**Team: CodeOne**

**Problem Statement:**

Given a dataset of food images belonging to 20 different categories, the task is to build a deep learning model that can accurately classify these food images into their respective categories.

**Approach:**

**Data Exploration and Visualization:**

Load and explore the dataset to understand its structure and characteristics.

Visualize sample images from different categories to get insights into the diversity and complexity of the data.

Analyze color channels, pixel distributions, and other relevant features to understand the data better.

**Data Preprocessing:**

Normalize the images to ensure uniformity in data representation and improve model convergence.

Apply data augmentation techniques like rotation, shifting, and flipping to increase the diversity of training samples and enhance model generalization.

**Data Organization:**

Split the dataset into training, validation, and test sets to evaluate the model's performance.

Organize images into respective folders for each food category to facilitate easy loading and preprocessing during model training.

**Model Building and Training:**

Choose a pre-trained deep learning model as the base architecture. In this case, InceptionV3 is used.

Add custom layers on top of the pre-trained model to adapt it to the specific classification task.

Compile the model with appropriate loss function, optimizer, and evaluation metrics.

Train the model using the training data while monitoring performance on the validation set. Save the best-performing model checkpoints during training.

**Model Evaluation:**

Evaluate the trained model's performance on the test set to measure its accuracy and generalization ability.

Analyze the accuracy and other relevant metrics to assess the model's effectiveness in classifying food images.

**Prediction:**

Use the trained model to predict the class labels of individual food images.

Implement functions to predict the classes of multiple images in a directory and calculate the accuracy of predictions.

Visualize the predictions to gain insights into the model's performance and identify any areas for improvement.

By following this approach, we aim to build a robust deep learning model capable of accurately classifying food images into their respective categories, thereby assisting in various food-related applications such as recipe recommendation, dietary analysis, and food recognition systems.