on the user’s interaction behaviors with respect to previously-presented ads. In some implementations, the previously-presented ads considered for analysis might be determined with respect to a particular time interval (e.g., user interaction with ads viewed in the past three months, etc.).

Interaction behaviors with previously-presented ads might include one or more of the following:

- watching an ad all the way through without skipping it;
- sharing an ad (e.g., via the content sharing platform, via a social network, via text messages, via email, etc.);
- “liking” or up-voting an ad;
- returning to a website or application (“app”) associated with the content sharing platform to re-watch an ad;
- re-watching an ad by “rewinding” to the beginning of the ad;
- visiting or subscribing to a “channel” associated with the advertised product or with the advertiser;
- commenting on the ad;
- commenting on a channel associated with the advertised product;
- commenting on a channel associated with the advertiser;
• adding an ad to a playlist;
• performing an Internet search for the ad;
• performing an Internet search for the product;
• performing an Internet search for the advertiser;
• visiting the advertiser's website;
• downloading the advertiser’s app;
• making an online purchase of the advertised product; or
• making an online purchase via the advertiser’s website.

In some implementations, a time threshold may be established for one or more of the above interactions (e.g., the interaction occurring within 24 hours of viewing an ad, etc.). In addition, some implementations might employ machine learning in the analysis of previously-presented videos. For example, a classifier (e.g., a Support Vector Machine, etc.) might be trained based on interactions with previously-presented videos, and the classifier then used to select advertisements, as will be discussed in more detail below.

Figure 1 depicts a flow diagram of a method for selecting an advertisement to present to a user in conjunction with a video, in accordance with some implementations. First, at step 102, a request by a user to view a particular video is received. For example, the requested video might be a music video of a particular singer, and a shampoo ad might be slated to present along with the video (e.g., a “default” ad associated with the video, etc.) because the singer is a spokesperson for the shampoo line being promoted in the ad.

Next, at step 104, past user interactions with advertisements are identified and analyzed. As described above, past user interactions may include watching an ad all the way through without skipping it; sharing an ad (e.g., via the content sharing platform, via a social network, via
text messages, via email, etc.; “liking” or up-voting an ad; returning to a website or application ("app") associated with the content sharing platform to re-watch an ad; re-watching an ad by “rewinding” to the beginning of the ad; visiting or subscribing to a “channel” associated with the advertised product or with the advertiser; commenting on the ad; commenting on a channel associated with the advertised product; commenting on a channel associated with the advertiser; adding an ad to a playlist; performing an Internet search for the ad; performing an Internet search for the product; performing an Internet search for the advertiser; visiting the advertiser's website; downloading the advertiser’s app; making an online purchase of the advertised product; or making an online purchase via the advertiser’s website.

Next, at step 106, an ad is selected based on the above analysis. As an example, the analysis might indicate that the user has not interacted favorably with previously-presented beauty-related ads (e.g., not watching beauty-related ads all the way through, etc.), but has interacted favorably with family-themed ads. In such an example, a family-themed ad might be substituted for the shampoo ad and presented to the user along with the requested music video. In some implementations, the selection of an ad might be preceded by applying a ranking algorithm to rank candidate ads based on the analysis of past user interactions with ads. In addition, as described above, some implementations might employ machine learning in the analysis of the previously-presented ads, and/or in the selection of the ad to present to the user in conjunction with the requested video. For example, characteristics of ads associated with specific prior user interactions may be provided to a machine learning algorithm, which can use those characteristics to recommend an ad for presentation to the user in conjunction with the requested video. Such specific prior user interactions may include watching an ad all the way through without skipping, sharing an ad, commenting on an ad, approving (“liking” or up-voting)
an ad, re-watching an ad, adding an ad to a playlist, subscribing to a channel associated with an ad, making an online purchase of a product being promoted by an ad, etc.

Next, at step 108, the selected ad is presented to the user in conjunction with the requested video. As described above, the selected ad might be a video clip that is presented prior to playback of the requested video, or after playback of the requested video, or in-stream.

Next, at step 110, user interactions with the presented ad are determined and added to the past interaction data for future use. In some implementations, the new user interactions might be used to update a classifier’s training (e.g., added to a training set, etc.) to improve ad recommendations for future videos. Execution of the flowchart of Figure 1 may then be repeated for videos that are subsequently requested by the user, and/or for videos that are subsequently requested by other users.

The mechanism described herein allows the topic of an ad to be different from the topic of the requested video, and diversifies the types of ads that can be shown before the requested video. Because the mechanism described herein selects ads based on prior user interactions with other ads, the selected ads are more likely to be of interest to the users. As such, users are more likely to watch such ads to the end (i.e., user engagement with ads increases as ad relevancy to the user increases), and advertisers are better able to provide their ads for people who have shown a preference to that type of ad in the past due to different reasons, including for example school assignments, work research, and many other reasons.
ABSTRACT

A mechanism for intelligently selecting advertisements to present to users in conjunction with videos. The mechanism identifies and analyzes past user interactions with advertisements, and uses this analysis to intelligently inform advertisement selection. Past user interactions may include watching an ad all the way through without skipping it; sharing an ad; “liking” or up-voting an ad; returning to a website associated with the content sharing platform to re-watch an ad; re-watching an ad by “rewinding” to the beginning of the ad; visiting or subscribing to a “channel” associated with the advertised product or with the advertiser; commenting on the ad; and so forth. The mechanism can be employed in conjunction with other advertisement selection techniques, or can be employed independently.

**Keywords:** video, advertising, user interaction, ad selection, machine learning
Receive a request by a user to view a particular video

Identify and analyze past user interactions with advertisements

Select an ad based on the analysis of past user interactions with ads

Present the selected ad to the user in conjunction with the requested video

Determine user interactions with the presented ad and add the user interactions to the past interaction data

FIG. 1