A Novel framework for Collaborative Video Recommendation, interest Discovery and friendship Suggestion Based on Semantic Profiling

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ABSTRACT

Two important challenges for social networks are the creation of targeted and personalized content for their users, selecting the most interesting material from the huge amount of user-generated content, and keeping user engagement , e.g. through creation and curation of users' profiles. In this demo we show a system for video commenting, sharing and interest discovery that combines recommendation algorithms, clustering techniques, tools for video tagging and evaluation of semantic resources relatedness. Combining these tools and techniques it becomes possible to provide personalized multimedia services and to improve and propagate interests and inter-personal connections through the network.

Categories and Subject Descriptors

H.3.5 [**Information Storage and Retrieval**]: Online Information Services; H.4 [**Information Systems Applications**]: Miscellaneous

General Terms

Algorithms, Design, Experimentation

Keywords

Social video tagging, internet videos, social video recommendation

1. INTRODUCTION

Nowadays the main challenges of a social network are, on the one hand, the targeting and personalization of services and resources to help users to choose from a wide variety of alternatives deriving from the huge amount of user-generated content in the network, on the other hand, the creation and curation of public profiles as a means to motivate users to be engaged with the systems. Considering online videos fruition the goal is to help users to find the most relevant content according to their recurrent viewings or preferences. As shown in [1], recommendation is a much more powerful force in driving users to watch new videos than direct searching.

Typically the approaches presented in the scientific literature are based on textual analysis of the metadata that accompany a video, possibly complemented by some multimedia content analysis, and user activity such as video player interaction. The YouTube recommendation system, described in [2], uses two broad classes of data: 1) content data, such as the raw video streams and video metadata such as title, description, etc., and 2) user activity data, either explicit (e.g. video rating/liking) and implicit (watching a video for a long time). Another important aspect to be considered is user interaction on social networks: this is motivated by the fact that, according to YouTube statistics, every day more than 500 years of videos are viewed on Facebook[1]. In [3] has been proposed a system that merges video content and social networks to gather semantic metadata to describe interaction, usage and opinion on video content.

2. DEMO

In this demo we present "InTime", a social network site[2], that combines a profiling module (through online social network, i.e. Facebook) and user's activity analysis, like semantic tagging, to generate targeted services for the users of the social network; this is achieved using a module for semi-automatic user profiles generation and curation, where the user profile that is created is exploited as a place to perform recommendation of videos, users and resources of interest. We show how helping users to create and maintain more easily their personal profile page, by semi-automatic means, also eases the task of creating targeted recommendations. The demo shows how to create a user profile containing the interests of a person through video commenting, how this profile is used to suggest new videos, friends and Wikipedia articles, and how the profile can be maintained and curated - manually and automatically - through video commenting. As highlighted in [4], interest targeting and friendship prediction are improved by considering the information contained both in interest and friendship networks.

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http://dx.doi.org/10.1145/2502081.2502264.

[1] http://bit.ly/Zxn5YI
[2] Available at: http://fiona.micc.unifi.it/intime

3. THE SYSTEM

The system allows users to share and browse videos, connect to friends, comment and semantically annotate videos at frame level, share and browse interests, related videos and users through recommendation, clustering and semantic similarity, and to create and curate personal profiles of interests in a semi-automatic way. In this regard InTime can be classified as an hybrid recommender system combining a collaborative filtering approach with content-based filtering techniques.

The system consists of two main parts that are closely interconnected: it provides a recommendation engine of videos and similar users, viewable in the personal home page of the social network (similarly to the YouTube home page), and it also features the automatic creation of a public profile of interests for which the framework exploits clustering and semantic distances to make recommendations and suggestions of resources (videos, persons, Wikipedia articles) that match those interests. The profile can then be edited and refined by users over time in a semi-automatic way. Users' profiles are created taking into account information extracted from Facebook (e.g. page likes), InTime network users activity (comments and annotations), information provided manually (categories of interest) or automatically computed (semantic analysis and categorization of annotations).

The modeling of user interests is carried out with three strategies: initially, in the "cold start" scenario, the system tries to extract some observable properties from users' Facebook profiles, then it uses algorithms to compute neighborhood user similarity, exploiting collaborative filtering techniques and implicit interest indicators, and finally it clusters resources extracted from the network activity, assigning the classifications of these clusters to the users' personal profile of interests. The workflow of InTime is shown in Fig. 1

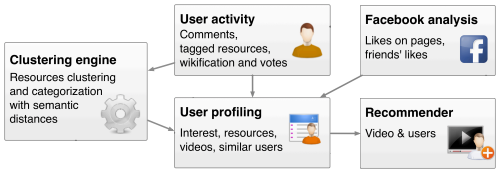

Figure 1: InTime system workflow.

Recommendations are based on videos, people and resources tagged or automatically extracted from video comments, added by users with a widget that let them create frame-accurate discussions and comments - similarly to what they are used to do when commenting photos on Facebook. Comments are processed using Named Entity Detection, based on rules and gazetteer and using a 'wikification' process that selects relevant topics and tags, using the approach presented in [5]. This semantic representation is then used to assign the resource to a taxonomy of interests, using clustering and kNN classification, based on Wikipedia Link-based Measure (WLM) [6] to compute the semantic distance. The system has been implemented using Hadoop/Mahout to address scalability. Each recommended item is part of the RDF semantic graph generated by the system and the interface shows its mutual relationship. In this way users can explore, from their automatically generated profiles of interests, videos, similar users and their profiles, resources or categories of resources (Fig. 2).

The recommender system outperforms in terms of prediction quality the baseline user-based recommender of Mahout, as shown in Fig. 3.

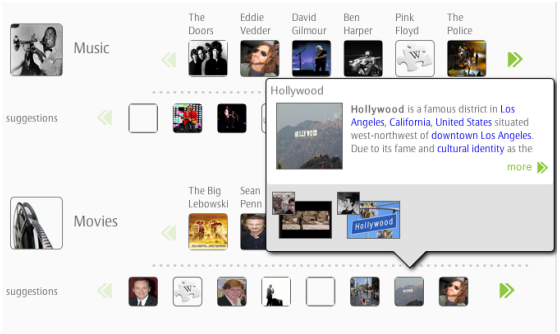

Figure 2: The categories of interest in a profile page. Each one presents a scrollable list of resource suggestions (below a dotted horizontal rule), and users' publicly visible selected resources (above). By hovering, users can visualize relative information, related videos, persons and reach the generated resource semantic URI.

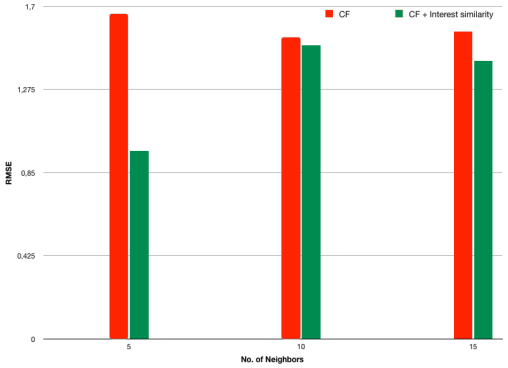

Figure 3: RMSE comparison between Mahout user-based recommendation (CF) and the proposed recommender algorithm (CF + Interest similarity).

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