

FilmTrust: Movie Recommendations from Semantic Web-based Social Networks

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Abstract

FilmTrust is a website that integrates social networks with movie ratings and reviews. Using FOAF-based social networks augmented with trust ratings, the site computes predictive movie ratings based on the ratings of trusted people in the network. Preliminary results show these results to be significantly more accurate than other predictive ratings in certain situations. This demo will show the FilmTrust website, illustrate its RDF and OWL output, and demonstrate cases where the predictive movie ratings are successful.

1 Introduction

FilmTrust, at <http://trust.mindswap.org/FilmTrust/>, is a website that combines social networking and movie reviews. The entire site is Semantic Web based, with FOAF output for the social network, and RDF output to share information, ratings, and reviews about movies.

Within the site, the social network contains trust ratings, indicating how much users trust one another about films. Those ratings, in addition to the ratings of movies, are combined to present the user with recommended ratings for films. The preliminary results presented here show that, in some cases, the predictive ratings using trust and the social network are significantly more accurate than other methods. We interpret this result as a starting place for how Semantic Web network analysis can be integrated into applications, and evidence that it can be an effective technique.

2 The FilmTrust Website

The social networking component of the website requires users to provide a trust rating for each person they add as a friend. Users are advised to rate how much they trust their friend about movies on a scale from 1 to 10 (1 is low trust, 10 is high trust). In the help section, when they ask for more help, they are advised to, "Think of this as if the

person were to have rented a movie to watch, how likely it is that you would want to see that film."

If trust ratings are visible to everyone, users can be discouraged from giving accurate ratings for fear of offending or upsetting people. Because honest trust ratings are important to the function of the system, these values are kept private and shown only to the user who assigned them.

The other features of the website are movie ratings and reviews. Users can choose any film and rate it on a scale of a half star to four stars. They can also write free-text reviews about movies. The "movies" page of a user displays data for every movie that the user has rated or reviewed.

Social networks meet movie information on the "Ratings and Reviews" page. Users are shown two ratings for each movie. Using the social network, trust ratings, and movie ratings, we compute a recommended rating. This is discussed in section 3. Similarly, if a movie has multiple reviews, they are sorted according to the inferred trust rating of the author. This presents the reviews authored by the most trusted people first to assist the user in finding information that will be most relevant.

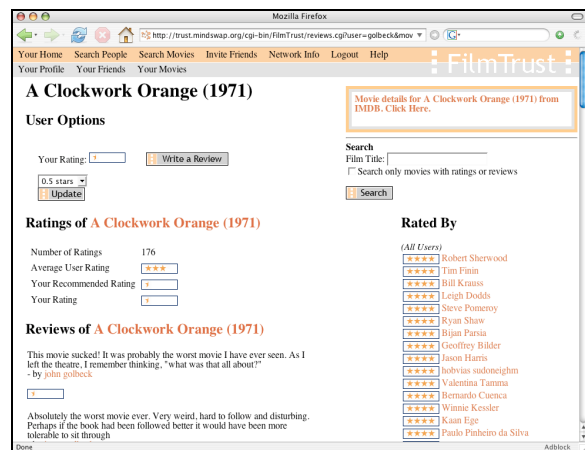


Fig 1. A sample page from FilmTrust, with recommended ratings, and ordered reviews.

3 FilmTrust Computations

FilmTrust is a website that utilizes trust ratings in a social network to make personalized predictive

recommendations about movies to the user. Using a social network trust inference algorithm called TidalTrust [1], we are able to show that in certain cases, the trust-based predictive ratings are more accurate than traditional methods.

The process for calculating this rating is done with a weighted average. Using the Tidal Trust algorithm, a set of highly trusted nodes who have rated the given film are chosen. For the set of selected nodes S , the recommended rating r for node s on movie m is computed as the average of the movie ratings from nodes in S weighted by the trust value t from s to each node:

$$r_{sm} = \frac{\sum_{i \in S} t_{si} r_{im}}{\sum_{i \in S} t_{si}}$$

This average is rounded to the nearest half-star, and that value becomes the "Recommended Rating" that is personalized for each user.

As a simple example, consider the following:

- Alice trusts Bob 9 (on a 1-10 scale)
- Alice trusts Chuck 3 (on a 1-10 scale)
- Bob rates the movie "Jaws" with 4 stars
- Chuck rates the movie "Jaws" with 2 stars

Then Alice's recommended rating for "Jaws" is calculated as follows:

$$\frac{t_{Alice \rightarrow Bob} * r_{Bob \rightarrow Jaws} + t_{Alice \rightarrow Chuck} r_{Chuck \rightarrow Jaws}}{t_{Alice \rightarrow Bob} + t_{Alice \rightarrow Chuck}} = \frac{9 * 4 + 3 * 2}{9 + 3} = \frac{42}{12} = 3.5$$

The accuracy of these ratings is judged with respect to known values. For each movie the user has rated, the recommended rating can be compared to the actual rating that the user assigned. For further comparison, we also compared the user's rating to the simple average rating of a movie (commonly shown on other movie websites), and to a recommended rating generated by a Pearson correlation-based automated collaborative filtering (ACF) algorithm [2].

Our results show that in the base case, the recommended ratings are no better than the simple average. This is because, in our data set, most ratings are very close to the average. However, as the difference between the user's assigned rating for a movie and the simple average rating for that movie grows (indicating that the user's opinion is different from the majority of users), the trust-based recommendations are significantly better (see figure 2). As one might expect, when data comes from trusted people, it tends to reflect the user's opinion more closely than information from the general public.

The implications of this result for the Semantic Web are interesting. The FOAF Project is one of the largest projects on the Semantic Web. Our result indicates that social network analysis on the Semantic Web data may offer benefits to the users within applications.

Because the nature of the Semantic Web is an open system, where this data is accessible for developers, the groundwork and data source for this technique of personalization is already in place.

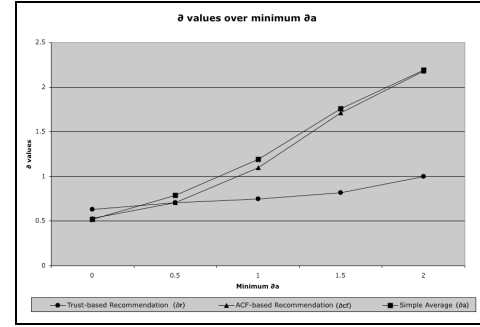


Fig 2. The average difference between the recommended ratings and actual rating as the difference between the user's rating and the average rating (θ_a) increases

4 Conclusions

This demo presents FilmTrust, a Semantic Web based website that integrates social networks, movie ratings, and recommender systems. Our analysis shows that in cases where the user holds an opinion different from the average, a movie rating recommendation calculated using trust values in the Semantic Web-based social network can offer significantly more accurate recommendations.

This shows that utilizing freely accessible data on the Semantic Web can lead to usability enhancements in some applications. Some of our related work shows other applications where this type of analysis can be used, such as email [3]. We hope this demo illustrates the potential of integrating semantic web network into applications, and encourages further adaptation of these techniques.

References

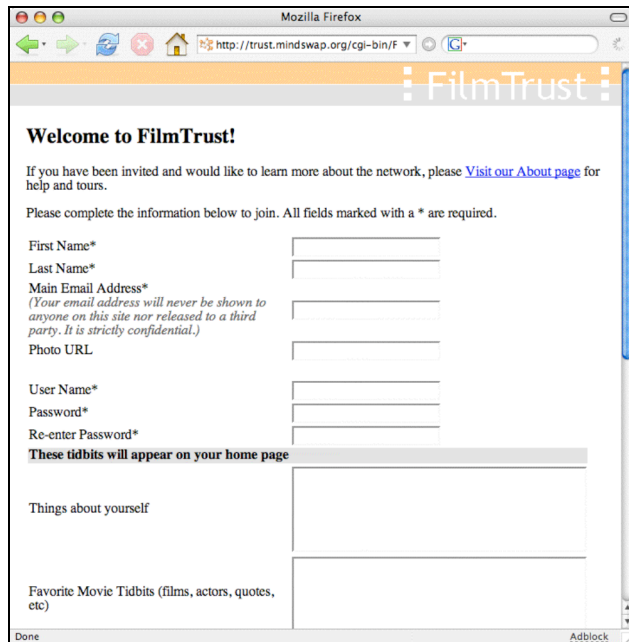
- [1] Golbeck, Jennifer. 2005. Computing and Applying Trust in Web-Based Social Networks. Ph.D. Dissertation, University of Maryland, College Park.
- [2] Herlocker, Jonathan L., Joseph A. Konstan, Al Borchers, John Riedl. 1999. An algorithmic framework for performing collaborative filtering. *Proceedings of the 22nd annual international ACM SIGIR conference on Research and development in information retrieval*. August 15-19, 1999, Berkeley, California: 230-237.
- [3] Golbeck, Jennifer, James Hendler. 2004. "Reputation Network Analysis for Email Filtering". *Proceedings of the First Conference on Email and Anti-Spam*, July 30-31, Mountain View, California.

Demo Description

The live demo will consist of an interaction with the FilmTrust website, available at <http://trust.mindswap.org/FilmTrust>. People will have the option to see a quick demo that utilizes a sample user account, a full demonstration of the features, or a demo based on the data in the site.

Quick Demo. In the quick demonstration, a sample account will be used to show a pre-rated set of movies with existing social network connections, and focus on the movie information page, similar that shown in figure 1, that shows the predictive rating and ordered reviews.

Full Demo. The longer demonstration will allow users to create an account (a quick process that only requires a username and password – the full form is shown below), add a social networking connection or two, rate a few movies, and see how the predictive ratings apply to them. In this case, users will also have the opportunity to change their trust ratings within the social network to see how this propagates through into different predictive ratings.

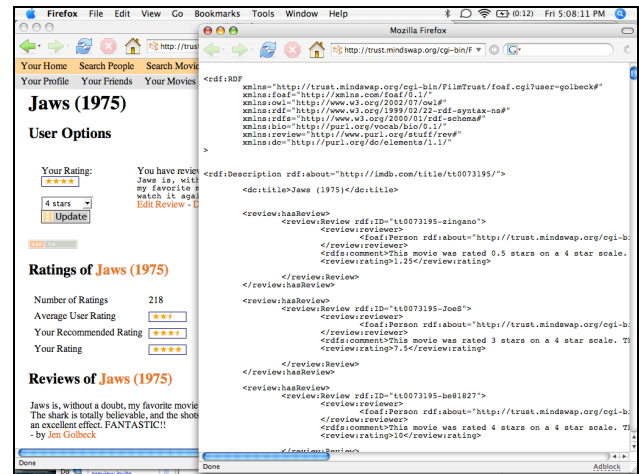


The screenshot shows the 'Welcome to FilmTrust!' page in a Mozilla Firefox browser. The page contains a registration form with the following fields: First Name*, Last Name*, Main Email Address* (with a note: 'Your email address will never be shown to anyone on this site nor released to a third party. It is strictly confidential.'), Photo URL, User Name*, Password*, and Re-enter Password*. Below these fields is a section titled 'These tidbits will appear on your home page' containing two text areas: 'Things about yourself' and 'Favorite Movie Tidbits (films, actors, quotes, etc)'. The browser's address bar shows 'http://trust.mindswap.org/cgi-bin/F'.

The FilmTrust account setup form.

Data Demo. For visitors interested in the Semantic Web data aspects, we will have a separate demo that will walk the user through the FOAF used to represent user information, a description of the FOAF Trust Module (used to represent the trust ratings in the social network),

and the OWL output for each movie that includes a representation of every review and rating.



The screenshot shows the 'Jaws (1975)' movie page in a Mozilla Firefox browser. The page displays the movie's title, a 'User Options' section with a 'Your Rating' of 4 stars and an 'Update' button, and a 'Ratings of Jaws (1975)' section showing 218 ratings with an average of 3.5 stars. Below this is a 'Reviews of Jaws (1975)' section with a sample review by Jen Golbeck. The right side of the browser window shows the RDF data for the movie, including FOAF information for the user and OWL data for the movie's ratings and reviews.

The FilmTrust data view for the movie Jaws.

Browsing. An additional computer will be available for visitors to browse the website without our intervention. Because the interface requires essentially no training to use, this will allow a free exploration of data in the system, and the RDF and OWL features of the site.