



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

Project Proposal Form MCST1043
Sem: 2 Session: 2024/25

SECTION A: Project Information.

Program Name: **Masters of Science (Data Science)**

Subject Name: **Project 1 (MCST1043)**

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Enhancing E-commerce recommendations with sentiment analysis using MLA-EDTCNet and collaborative filtering

Project Title:

Supervisor 1:

Supervisor 2 /

Industry Advisor(if

any):

SECTION B: Project Proposal

Introduction:

Recommendation systems have become an integral part of modern e-commerce platforms, driving user engagement, satisfaction, and revenue. Traditional recommendation algorithms rely mainly on collaborative filtering or content-based methods, which, while effective to a certain extent, often fail to fully understand the sentiment and nuanced preferences expressed by users in text data such as product reviews. As the amount and richness of user-generated content continue to grow, there is an increasing potential to leverage sentiment information embedded in user reviews to improve recommendation quality. This project proposes a method that combines sentiment analysis with collaborative filtering to enhance personalized recommendation results.

Problem Background:

Traditional collaborative filtering models predict user preferences based on the behavior patterns of similar users or items. However, these models suffer from some inherent limitations, such as: the cold-start problem (when there is limited interaction data for new users or items); data sparsity, i.e., the user-item rating matrix is incomplete or sparse; and lack of context understanding, as traditional models ignore the semantic and sentiment context provided by the review text. At the same time, natural language processing (NLP) techniques, especially those involving deep learning, have made significant progress in extracting sentiment and semantic features from textual content. Incorporating these features into recommendation models has shown promise in recent literature but remains underexplored in practical and scalable hybrid systems.

Problem Statement:

Although collaborative filtering is still a widely used technique in recommender systems, it lacks the ability to capture users' fine-grained sentiment preferences. This leads to a lack of personalization and sometimes even inaccurate recommendations. There is still a gap in how to effectively integrate text sentiment analysis into the collaborative filtering framework to improve recommendation accuracy, especially in cold-start and sparse data scenarios.

Aim of the Project:

The aim of this project is to develop and evaluate a hybrid recommender system that combines collaborative filtering with sentiment analysis of user-generated reviews to enhance personalization, accuracy, and robustness of recommendations in e-commerce platforms.

Objectives of the Project:

1. To review and analyze state-of-the-art approaches in sentiment analysis and collaborative filtering.
 2. To build a sentiment analysis module using deep learning techniques (e.g., BERT, TextCNN, or BiLSTM) for extracting sentiment representations from reviews.
 3. To implement a collaborative filtering recommendation model (e.g., Matrix Factorization or Neural Collaborative Filtering).
 4. To design a fusion strategy that combines sentiment embeddings and CF outputs to produce final recommendation scores.
 5. To evaluate the proposed hybrid system using benchmark datasets and performance metrics such as Precision, Recall, NDCG, and RMSE.
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Scopes of the Project:

Included:

- Use of real-world datasets (e.g., Amazon Reviews, Yelp) that include ratings and textual reviews.
- Implementation of both sentiment analysis and collaborative filtering modules.
- Evaluation of hybrid models compared to traditional CF approaches.

Excluded:

- Real-time recommendation system deployment or online testing.
 - Multilingual sentiment analysis or cross-domain recommendation.
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Expected Contribution of the Project:

This research project is expected to provide the following contributions:

- A novel hybrid recommendation framework that incorporates sentiment-aware review analysis into collaborative filtering.
 - Empirical validation showing the performance improvement of sentiment-augmented models over traditional methods.
 - Insights into the effectiveness of textual review data in resolving cold-start and data sparsity issues in recommendation systems.
 - A reusable model architecture and methodology that can be extended to various domains beyond e-commerce, such as movie or news recommendation.
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Project Requirements:

Software: _____

Hardware: _____

Technology/Technique/ _____

Methodology/Algorithm: _____

Type of Project (Focusing on Data Science):

[☒] Data Preparation and Modeling _____

[☒] Data Analysis and Visualization _____

- ☐ Business Intelligence and Analytics
- ☒ Machine Learning and Prediction
- ☐ Data Science Application in Business Domain

Status of Project:

- ☒ New
- ☐ Continued

If continued, what

is the previous

title?

SECTION C: Declaration

I declare that this project is proposed by:

- ☒ Myself
- ☐ Supervisor/Industry Advisor ()

Student

Name: wangzhengqiu

Signature

Date

SECTION D: Supervisor Acknowledgement

The Supervisor(s) shall complete this section.

I/We agree to become the supervisor(s) for this student under aforesaid proposed title.

Name of Supervisor 1:

Signature

Date

Name of Supervisor 2 (if any):

Signature

Date

SECTION E: Evaluation Panel Approval

The Evaluator(s) shall complete this section.

Result:

[] FULL APPROVAL

[] CONDITIONAL APPROVAL (Major)*

[] CONDITIONAL APPROVAL (Minor)

[] FAIL*

* Student has to submit new proposal form considering the evaluators' comments.

Comments:

