

**DEEP LEARNING ENABLED DYNAMIC
USER-USER-PRODUCT RATING
BASED RECOMMENDATION SYSTEM**

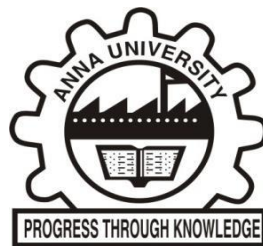
ABSTRACT

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in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY



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FEBRUARY 2022

ABSTRACT

Recommendation systems are the utmost need in any E-commerce business. There are various recommendation systems built with machine learning and deep learning algorithms. In abstract, all the recommendation models fall in one of the following categories. Popularity based model, classification based models, models based on the contents, collaborative filtering models, hybrid approaches that combines two or more models and finally models based on association.

It has been observed from the literature that most of the studies follow collaborative filter approach or its variants in one or other way. Collaborative filtering models mainly depend on the similarity between the users based on the rating they make. it is a two step process in which the first step concentrates on finding the similarity based on which the second step finds the rating of the unrated products by the intended user.

The first part of this work concentrates on experimenting with the existing models; first experimentation with the zomato dataset is made. The problem is considered as multi class classification problem. Various machine learning algorithms are implemented. Decision Tree, Random Forest, K-Nearest Neighbor, and a neural network model. It has been observed though the accuracy of the Artificial Neural Networks is low it performs better than the other machine learning models. The accuracy obtained is 68%.

The second part of the work concentrates on the implementation of the collaborative filtering approach. In general the recommendations to a user are made based on similarity that exists between the intended user and the other users. This similarity can be calculated either based on the similarity between the user profiles or the similarity between the ratings made by the users. First phase

of this work concentrates on experimentally analyzing both these model and get a deep insight of these models. With the lessons learned from the insights, second phase of the work concentrates on developing a deep learning model. The model does not depend on the other users profile or rating made by them. The model is tested with a small restaurant dataset and the model can predict whether a user likes the restaurant or not. The model is trained with different users and their rating. The system learns from it and in order to predict whether a new user likes or not a restaurant that he/she has not visited earlier, all the data the trained model needed is the rating made by the same user for different restaurants. The deep learning model is analyzed with the parameter average distance. From the results obtained the percentage of correct predictions made during training is 64% and the percentage of correct prediction during test is 56%. It can be observed that the results obtained are low. The same model is tested with the movie lens dataset and the percentage of correct prediction is 74.6%.

Both the machine learning models and the other two models implemented and experimented are done without the consideration of the opinion of the user on the users. Though there is very few countable numbers of works that uses the relation that exist between the users in the social networks, this can be considered as the first work that considers the rating made by the user on other users. Two models were developed based on this user-user-product model and dynamic user-user product model. A new simple dataset is created for experimenting with this model as there is no other existing dataset available for this. The performance of the model is evaluated with the spearman correlation and the proposed Dynamic User-User-Product model performs well than the collaborative filtering approach.