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)**
Student Name:	wangzhengqiu
Metric Number:	MCS241010
Student Email & Phone:	Wangzhengqiu@graduate.utm.my
	60129227598
Project Title:	Enhancing E-commerce recommendations with sentiment analysis using MLA-EDTCNet and collaborative filtering
Supervisor 1:	
Supervisor 2 / Industry Advisor(if any):	

SECTION B: Project Proposal

Introduction:

Recommendation systems have become indispensable in modern e-commerce platforms, driving user engagement, satisfaction, and revenue. Traditional recommendation algorithms primarily rely on collaborative filtering or content-based methods, which, while effective to some extent, often fail to fully understand users' emotional inclinations and nuanced preferences expressed in textual data such as product reviews.

As user-generated content continues to grow in both volume and richness, there is increasing potential in leveraging sentiment information embedded within user reviews to augment recommendation quality. This project proposes an approach that integrates sentiment analysis into collaborative filtering to enhance personalized recommendation outcomes.

Problem Background:

Conventional collaborative filtering models predict user preferences based on the behavioral patterns of similar users or items. However, these models suffer from inherent limitations, such as:Cold-start problems (when new users or items have limited interaction data);Data sparsity, where the user-item rating matrix is incomplete or sparse;Lack of contextual understanding, as traditional models ignore the semantic and emotional context provided by review texts.Meanwhile, natural language processing (NLP) techniques—especially those involving deep learning—have advanced significantly, enabling sentiment and semantic feature extraction from textual content. Incorporating these features into recommendation models has shown promise in recent literature but remains underexplored in practical, scalable hybrid systems.

Problem Statement:

Although collaborative filtering remains a widely used technique in recommender systems, it lacks the capability to capture fine-grained emotional preferences of users. This leads to less personalized and sometimes inaccurate recommendations. A gap exists in effectively integrating textual sentiment analysis into collaborative filtering frameworks 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 recommendation system that combines collaborative filtering with sentiment analysis of user-generated reviews to enhance the 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.

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.

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.

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:

Name of Evaluator 1:

_____

Signature   **Date**

Name of Evaluator 2:

_____

Signature   **Date**