

Chapter 26

Movie Recommendation System Based on Fuzzy Inference System and Adaptive Neuro Fuzzy Inference System

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ABSTRACT

One of most prominent features that social networks or e-commerce sites now provide is recommendation of items. However, the recommendation task is challenging as high degree of accuracy is required. This paper analyzes the improvement in recommendation of movies using Fuzzy Inference System (FIS) and Adaptive Neuro Fuzzy Inference System (ANFIS). Two similarity measures have been used: one by taking account similar users' choice and the other by matching genres of similar movies rated by the user. For similarity calculation, four different techniques, namely Euclidean Distance, Manhattan Distance, Pearson Coefficient and Cosine Similarity are used. FIS and ANFIS system are used in decision making. The experiments have been carried out on Movie Lens dataset and a comparative performance analysis has been reported. Experimental results demonstrate that ANFIS outperforms FIS in most of the cases when Pearson Correlation metric is used for similarity calculation.

1. INTRODUCTION

Item recommendation is popularly known for its use in most social networks and e-commerce websites where the customer's choice information is analyzed to generate a list of most likely products which the customer will be interested in. Different recommender systems use different techniques to perform these recommendations. One of the most common techniques is to analyze the customer's previous purchase records. Once a recommender system is designed, any product can be recommended using the system. In our system, we build a system for recommending movies. Generally movies are recommended using two techniques, collaborative filtering and content-based filtering.

One of the most important and effective technique is collaborative filtering. It works by creating a database for the preferred items by users. A user is compared against the database to find neighbors who have similar taste like him. Items that the neighbors like are then recommended to the user with the expectation that he will also like them. Collaborative filtering has proven to be effective in many areas information filtering applications and e-commerce sites. Yet, there are still challenges and room for improvement in this technique. Challenges include improving scalability since it is required to search millions of data. Since a single user can rate many items, there are thousands of data points to be considered. Another challenge is to improve the quality of recommendations to the users. Users require recommendations that help them find the items they like. It is important to consider both the challenges simultaneously in order to retain the performance since the less time an algorithm takes to search for neighbors, the more it becomes scalable. In this paper, we compare the results using different techniques to measure similarity and analyze the performance of the techniques.

Our objective is to recommend movies to a user. Let us rephrase this as if we would like to find the expected rating a user might give to a movie. By looking at the predicted rating, we can judge whether the user may like the movie or not.

Suppose we are recommending a target movie to a target user. At first, we define the term neighborhood as the users who have similar choice to the target user. By similar choice, we mean the user's similarity in rating to the movies which other users also rated. To calculate choice similarity, we used Euclidean Distance, Manhattan Distance, Pearson Correlation Coefficient and Cosine Similarity. Then we took the K most similar users and found the average rating they have given to the target movie. This is our first input parameter. Secondly, we need to find similar movies to the target movie. To do that, we consider the movies that have the highest number of matching genres and we also found this using Euclidean Distance, Manhattan Distance, Pearson Correlation Coefficient and Cosine Similarity. Then we took the K most similar movies and calculated the average rating the target user has given to these movies. This is our second input parameter which we call Acceptance Rate. Then we calculated expected rating using these two parameters and the decision making is made using Mamdani FIS and ANFIS systems. Then we compared the performance of the systems by varying parameters, value of K, and different membership functions.

2. RELATED WORK

Fuzzy logic has been used in many areas that include recommendation systems, fuzzy controller, robotics etc. Recently, Semwal et al. (2015) designed fuzzy logic controller that can predict push recovery strategy for a robot. Fuzzy rules were defined in terms of roll and pitch to avoid high variability. One

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