Problem Statement:-

Indian mothers face daily challenges and frustrations when preparing morning curries. In response to this widespread issue, we have initiated a project called 'From Bytes to Bites: Harnessing Deep Learning and AI for Crafting Recipes to Empower Mothers.' This project strives to offer innovative solutions to address these culinary challenges.

Solution Approach:-

Our approach offers users two input options: they can either capture a photo using the camera or upload an existing image. Additionally, we provide fields where users can specify the language in which they want the recipe to be generated, as well as another field to indicate the desired quantity of recipes. * The process begins by inputting the collected image into our model, which then generates text files containing information about detected vegetable classes within the image, along with their corresponding bounding box values . * Following this step, a validation check is performed. * If the model doesn't produce any text files, then an error message is displayed, prompting the user to review their image. Our model exclusively generates text files for correctly formatted images from the user . *

Assuming the model successfully generates the text files, we move on to the next step: recipe generation using generative AI. We extract unique class labels from the image and combine them with the user's selected language and desired number of recipes to create a prompt template. This template is then inputted into the Google Palm's model using the API key, resulting in the generation of recipes based on our template. These recipes are presented on the user's screen, and users also have the option to store them locally for future reference.

Note:- (*- positive case, *-negative case)

Architecture:-

Drive Link:- https://tinyurl.com/32jn2ybd

Prototype:-

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https://from-bytes-to-bites-v1.streamlit.app/

Technologies Used:-

YOLOv8: We employed YOLOv8 for model training, enabling precise detection of vegetable classes and bounding box values in images.

Streamlit: Our web application has been developed using Streamlit, which offers an intuitive and user-friendly interface for capturing images and displaying generated recipes.

Streamlit Cloud: We have deployed our application on Streamlit Cloud, ensuring seamless accessibility for users without the need for local installations.

Google Palm: To generate recipes based on user inputs, we harnessed the power of Google Palm using API keys, allowing for dynamic and context-aware recipe creation.

Challenges:-

Challenges in Model Building:

Limited GPU Resources (Google Colab's free-tier): Constraints on computational resources result in longer model training times.

Resource-Intensive Deep Learning:

Developing large deep learning networks demands substantial computational power, which affects optimal performance.

Difficulties in Data Annotation:

Labor-Intensive Annotation: The data annotation process is time-consuming.

Ensuring Quality for Diverse Vegetable Classes: This is a complex task that demands meticulous attention to detail.

Limitations of the Recipe Generation API:

Dependence on the Google Palm Free API: There are usage limitations when it comes to recipe generation.

Migitation Strategies:-

For Model Building:

Model Optimization: Fine-tuning deep learning networks for improved resource efficiency and performance.

Data Augmentation: Implementing advanced techniques to expedite model training and optimize resource utilization.

Exploration of Cloud Resources: Consideration of cloud-based GPU solutions to overcome resource limitations.

For Data Annotation:

Quality Assurance Protocols: Implementing rigorous protocols to ensure accurate and reliable data annotations.

Collaborative Annotation: Facilitating collaborative efforts and providing expert supervision to streamline the process.

For Recipe Generation:

Usage Optimization: Optimizing API utilization within constraints for generating high-value recipes.

By addressing these challenges and implementing effective mitigation strategies, we showcase our adaptability and resilience. Our team remains dedicated to delivering a successful solution that empowers mothers while navigating these complexities.

Future Enhancements:-

Our commitment to innovation drives us to envision the following future enhancements:

Personalization: We will tailor recipes based on individual preferences and dietary needs.

Recipe Variations: We will expand our recipe options to include regional cuisines and various variations.

Ingredient Substitutions: We will provide real-time alternatives for ingredients to offer flexibility in your cooking.

User Community: We aim to foster user interaction through a community platform designed for sharing recipes.

Smart Appliances Integration: We are exploring integration with existing smart kitchen devices to provide a seamless cooking experience.

Multilingual Support: We will extend language accessibility to reach a broader user base.

Dedicated Mobile App: We are in the process of developing a mobile app for image capture and easy access to recipes.

Nutritional Information: We will include detailed nutritional data, such as calorie counts and macronutrient breakdowns, to help you make informed choices.

We have some special things on our website.

Github link:-
https://github.com/chakka-guna-sekhar-venkata-chennaiah/from-bytes-to-bites/

Official CLoud Link:
https://from-bytes-to-bites-v1.streamlit.app/