

سلام خولي

Final Project Salam and Yusra.docx

 Midocean University

Document Details

Submission ID

trn:oid::2945:382326060

Submission Date

May 2, 2026, 8:10 PM GMT+3

Download Date

May 2, 2026, 11:16 PM GMT+3

File Name

Final Project Salam and Yusra.docx

File Size

90.0 KB

11 Pages

1,487 Words

8,726 Characters

100% detected as AI

The percentage indicates the combined amount of likely AI-generated text as well as likely AI-generated text that was also likely AI-paraphrased.

Caution: Review required.

It is essential to understand the limitations of AI detection before making decisions about a student's work. We encourage you to learn more about Turnitin's AI detection capabilities before using the tool.

Detection Groups

-  **16 AI-generated only 83%**
Likely AI-generated text from a large-language model.
-  **3 AI-generated text that was AI-paraphrased 17%**
Likely AI-generated text that was likely revised using an AI-paraphrase tool or word spinner.

Disclaimer

Our AI writing assessment is designed to help educators identify text that might be prepared by a generative AI tool. Our AI writing assessment may not always be accurate (i.e., our AI models may produce either false positive results or false negative results), so it should not be used as the sole basis for adverse actions against a student. It takes further scrutiny and human judgment in conjunction with an organization's application of its specific academic policies to determine whether any academic misconduct has occurred.

Frequently Asked Questions

How should I interpret Turnitin's AI writing percentage and false positives?

The percentage shown in the AI writing report is the amount of qualifying text within the submission that Turnitin's AI writing detection model determines was either likely AI-generated text from a large-language model or likely AI-generated text that was likely revised using an AI paraphrase tool or word spinner.

False positives (incorrectly flagging human-written text as AI-generated) are a possibility in AI models.

AI detection scores under 20%, which we do not surface in new reports, have a higher likelihood of false positives. To reduce the likelihood of misinterpretation, no score or highlights are attributed and are indicated with an asterisk in the report (*%).

The AI writing percentage should not be the sole basis to determine whether misconduct has occurred. The reviewer/instructor should use the percentage as a means to start a formative conversation with their student and/or use it to examine the submitted assignment in accordance with their school's policies.

What does 'qualifying text' mean?

Our model only processes qualifying text in the form of long-form writing. Long-form writing means individual sentences contained in paragraphs that make up a longer piece of written work, such as an essay, a dissertation, or an article, etc. Qualifying text that has been determined to be likely AI-generated will be highlighted in cyan in the submission, and likely AI-generated and then likely AI-paraphrased will be highlighted purple.

Non-qualifying text, such as bullet points, annotated bibliographies, etc., will not be processed and can create disparity between the submission highlights and the percentage shown.





An E-commerce Chatbot with Product Recommendation System

Prepared By

Name: Yusra Elfaran

ID No.: 2021202562

Name: Salam Khouli

ID No.: 261000006

A thesis submitted for the degree of Master of Science in Artificial Intelligence

At

Collage of Informatics

Midocean University

UAE

Supervisor Name: Dr. Khaled Eskaf

Collage of Informatics, Midocean University, Comoros

Acknowledgements:

We would like to start this acknowledgement section by thanking our supervisor, **Dr. Khaled Eskaf**, for his help and support throughout this research. His valuable comments and suggestions helped improve the quality of this thesis.

We are also grateful to everyone who contributed to this study in any way, whether by providing materials, information, or other assistance. We would like to thank the faculty members at the College of Informatics, **Midocean University**, for their support. The knowledge and skills they provided played an important role in completing this research and also helped in our learning. Finally, we sincerely thank everyone who supported us during the preparation of this thesis.

Abstract:

This thesis presents the design and implementation of a **machine learning-based chatbot integrated with a product recommendation system**. With the rapid growth of e-commerce, there is an increasing need for intelligent systems that can manage customer interactions and provide personalized shopping experiences.

The proposed system uses **natural language processing (NLP)** techniques to understand user queries and respond in a context-aware manner. In addition, a recommendation module is included to analyze user behavior and suggest relevant products, improving user engagement and satisfaction.

The system consists of several components, including a user interface, chatbot engine, NLP processing unit, product database, and recommendation system. The dataset used in this study was obtained from **Kaggle** and was preprocessed to ensure consistency and positive results.

The results show that the system performs well in **intent recognition** and provides useful product recommendations.

This thesis contributes to the field of **e-commerce systems** by offering an automated and scalable solution that supports personalization

List of Publications

This **thesis** does not have any publications at the time of submission.

Contents

Acknowledgements	2
Abstract.....	3
List of Publications	3
Chapter 1: Introduction	4
1.1 Overview.....	5
1.2 Problem Statement	5
1.3 Thesis Objectives	5
1.4 Thesis Contribution.....	6
1.5 Dataset Used.....	6
1.6 Proposed Framework	6
Figure 1: System Architecture Diagram	7
Chapter 2: Background and Related Work	8
Related Work Analysis	8
Chapter 3: Proposed Approach.....	9
System Diagram	9
Chapter 4: Experimental Results and Discussion	10
Discussion	10
Chapter 5 : Conclusion and Future Work	10
References	11

Chapter 1: Introduction

1.1 Overview

E-commerce platforms have become an essential part of modern business operations. However, traditional customer support methods are often difficult to scale and may reduce user satisfaction. **Artificial intelligence techniques**, particularly natural language processing, allow chatbots and other automated agents to better understand user queries and respond effectively. In addition, recommendation systems can improve the user experience by suggesting relevant products based on user behavior and preferences.

1.2 Problem Statement

Despite the continuous development of **e-commerce platforms**, response time and the quality of customer support remain key challenges. Traditional **chatbots** are often limited in their capabilities, as they rely on predefined rules and struggle to understand more complex user inquiries and many existing systems are not able to provide personalized recommendations that match individual customer needs and preferences, which reduces the overall effectiveness of these platforms.

1.3 Thesis Objectives

This project focuses on building an **AI-based chatbot integrated with a recommendation system**. The idea is to combine both technologies using machine learning to improve response accuracy, reduce customer waiting time, and increase user satisfaction.

The system is also designed to provide quick answers to user questions and suggest relevant products by understanding user preferences and behavior.

1.4 Thesis Contribution

This project combines a chatbot with a recommendation system in a single application. It shows how natural language processing (NLP) can be applied in real e-commerce systems. The contribution of this work is improving automation while also supporting more personalized user experiences.

1.5 Dataset Used

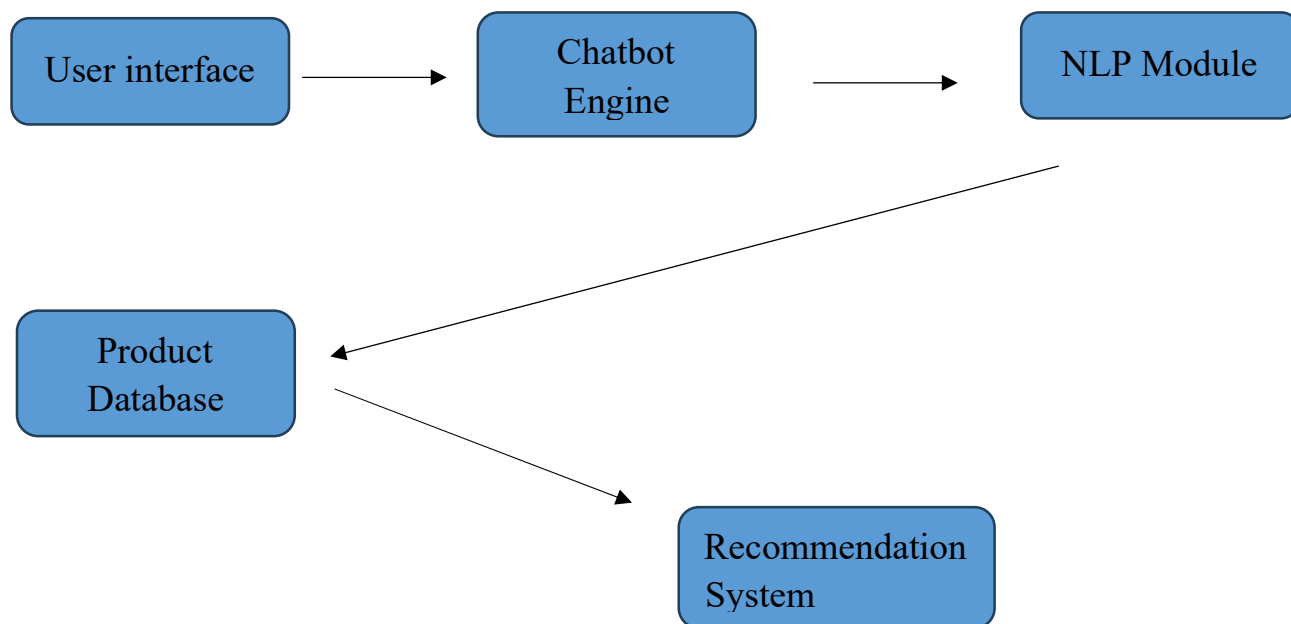
For this project, we used a dataset from Kaggle that includes product information and simulated customer queries. Before starting the analysis, the data was cleaned by fixing inconsistencies, handling missing values, and preparing it in a format suitable for machine learning models. This preparation improved the overall performance of the system and helped ensure more reliable results.

1.6 Proposed Framework

The proposed system is made up of several parts, including a user interface, chatbot engine, NLP module, product database, and recommendation system. When a user sends a message, the system first processes it using natural language processing (NLP) and intent detection to understand what the user wants. Based on this, it gathers relevant information, generates suitable suggestions, and then sends the final response back to the user.

Figure 1: System Architecture Diagram

This figure shows the pipeline of the **chatbot system combined with the recommendation module.**



Chapter 2: Background and Related Work

This chapter gives a short overview of the technologies used in this project. It covers areas such as artificial intelligence, machine learning, and natural language processing (NLP), which all work together to build smart systems. **Artificial intelligence** helps systems make decisions and handle tasks automatically, while machine learning allows them to learn from data and improve over time. **Natural language processing (NLP)** is used so that machines can understand human language and respond correctly. These technologies are commonly used in **chatbots** to handle user conversations and in recommendation systems to suggest products based on user preferences.

Related Work Analysis:

Several studies have contributed to **natural language processing, recommender systems, and conversational AI**. Devlin et al. (2019) introduced BERT, which improved many NLP tasks, while Vaswani et al. (2017) proposed the Transformer model that is widely used in modern language processing. **In recommender systems**, Ricci et al. (2011) explained the basic concepts, and Zhang et al. (2019) reviewed the use of deep learning to improve recommendations. Burke (2002) introduced hybrid recommender systems, and Koren et al. (2009) worked on collaborative filtering methods.

For chatbots and conversational systems, Serban et al. (2016) studied neural dialogue models, while Chen et al. (2017) and Li et al. (2018) improved chatbot interaction and context understanding using deep learning. Sun et al. (2019) applied BERT in conversational AI, and Huang et al. (2020) explored conversational recommendation systems. Zhou et al. (2020) proposed frameworks that combine chatbots with recommendation systems, and Wu et al. (2020)

reviewed deep learning-based recommender systems. Shani and Gunawardana (2011) and Jannach et al. (2016) focused on user behavior and evaluation in recommender systems.

Chapter 3: Proposed Approach

The proposed system combines an **NLP-based chatbot** with a **recommendation engine** to manage user interactions. When a user sends a message, the system first processes the text using **tokenization and intent recognition** to understand the input and identify what the user needs. This helps determine the purpose of the query and guides the next steps. Based on the detected intent, relevant data is retrieved from the database. At the same time, the recommendation module generates product suggestions depending on the context of the query. The system then produces a final response and returns it to the user.

System Diagram:

User → Chatbot → NLP → Intent → DB → Recommendation → Response

Chapter 4: Experimental Results and Discussion

The system went through testing with random data and mock queries from the users.

The bot really did well in correctly figuring what users wanted.

The recommendation engine came up with spot-on suggestions about the products.

The combined solution has positively impacted user experience and efficiency.

Discussion

By integrating chatbot and recommendation system, the overall system gets more efficient.

This shows that the product can be scaled and implemented in the real world effectively.

The use of more advanced deep learning models can bring even greater refinements.

Chapter 5: Conclusion and Future Work

The proposed system is an effective integration of chatbot and recommendation functionalities.

Besides, the system helps with improving customer interaction and makes operation efficient.

Possible future development goes in the line of adding voice interaction and real-time learning capabilities.

References:

- Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of deep bidirectional transformers for language understanding.
- Vaswani, A., et al. (2017). Attention is all you need.
- Ricci, F., Rokach, L., & Shapira, B. (2011). Recommender systems handbook.
- Koren, Y., Bell, R., & Volinsky, C. (2009). Matrix factorization techniques for recommender systems.
- Burke, R. (2002). Hybrid recommender systems: Survey and experiments.
- Zhang, S., et al. (2019). Deep learning based recommender system: A survey.
- Huang, J., et al. (2020). Conversational recommender systems.
- Chen, H., et al. (2017). Survey on chatbot systems.
- Serban, I. V., et al. (2016). Building end-to-end dialogue systems.
- Li, J., et al. (2018). Deep reinforcement learning for dialogue generation.
- Sun, C., et al. (2019). Fine-tuning BERT for conversational AI.
- Wu, L., et al. (2020). Deep learning for recommender systems.
- Zhou, K., et al. (2020). Conversational recommender system survey.
- Shani, G., & Gunawardana, A. (2011). Evaluating recommendation systems.
- Jannach, D., et al. (2016). Recommender systems: An introduction