Data Analytics

Project Presentation

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Abstract and Scope

- Overwhelmingly large variety of products online
- No single model exists that can simultaneously optimize multiple objectives
- Helping online retailers select more relevant items from a vast range to recommend to their customers based on their real-time behavior
- Improving recommendations to ensure navigating through seemingly endless options is more effortless and engaging for shoppers.
- The recommender system along with accurately predicting a user's buying habits, must also include some form of novelty and serendipity in its predictions in order to expand the user's taste as a job of a recommender system is not only to recommend the right items but also keep the user engaged.

Goal of the Project

Building a multi-objective recommender system based on previous events in a user session to predict e-commerce clicks, cart additions, and orders

Project Demonstration

Exhibit the demonstration of the complete project.

Implementation Details

Module 1: Exploratory Data Analysis (EDA)

- Data Visualisation and Description using Python and its libraries including numpy, pandas, matplotlib, seaborn
- Comparisons drawn between number of various events (clicks, carts, orders)
- Finding of the top 20 products most interacted with in terms of various events.
- Visualisation of sessions

Module 2: Model Building- Model 1 using Word2Vec

- First model was built using Word2Vec to learn word associations from a large corpus of text
- Corpus created for clicks, carts and orders

Module 3: Model Building- Model 2 Baseline Model

- The task is to predict the next aid clicked after the session truncation, as well as the the remaining aids that are added to carts and orders

- For each session in the test data, we have to predict the aid values for each type that occur after the last timestamp

Results and Discussion

We aimed to build a multi-objective recommender system based on previous events in a user session to predict e-commerce clicks, cart additions, and orders
Our recommender system must maximise all three: accuracy, novelty and serendipity and thus is a multi objective optimisation problem.

According to our results,we are able to predict possible events for each user

Conclusion

- There is an emerging demand in multi-objective optimization recently in RecSys, especially in the area of multi-stakeholder and multi-task recommender systems
- The multi-objective recommendation is an application of MOO(MULTI-OBJECT OPTIMIZATION) in the area of recommender systems.

Conclusion

- The aim of this project was to predict e-commerce clicks, cart additions, and orders by building a multi-objective recommender system based on previous events in a user session.

- Current recommender systems consist of various models with different approaches, ranging from simple matrix factorization to a transformer-type deep neural network. However, no single model exists that can simultaneously optimize multiple objectives. we tried to build a single entry to predict click-through, add-to-cart, and conversion rates based on previous same-session events.

Future work

Model Building- Model 3 Candidate reranking model

In the final stage of a recommendation system, the system can re-rank the candidates to consider additional criteria or constraints. One re-ranking approach is to use filters that remove some candidates.

Step 1 - Generate Candidates

For each test user, we generate possible choices, i.e. candidates. we generate candidates from 5 sources: user history, most popular events, co visitation matrix of events with type weighting, buy2buy and time weighting

Future Work

Model 3 Candidate reranking model

- Step 2 - ReRank and Choose 20

Given the list of candidates, we must select 20 to be our predictions. We can do this with a set of handcrafted rules. We can improve our predictions by training an XGBoost model to select for us.

Future Work

Suggested Models:

- Transformers
- Particle Swarm Optimisation

References

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IEEE Draft

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