CS 533 PROJECT: KNOWLEDGE AWARE CONVERSATIONAL MOVIE RECOMMENDER SYSTEM

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Abstract

A movie recommendation is important in everyone's social life due to its prowess in providing enhanced entertainment. Our life is increasingly being governed by machine-suggested recommendations. Facebook posts, Instagram stories, Spotify songs, Netflix movies; all of them are recommended to us. The rise in popularity of voice-based personal assistants opens an avenue of using conversational data to make recommendations. In this project, we adopt the data and approach as described in “You Sound Like Someone Who Watches Drama Movies: Towards Predicting Movie Preferences from Conversational Interactions” to further explore this problem space. We use conversational context to infer a user's sentiment about a movie and use the ratings of "similar" external critics to predict the user's next movie preference. After working through the paper from scratch, we experiment with more sophisticated deep learning matrix factorization techniques like neural collaborative filtering with an aim to attain better results.

Problem Statement

Given a conversational database between two users (out of one which simulates a conversational personal assistant) with *k* turns and *m* movie references, to predict the user's $(m+1)^{st}$ movie preference.

This is done by inferring user sentiment towards the m = 2 movies from the conversation and then using collaborative filtering and domain adaptation to find ratings of ”similar” external critics reviews and use them to make the $(m+1)^{st}$ movie preference prediction for the user.

Dataset

We use the MovieSent dataset made available by the authors. The dataset contains the following:

- conversation data with fine-grained user sentiment labels
- reviews of critics scraped from Rotten Tomatoes.

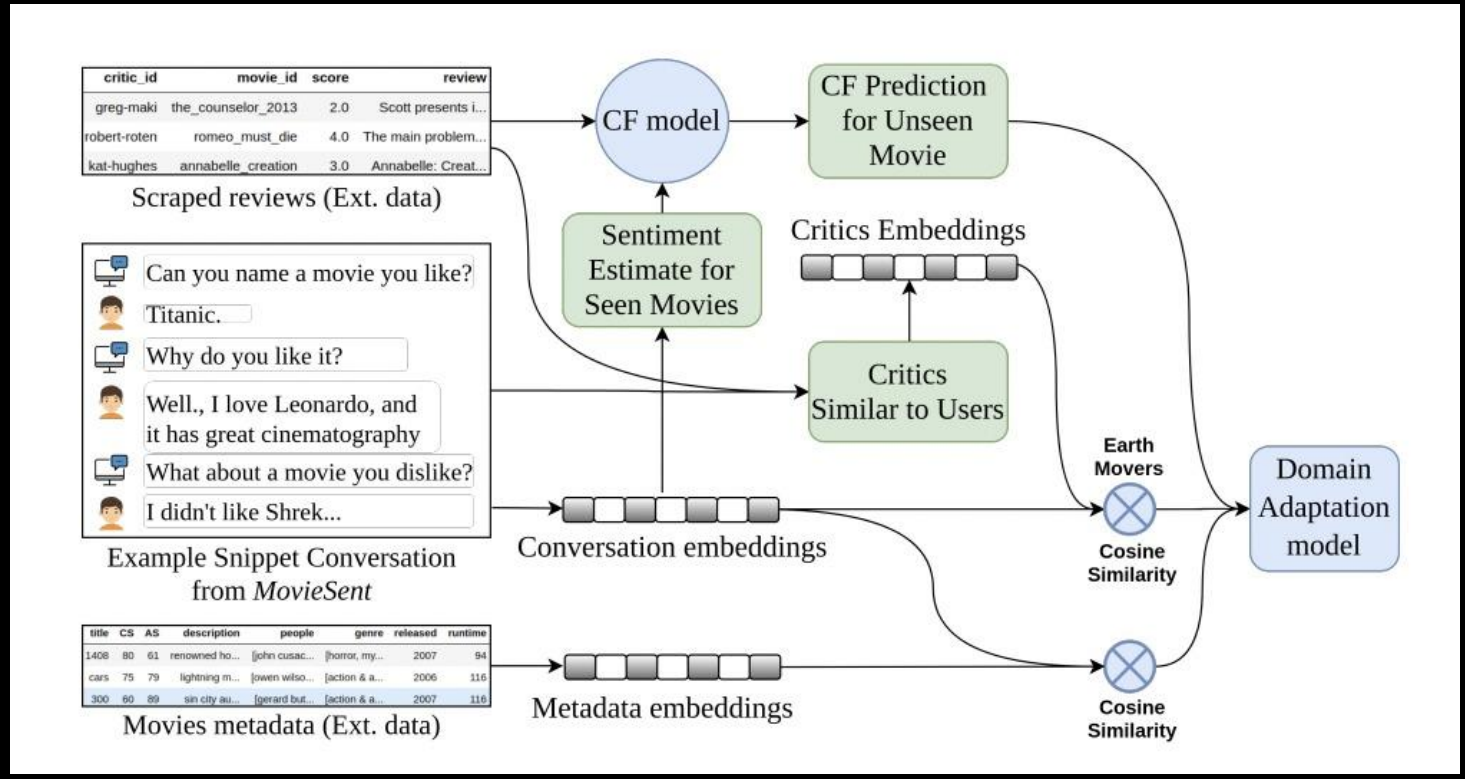
How dataset is used:

- We first clean the available dataset to extract conversations that have at least two movie mentions, so that we can predict the third one. This is the case where m = 2
- We use finely labelled sentiment data on the user conversations to estimate the user sentiment towards the movies mentioned in the conversation.
- We then adapt the domain of the external critic reviews scraped from Rotten Tomatoes for the movies mentioned and use that for collaborative filtering. The CF model is then leveraged to predict the next movie in the conversation.

Methodology Overview

Components:

- Encoding
- Sentiment Estimation
- CF Model
- Domain Adaptation using GBRT



Collaborative Filtering

Collaborative filtering uses the ratings to form a neighborhood N of a user, say X, whose ratings (likes and dislikes) are similar to X's ratings. The neighborhood of X is defined using nearest neighbor approach with a notion of similarity defined.

There can be two types of collaborative filtering user-user and item-item. This method is different from content based as the neighborhood or similarity is defined only on the basis of rating behavior.

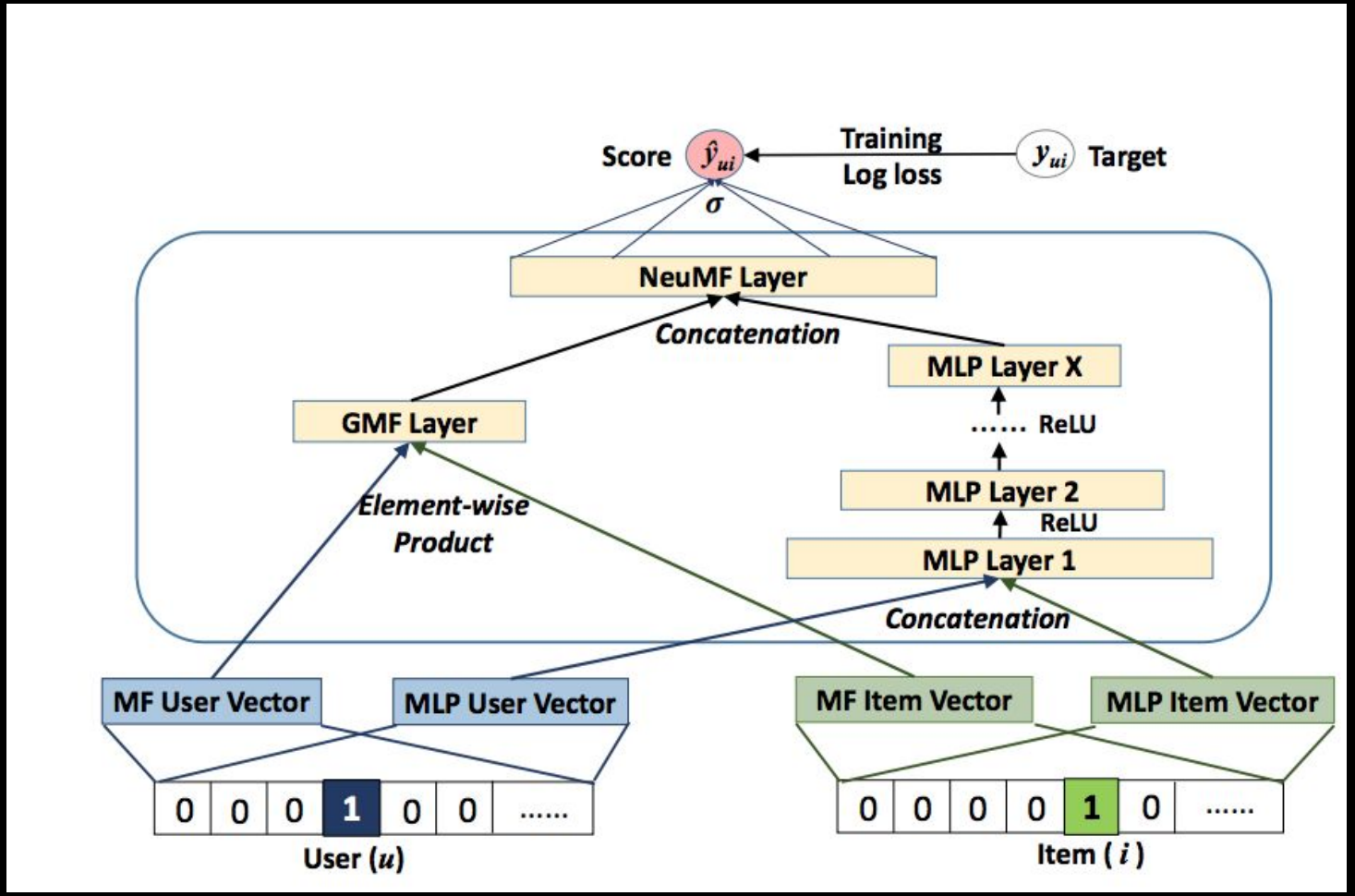
Collaborative Filtering

CF Methods Used:

- KNNBaseline
- KNNwithMeans
- KNNWithZScore
- SVD
- SVDpp

Why NCF?

- Learn user-item interactions with a neural architecture
- NeuMF: A fusion of GMF and MLP



Hyperparameter Tuning

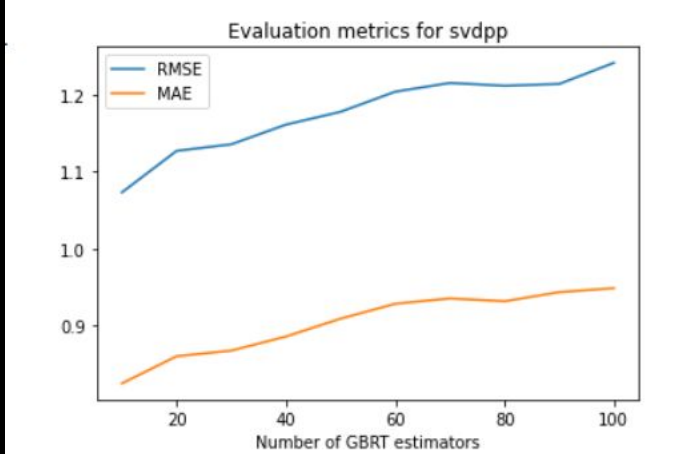


Figure 4: Hyperparameter Tuning for SVDpp + GBRT

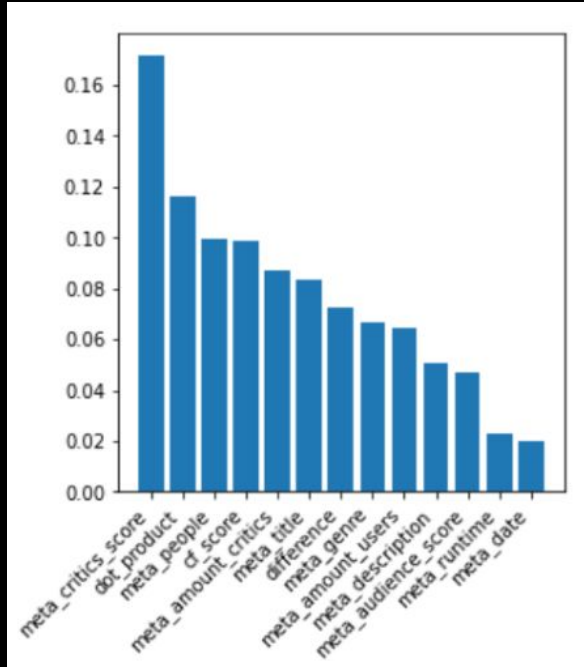


Figure 5: SVD Feature Importance for GBRT Estimators = 10

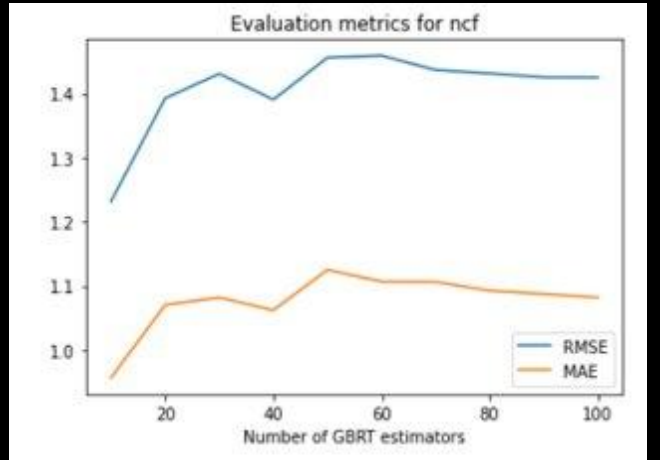


Figure 6: Hyperparameter Tuning for NCF + GBRT

Final Results

Table 1: Quantitative Evaluation of different CF methods, with GBRT estimators = 10

CF-Method	RMSE	MAE
KNNBaseline	1.1118	0.8524
KNNwithMeans	1.1131	0.8527
KNNwithZScore	1.101	0.8383
SVD	1.1318	0.8301
SVDpp	1.07	0.81
NeuMf	1.232	0.9569

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Thank You !