Group 1

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Project Title:

CookVision: A Virtual AI-Powered Cooking Assistant for ingredient Detection and Recipe Guidance Using Machine Learning

Abstract: CookVision is a virtual prototype of an AI-powered cooking assistant that uses machine learning and image detection to support the food preparation process. The system simulates a smart kitchen environment by using pre-recorded images and videos to detect ingredients, cooking tools, and food states. It integrates a pre-trained object detection model (YOLOv8) with LLM based recipe recommendation engine to suggest context-aware recipes based on detected inputs. A simple web-based interface displays detection results and guides users through recipe steps. This prototype serves as a foundation for future deployment on edge devices, demonstrating the feasibility of combining computer vision and machine learning in the domain of intelligent cooking assistant.

The system will be trained and evaluated on public datasets such as Food-101 and UECFOOD-256 for ingredient recognition, EPIC-KITCHENS and YouCook2 for activity detection, and Kaggle's Recipe Ingredients Dataset for mapping ingredients to recipes. We will also create a small, curated dataset grouped by cuisine to support custom recipe generation and evaluation.

The project will be implemented using Python 3 as the primary programming language. For machine learning and computer vision tasks, we will utilize YOLOv8 (from Ultralytics) and OpenCV. The web-based interface will be developed using either Streamlit or Flask, depending on the final deployment needs. JSON and CSV formats will be used for storing and managing recipes and ingredient data. For team collaboration, we will use GitHub for version control and Notion for documentation and project planning.