Department of Electrical and Computer Engineering
North South University (NSU)

CSE 445: Machine Learning
Section 6

Project

Instructor: Dr. Mohammad Mahmudul Alam Semester: Fall 2025

Title:	CraveBot: A RAG Chatbot for Calorie Deficit Meal Guidance
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Proposal

Title: CraveBot: A RAG Chatbot for Calorie Deficit Meal Guidance

Introduction:
I am aiming to develop a nutrition-based conversational chatbot that leverages RAG (Retrieval-Augmented Generation) and Machine Learning methods. It will allow users to ask questions related to food, nutrition, and calories, and later receive personalized responses. It may help maintain one's healthy lifestyle, where most people are not even aware of what they are consuming compared to what their body needs.

Problem Statement:
In today's health-conscious society, people increasingly seek personalized dietary guidance, yet most nutrition-related resources remain static, unstructured, or overwhelming. There is a growing need for an interactive system that provides personalized recommendations. This project addresses this gap. It will retrieve food knowledge from a structured dataset, which will help others get their personalized feedback on their questions regarding diet, food, and nutrition.

Objectives:
- Identify and analyze the problem domain by understanding personalized nutritional information
- Design a food-focused chatbot with RAG pipeline
- Enhance usability and relevance of responses
- Validate system performance through testing, evaluating with various metrics like accuracy, F-1 score
- Document the developmental process and experimental results, and present a conclusion with future improvement scopes.

Methods:
This project will be implemented using the RAG pipeline. I will use supervised classification and split them to train and test. The retriever will fetch the food-relevant knowledge with embeddings, will use GPT-2 or similar LLM to generate natural language responses based on context, which is pre-trained, evaluate the model with standard ML metrics, and finally optimize it through hyperparameter tuning.

Datasets and Tools:
Dataset: OpenFoodFacts: a dataset of 4.3million food entries with nutritional information.
Tools and Software: Python, Scikit-learn, SentenceTransformers, Google Colab, Flask/HTML, and Transformer (GPT-2).