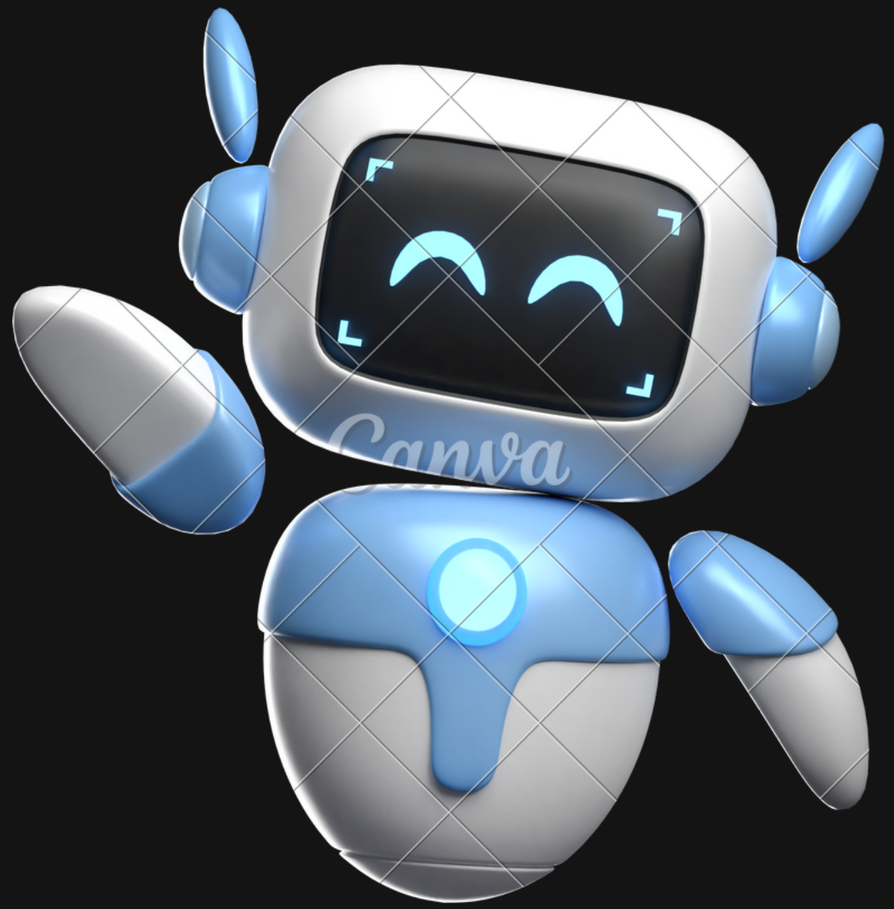
FINAL PROJECT



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DEPT: IIIrd year BE-CSE

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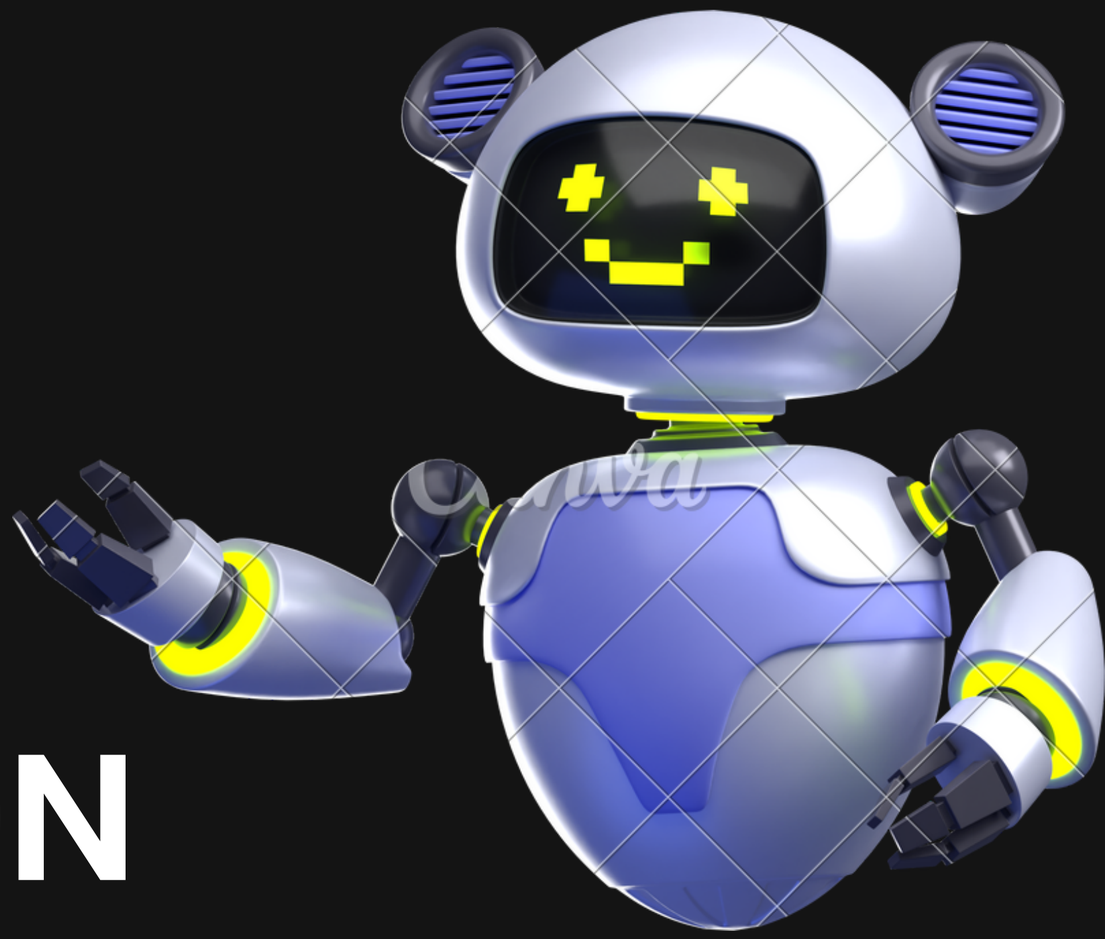
GENERATIVE AI

FAST FOOD CLASSIFICATION

USING CONVOLUTION NEURAL NETWORK



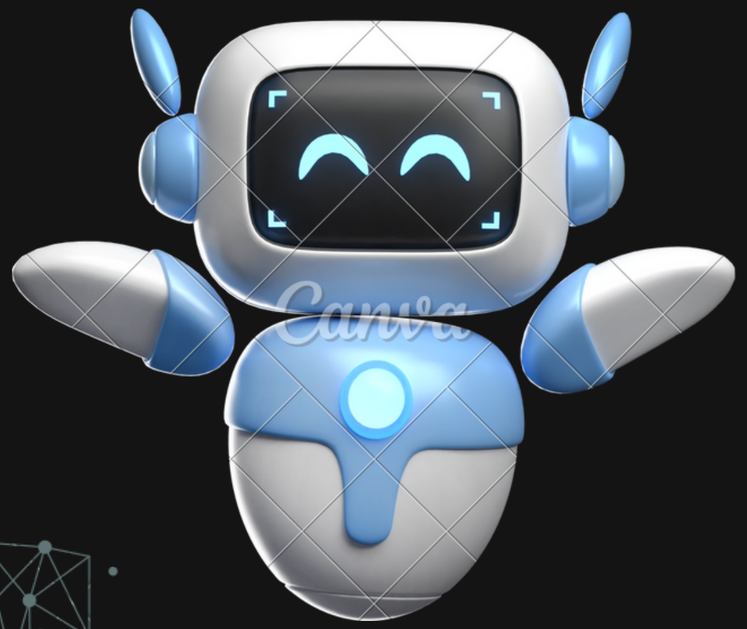
AGENDA

The proliferation of fast-food establishments worldwide has led to a diverse and extensive menu landscape, making it challenging for consumers to make informed and healthy food choices. The objective of fast food classification is to develop a system that can automatically identify and categorize images containing different types of fast food. Fast food consumption is a prevalent dietary trend. This can be achieved using deep learning techniques, particularly convolutional neural networks (CNNs).

This project has the potential to be applied in various contexts, such as:

- Dietary Tracking Applications: Users can upload pictures of their meals, and the system can classify the food items, potentially providing feedback based on their dietary goals.
- Automated Fast Food Image Analysis: The system can be integrated into restaurant operations to streamline processes or analyze customer preferences.

PROBLEM STATEMENT



This project revolves around one of my greatest passions: food!

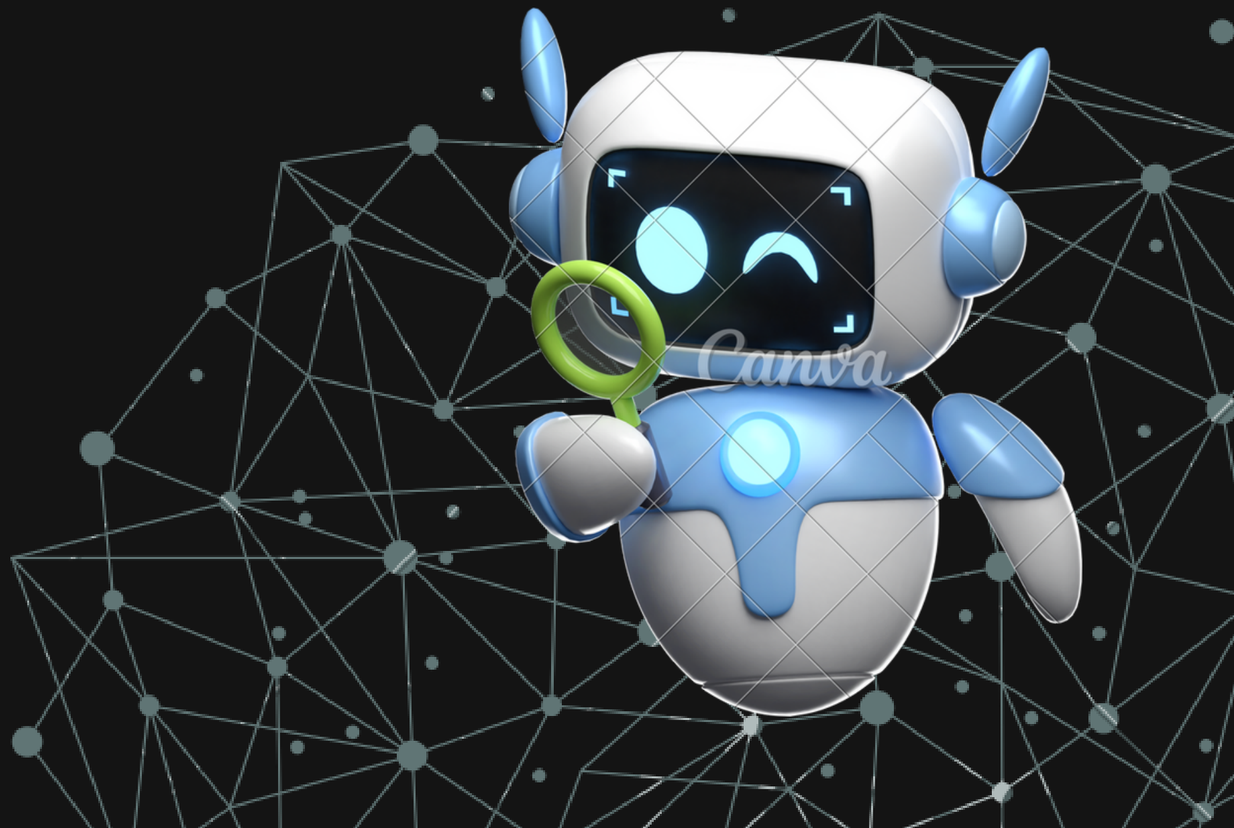
Fast food is a convenient choice for many individuals due to its convenience and accessibility. However, the health implications of consuming fast food regularly are well-documented, leading to a growing interest in understanding and managing dietary habits.

The problem to be addressed is the classification of various fast food items and their visualization. This classification can be used in assisting consumers in making informed choices about their food consumption and to raise awareness about the nutritional value of different fast food options.

OVERVIEW

This project aims to develop a system that automatically classifies images containing different types of fast food using CNNs. This project aims to classify fast food images based on nutritional values.
Here's a breakdown of the key steps in fast food classification using deep learning:

- Data Collection
- Data Preprocessing
- Model Building
- Model Training
- Data Visualization
- Model Evaluation



Who are the end users?

Individual Users:

- Diet-conscious individuals
- Nutritionists and Dietitians
- Fitness professtionals

Businesses in the Food Industry:

- Food Service Providers
- Gym
- Food Manufacturers and Suppliers
- Mobile Health (mHealth) Platforms

Government agencies

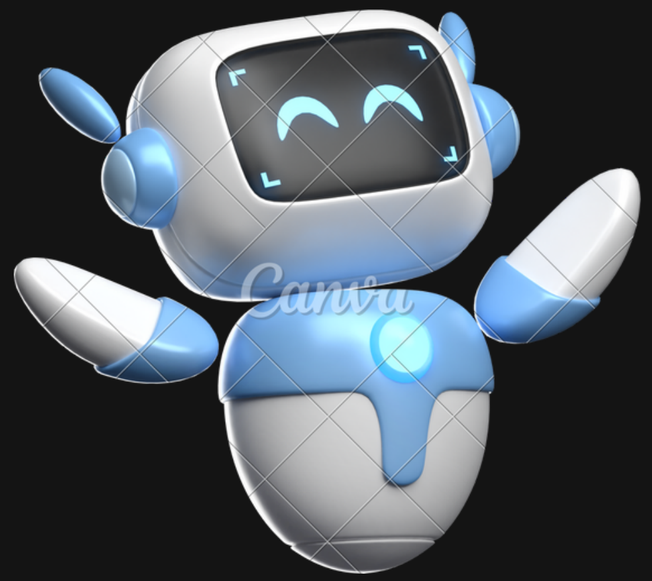
Public Health Organizations

Technology and Data Science Professionals

- Fitness app Developers
- Data scientists and Data analysts

SOLUTION

Our solution for fast food classification leverages machine learning techniques to categorize fast food items and visualize them using Convolution Neural Network, and ResNet50V2



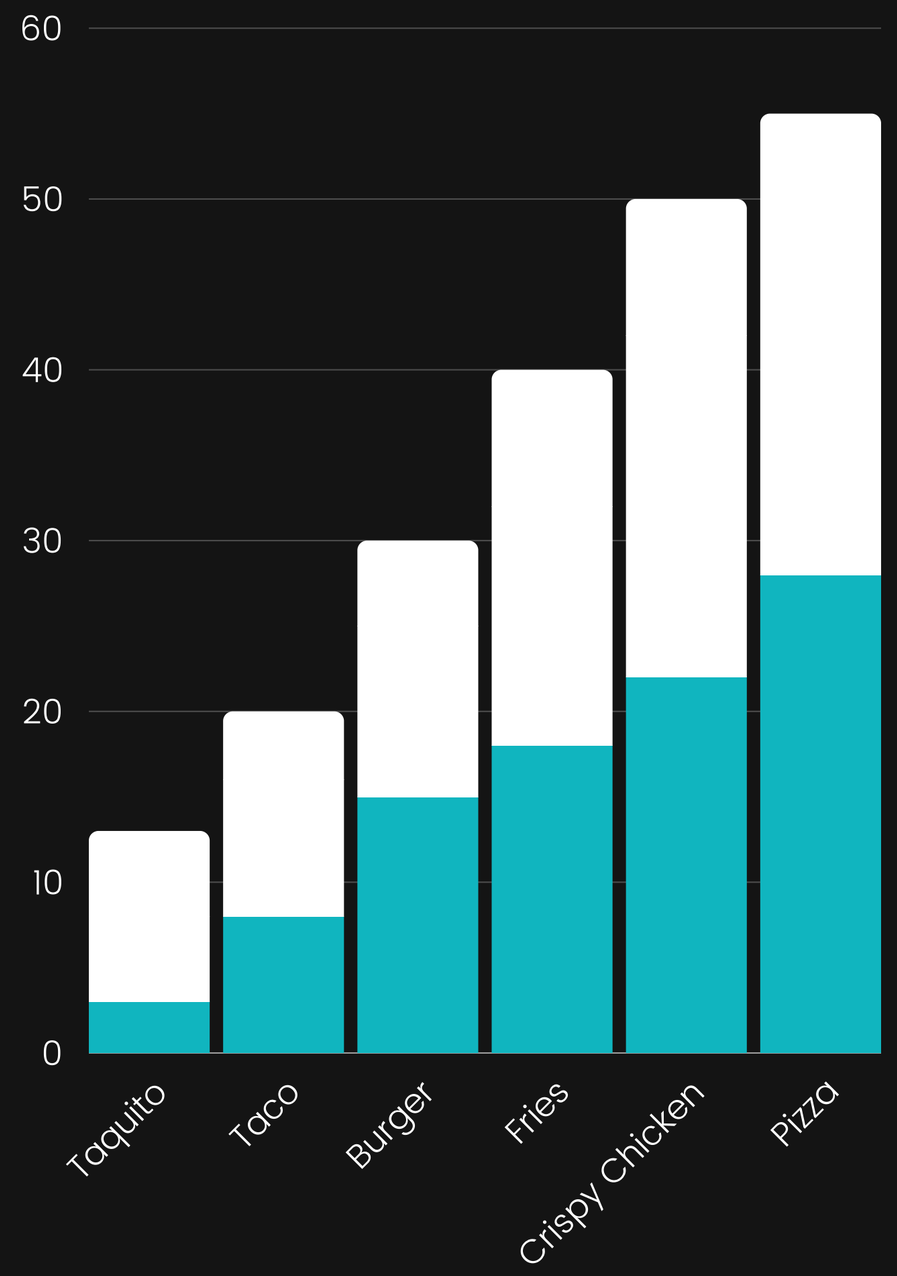
VALUE PROPOSITIONS

1. Informed Decision-Making: Empowers consumers to make healthier fast food choices based on detailed nutritional information.
2. Professional Support: Assists health professionals in educating clients about fast food nutritional content, facilitating better dietary guidance.
3. Industry Improvement: Enables food businesses to develop and promote healthier fast food options, meeting consumer demand for nutritious choices.
4. Public Health Impact: Supports public health efforts by monitoring fast food consumption trends and implementing targeted interventions to address diet-related health issues.
5. Convenience and Accessibility: Provides a user-friendly interface for easy access to fast food classification results.

THE WOW IN MY SOLUTION

Emphasize that our solution can recognize a broad range of fast food items, going beyond the basic burgers and fries.

- Identify a wide variety of fast food items with high accuracy. (e.g., burgers, fries, pizza, tacos, donuts, etc.)
- Leverage transfer learning to achieve state-of-the-art performance without massive datasets.
- Offer real-time classification capabilities for applications like dietary tracking or fast food ordering systems.
- Potential for customization to include specific food items from different restaurant chains.



MODELLING

1

DATASET PREPARATION

Dataset serves as the training material for the neural network to learn the distinctive features

2

NEURAL NETWORK ARCHITECTURE/ WORKING

Convolutional Neural Networks (CNNs) are commonly used for image classification due to their ability to capture spatial hierarchies and patterns.

3

TRAINING

The neural network analyzes the input images

4

TESTING AND VALIDATION

the model is tested on a separate set of images not used during training, called the validation or test set.

5

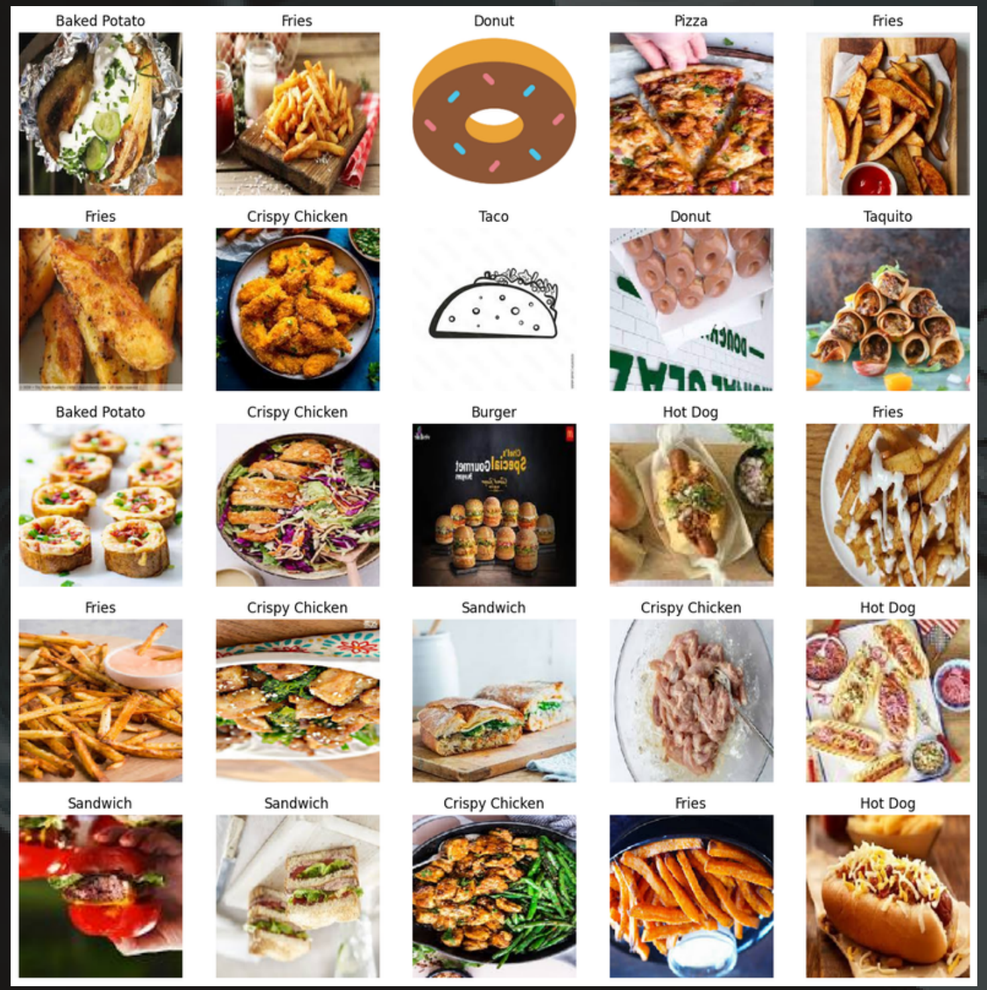
Prediction:

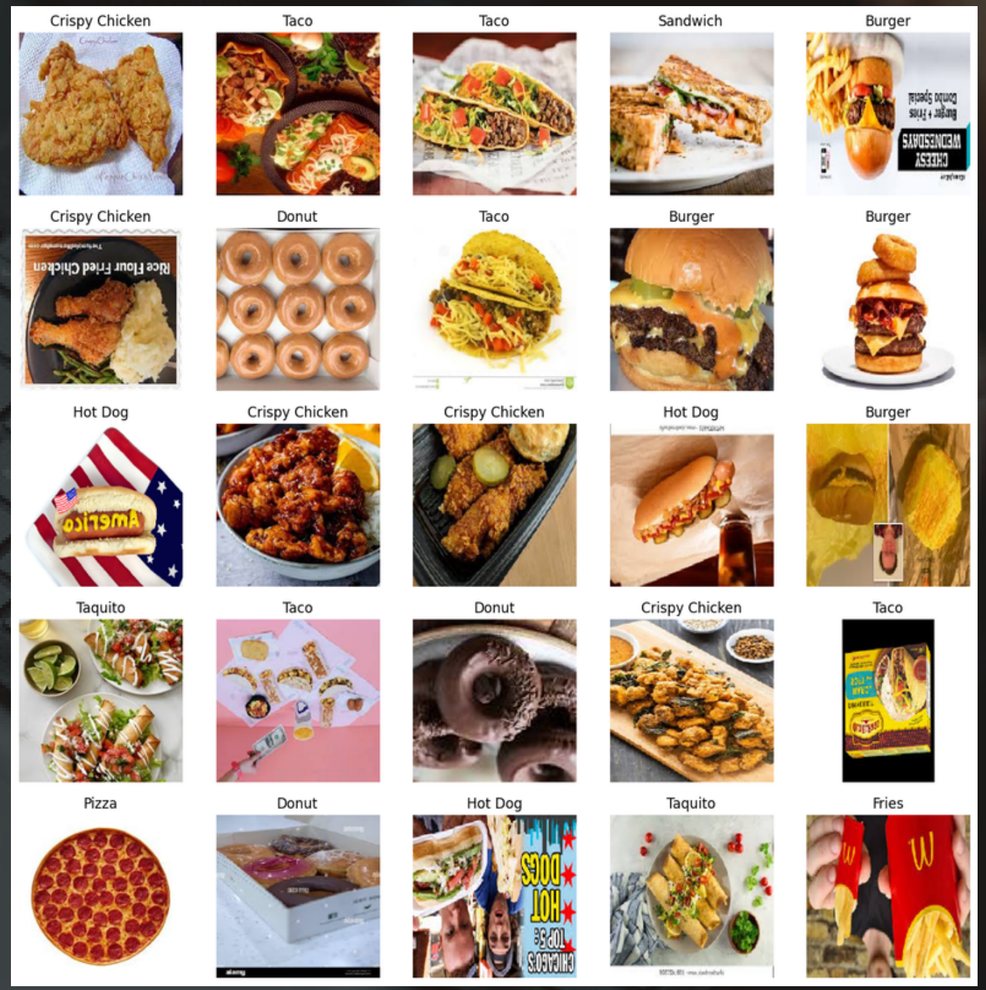
Once trained and validated, the model can be applied to new, unlabeled images for classification

- **Transfer learning:** Leverage pre-trained models (e.g., VGG16, ResNet50)
  - Reduce training time and improve accuracy
  - Fine-tuned for fast food image classification task

OUTPUT

Data visualization





ResNet50V2- MODEL COMPILATION AND TRAINING

Fast Food Classification

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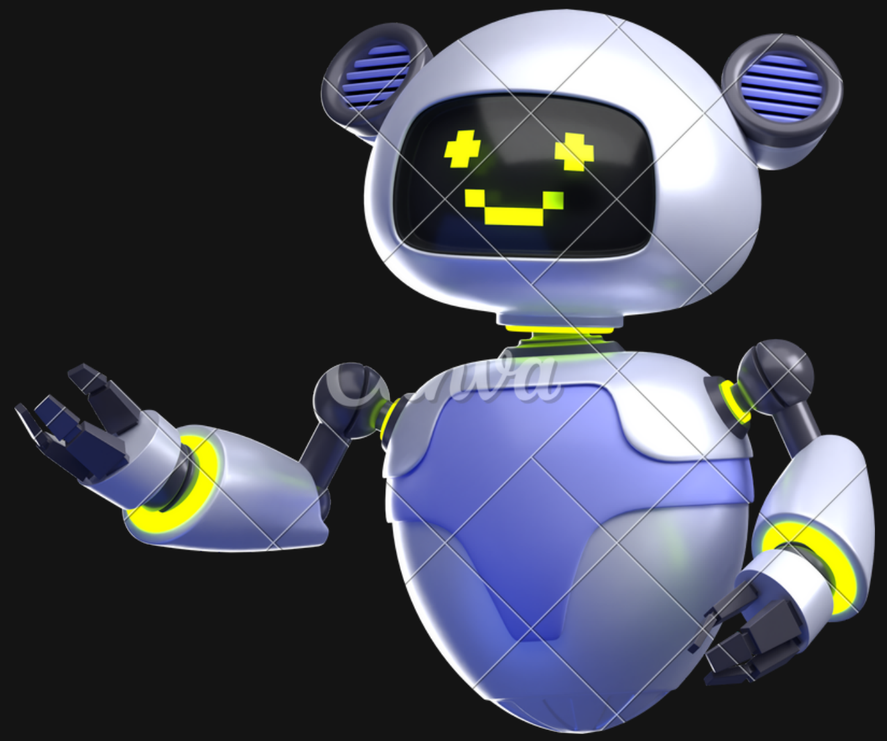
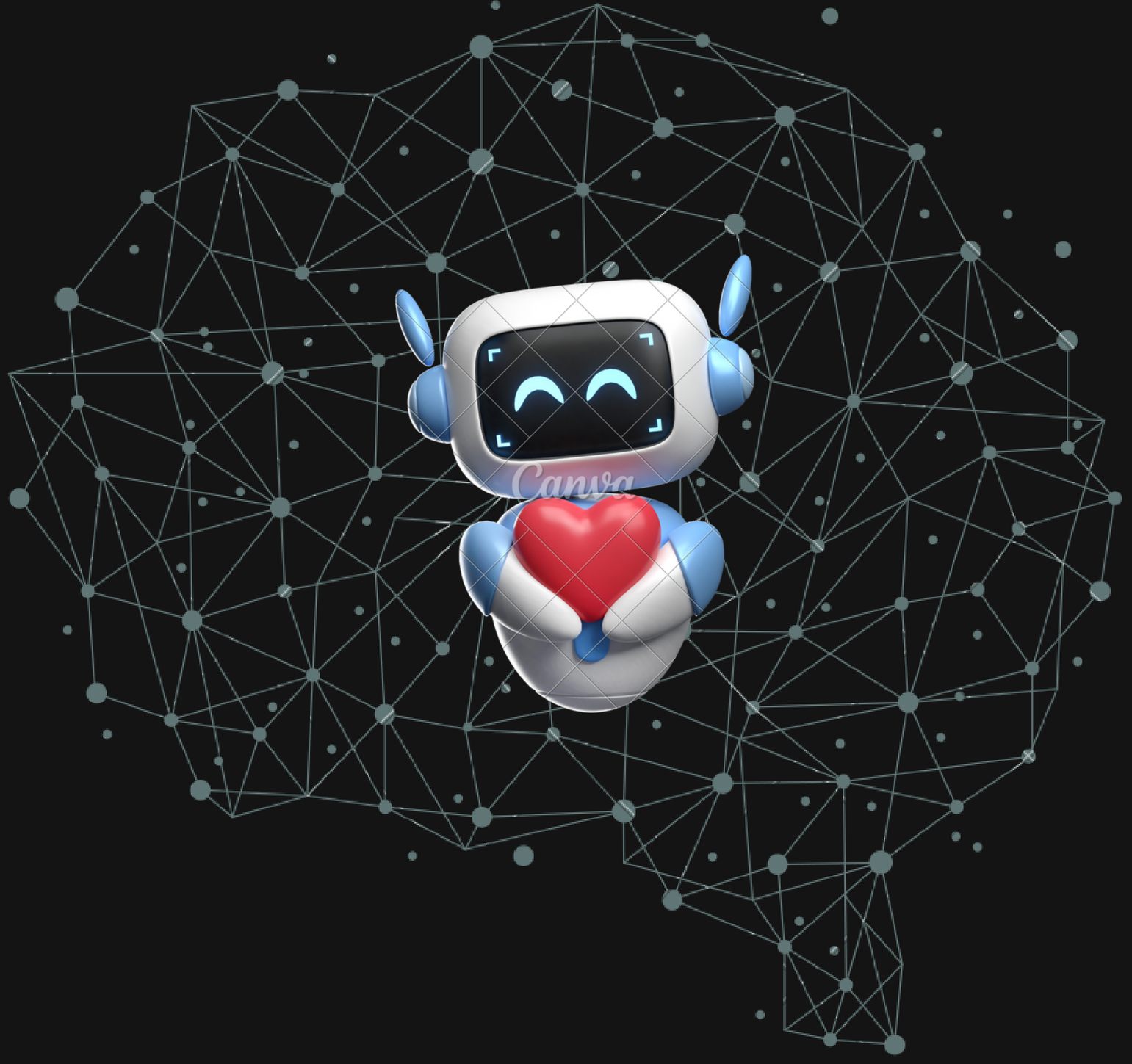
```
Epoch 1/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 440s 1s/step - accuracy: 0.5232 - loss: 1.4377 - val_accuracy: 0.7946 - val_loss: 0.6687 - learning_rate: 1.0000e-04
Epoch 2/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 271s 1s/step - accuracy: 0.8572 - loss: 0.4749 - val_accuracy: 0.8237 - val_loss: 0.5883 - learning_rate: 1.0000e-04
Epoch 3/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 267s 1s/step - accuracy: 0.8939 - loss: 0.3468 - val_accuracy: 0.8309 - val_loss: 0.5808 - learning_rate: 1.0000e-04
Epoch 4/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 267s 1s/step - accuracy: 0.9283 - loss: 0.2478 - val_accuracy: 0.8214 - val_loss: 0.6483 - learning_rate: 1.0000e-04
Epoch 5/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 320s 1s/step - accuracy: 0.9351 - loss: 0.2141 - val_accuracy: 0.8397 - val_loss: 0.5792 - learning_rate: 1.0000e-04
Epoch 6/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 320s 1s/step - accuracy: 0.9476 - loss: 0.1711 - val_accuracy: 0.8269 - val_loss: 0.6438 - learning_rate: 1.0000e-04
Epoch 7/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 264s 1s/step - accuracy: 0.9571 - loss: 0.1442 - val_accuracy: 0.8297 - val_loss: 0.6557 - learning_rate: 1.0000e-04
Epoch 8/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 0s 917ms/step - accuracy: 0.9601 - loss: 0.1247
Epoch 8: ReduceLROnPlateau reducing learning rate to 1.9999999494757503e-05.
235/235 ━━━━━━━━━━━━━━━━━━━━ 321s 1s/step - accuracy: 0.9601 - loss: 0.1247 - val_accuracy: 0.8140 - val_loss: 0.7671 - learning_rate: 1.0000e-04
Epoch 9/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 324s 1s/step - accuracy: 0.9754 - loss: 0.0915 - val_accuracy: 0.8711 - val_loss: 0.5429 - learning_rate: 2.0000e-05
Epoch 10/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 320s 1s/step - accuracy: 0.9851 - loss: 0.0560 - val_accuracy: 0.8686 - val_loss: 0.5533 - learning_rate: 2.0000e-05
Epoch 11/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 326s 1s/step - accuracy: 0.9870 - loss: 0.0419 - val_accuracy: 0.8740 - val_loss: 0.5319 - learning_rate: 2.0000e-05
Epoch 12/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 265s 1s/step - accuracy: 0.9887 - loss: 0.0408 - val_accuracy: 0.8783 - val_loss: 0.5393 - learning_rate: 2.0000e-05
Epoch 13/100
235/235 ━━━━━━━━━━━━━━━━━━━━ 319s 1s/step - accuracy: 0.9909 - loss: 0.0309 - val_accuracy: 0.8686 - val_loss: 0.5648 - learning_rate: 2.0000e-05
Epoch 14/100
```

RESULTS

High accuracy



Visualization: **High level image visualization**

It can be used for Versatile applications such as Diet apps, Food chain etc,.

THANKYOU