**Coimbatore Institute Of Technology, Coimbatore -14**

**Career Guidance and Counselling Cell**

**&**

**Department of Computing**

**The DoughVinci Code**

**Problem Statement 2**

Statement – **Automated Menu Review with Ingredient Identification.**

**Description:**

Develop an AI model that can assess newly submitted menus from kitchens. The model should review the menus based on factors such as dish uniqueness, ingredient availability, pricing, and compliance with regulatory standards. It should also determine the cuisine of each menu using information from the name, description, and ingredients after they have been reviewed and approved by the model. The model should highlight any discrepancies or issues for manual review by our team. Additionally, the system should be capable of analysing images of food dishes uploaded by kitchens to accurately identify the ingredients used and attempt to deduce the cooking methods based on visual cues from the images.

**Approach:**

* **Data Loading**: Load images from folders representing different cuisine categories using OpenCV.
* **Data Preprocessing:** Resize images to a common size (128x128) and preprocess them.
* **Data Labeling:** Assign labels to each cuisine category.
* **Model Architecture:** Design a Convolutional Neural Network (CNN) model using TensorFlow's Keras API.
* **Model Training:** Train the CNN model on the preprocessed data.
* **Model Evaluation**: Evaluate the trained model on the test data and generate a classification report.
* **Visualization**: Plot training history to observe model performance over epochs.
* **Image Prediction:** Load a sample image, preprocess it, and use the trained model to predict its cuisine category.
* **Metadata Handling:** Load metadata from a CSV file, extract additional information for predicted images.
* **Prediction Display:** Show the predicted cuisine along with additional metadata if available.

**Implementation Details:**

* Utilize libraries like NumPy, Matplotlib, OpenCV, TensorFlow, and scikit-learn.
* Define helper functions for image loading, metadata loading, prediction, and visualization.
* Train the CNN model with appropriate hyperparameters like epochs, batch size, and optimizer.
* Handle exceptions during image loading and ensure minimum image dimensions.

**Problems Faced:**

* **Image Loading**: Addressed issues related to loading images, ensuring compatibility with OpenCV.
* **Data Imbalance:** Ensure balanced representation of different cuisine categories for effective model training.
* **Data Collection:** data collected from the scratch for each cuisine

**Future Improvements:**

* **Data Augmentation:** Introduce augmentation techniques to increase dataset diversity and improve model generalization.
* **Model Tuning:** Experiment with different CNN architectures, hyperparameters, and regularization techniques for better performance.
* **Metadata Enhancement**: Enhance metadata with more attributes for richer predictions and insights.
* **Deployment:** Deploy the model as a web service or mobile application for real-time predictions.
* **User Interface**: Develop a user-friendly interface for users to interact with the model and view predictions seamlessly.