



## TV Predictor

Personalized Program Recommendations to be displayed on Hybrid TVs

### At a Glance

Fraunhofer FOKUS introduces the TV Predictor providing personalized program recommendations for Hybrid TVs. In contrast to the established Electronic Program Guide (EPG) this HbbTV and OIPF compliant application allows for obtaining individual predictions based on the automatically tracked viewing behavior and explicitly given ratings. Thereby, the scalable server side recommendation engine selects the best fitting Content-based and Collaborative Filtering algorithms in order to calculate the most accurate recommendations.

### About the Product

We are all familiar with this scenario: After a long day at work, you lean back on the couch, switch on the TV and channel surfing for something good to watch. But, by the time the prime-time viewing hours have arrived, you are faced with the enormous variety of different channels offering so many programs, often forcing you to consult the traditional or electronic program guide because you've just lost track of what's on and what you might be interested in watching.

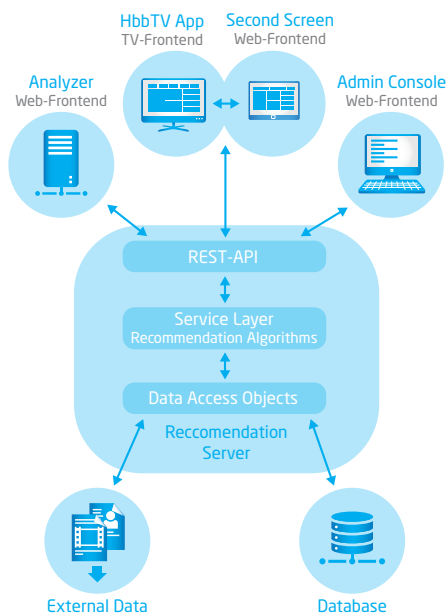
Fraunhofer FOKUS introduces the TV Predictor approach, which allows you to obtain personalized program recommendations, without leaving the comfort of your couch. Based on the customer's viewing behavior, the TV itself tells us what the viewer is going to want to watch. Hints and details will overlay the broadcasting signal, so the user will receive recommendations in appropriate situations; for instance the most relevant movies on tonight. Thereby the customer does not have to explicitly rate the programs watched, but they have the possibility to do so. In general, the TV set shall automatically track the user's viewing behavior in order to find specific characteristics and patterns in their viewing behavior. So the resulting recommendations can be based for instance on how often a specific genre is watched or even a preferred actor, a specific weekday or time and on the viewing preferences and behavior of similar users.

The TV Predictor offers high scalability and the distribution of the domain data on different data store nodes. The content-based and collaborative filtering algorithms were implemented in order to provide high accuracy and low errors, portability and good performance results.

### TV Predictor Recommendation System

With the rapid explosion of content due to the internet, it is no longer possible for anyone to consume all products offer at once - or in a life time for that matter. So they have to find a considered selection of media items they want to consume. Recommendation systems help their users to find a range of items they might be interested in.

## TV Predictor



TV Predictor Architecture

In the case of the TV Predictor being introduced here, the recommendation system uses a set of different criteria to make recommendations which correspond to the users' viewing behavior.

When users watch TV Predictor enabled channels, they can open the recommendation menu by pressing the according button on their remote control. A set of the best and most relevant programs for the current user will appear. These personalized recommendations are based on the automatically tracked viewing behavior and explicitly defined program ratings of the registered user or – in case they did not sign up – they will get averaged or well-selected recommendations.

## Features

In order to generate the best and most accurate recommendations, the recommendation system combines the best fitting algorithms in a hybrid switching, cascading or merging way. The usage of these algorithms depends on the user's request:

- **Find similar programs to the selected one** by using common content-based filtering algorithms, such as the Euclidean Distance or the Cosine Similarity, or by using unsupervised learning algorithms, such as Association Rules
- **Get program highlights for a specific time period** based on the favorite programs of similar users (Pearson Correlation Coefficient) and predictions of program ratings (Slope One)
- **Calculate a personalized program guide** changing the channel automatically by using clustering to pre-select programs best fitting the user's interests and rating predictions
- **Overlay upcoming program recommendations** while watching TV based on recognized behavior patterns (calculated by a Support Vector Machine) to find user interests, such as genres and categories, favored actors, directors and producers or even the preferred channels, weekdays or times to watch specific content

## Components

- Java-based Recommendation Server
- TV Application and Framework based on HbbTV, CE-HTML, OIPF
- Second Screen Application based on HTML5
- Analyzer Module
- Admin Console

## Benefits and Areas of Application

As this application is based on CE-HTML it can be used as a broadcaster dependent HbbTV-Application or as broadcaster independent TV-App – for instance for TV Portals. Moreover, as Javascript-Framework, the TV Predictor can be easily integrated into existing HbbTV Applications without changing the user interface.

The engine is developed to recommend TV programs, however it can be easily adapted to Video-On-Demand or other media contents as well. Service providers and broadcasters are able to analyze the viewer's behavior – e.g. count statistics or average customer ratings for a specific item – so they no longer have to rely on the established approximation techniques anymore. Tracked user and usage behavior allow profiles to be created about the end customers, for instance their gender, their age and their likings. This information is valuable – for example in predicting the customer's reaction to commercials and in turn only recommending products which might be appropriate to them.

So the TV Predictor makes the consumption of linear video more comfortable for the end-user by recommending relevant programs and allows the service provider to predict the customer's viewing behavior and to interpret personalized viewing data.

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