

FOOD recognition



INTRODUCTION

This project focuses on developing a Food Recognition for Calorie Estimation system using machine learning

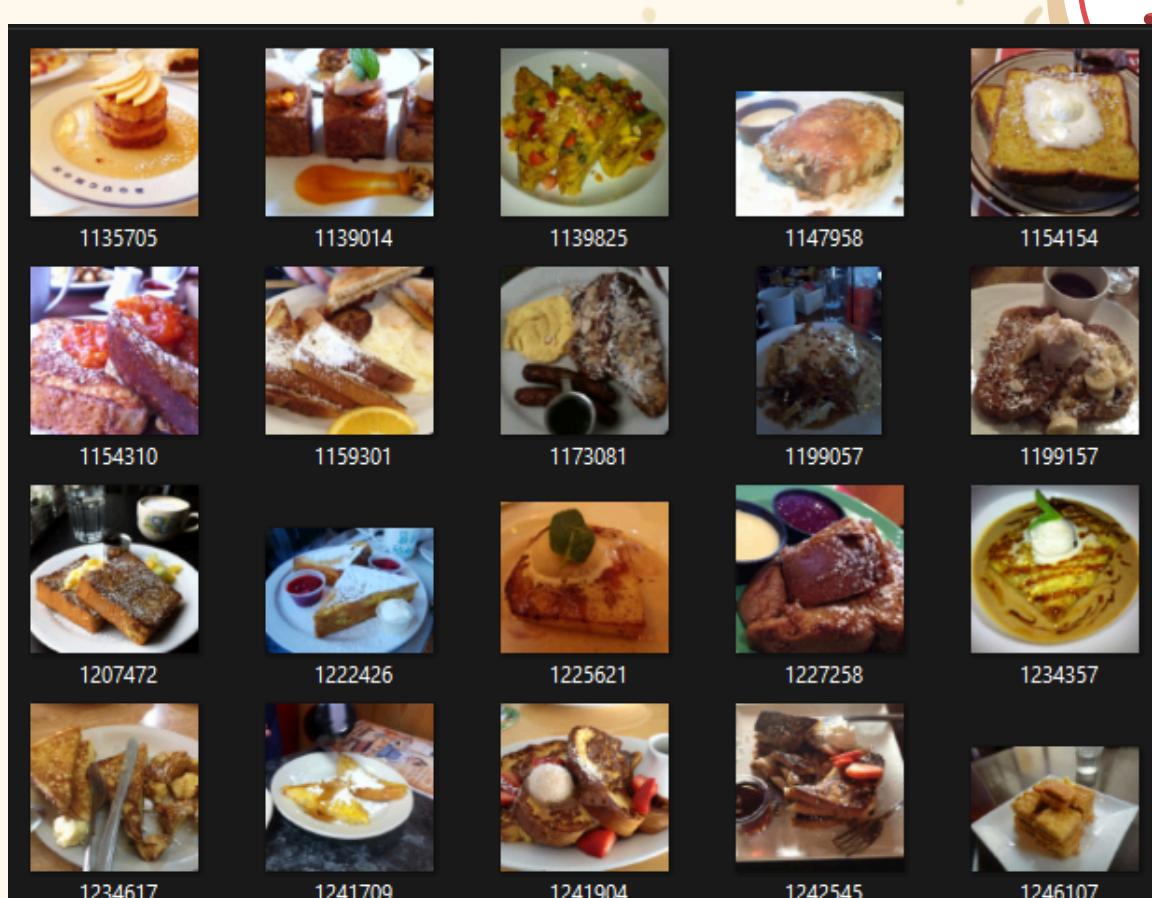
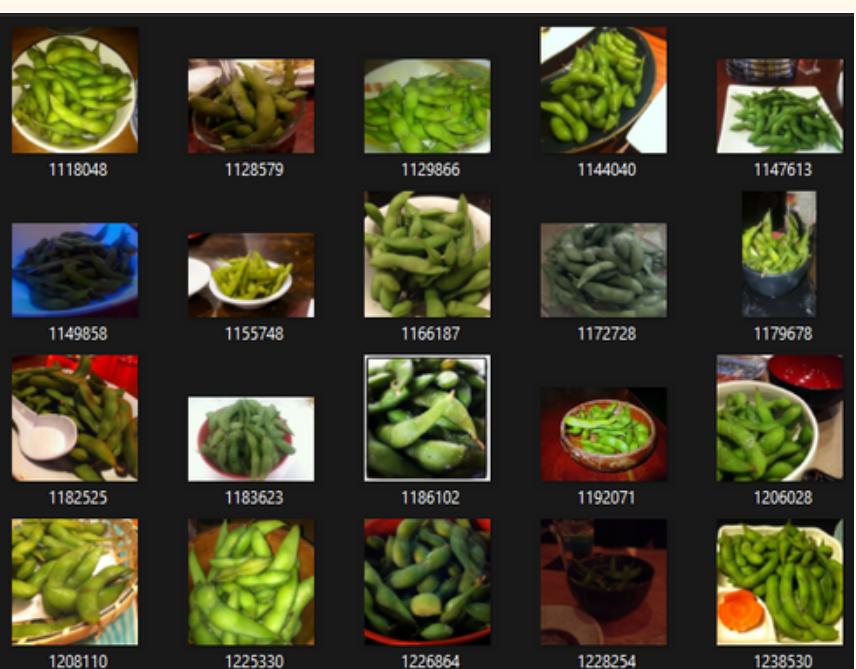
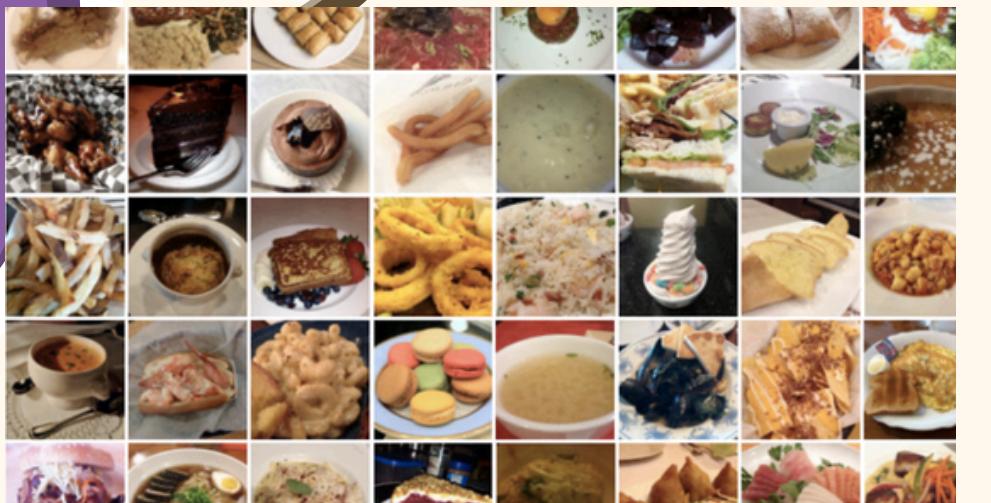
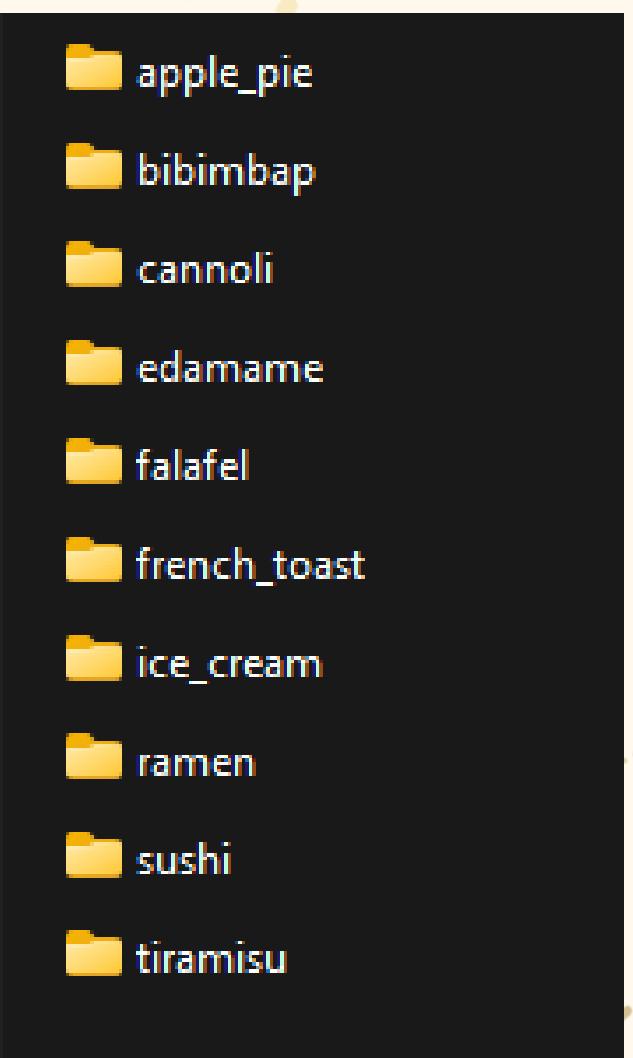
In this project, i use ResNet and an advanced version of ResNet that we've customized to improve performance.



Dataset from kaggle

DATASET FOOD 100 TINY

The Food-101 mini dataset is a smaller, more manageable version of the Food-101 dataset, making it ideal for rapid experimentation in food recognition tasks. It contains a variety of labeled food images, allowing models to quickly learn to classify common food items for applications like calorie estimation, while requiring fewer computational resources.



DATA AUGMENTATIONS

FOR TRAINING, IT APPLIES RANDOM RESIZED CROPPING, HORIZONTAL FLIPPING, AND NORMALIZATION TO INTRODUCE DATA AUGMENTATION, IMPROVING MODEL GENERALIZATION.

FOR VALIDATION, IT RESIZES IMAGES, APPLIES A CENTER CROP, AND NORMALIZES THEM TO ENSURE CONSISTENCY AND REDUCE OVERFITTING DURING EVALUATION.

```
data_transforms = {
    'train': transforms.Compose([
        transforms.RandomResizedCrop(224),
        transforms.RandomHorizontalFlip(),
        transforms.ToTensor(),
        transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
    ]),
    'valid': transforms.Compose([
        transforms.Resize(256),
        transforms.CenterCrop(224),
        transforms.ToTensor(),
        transforms.Normalize([0.485, 0.456, 0.406], [0.229, 0.224, 0.225])
    ])
}
```

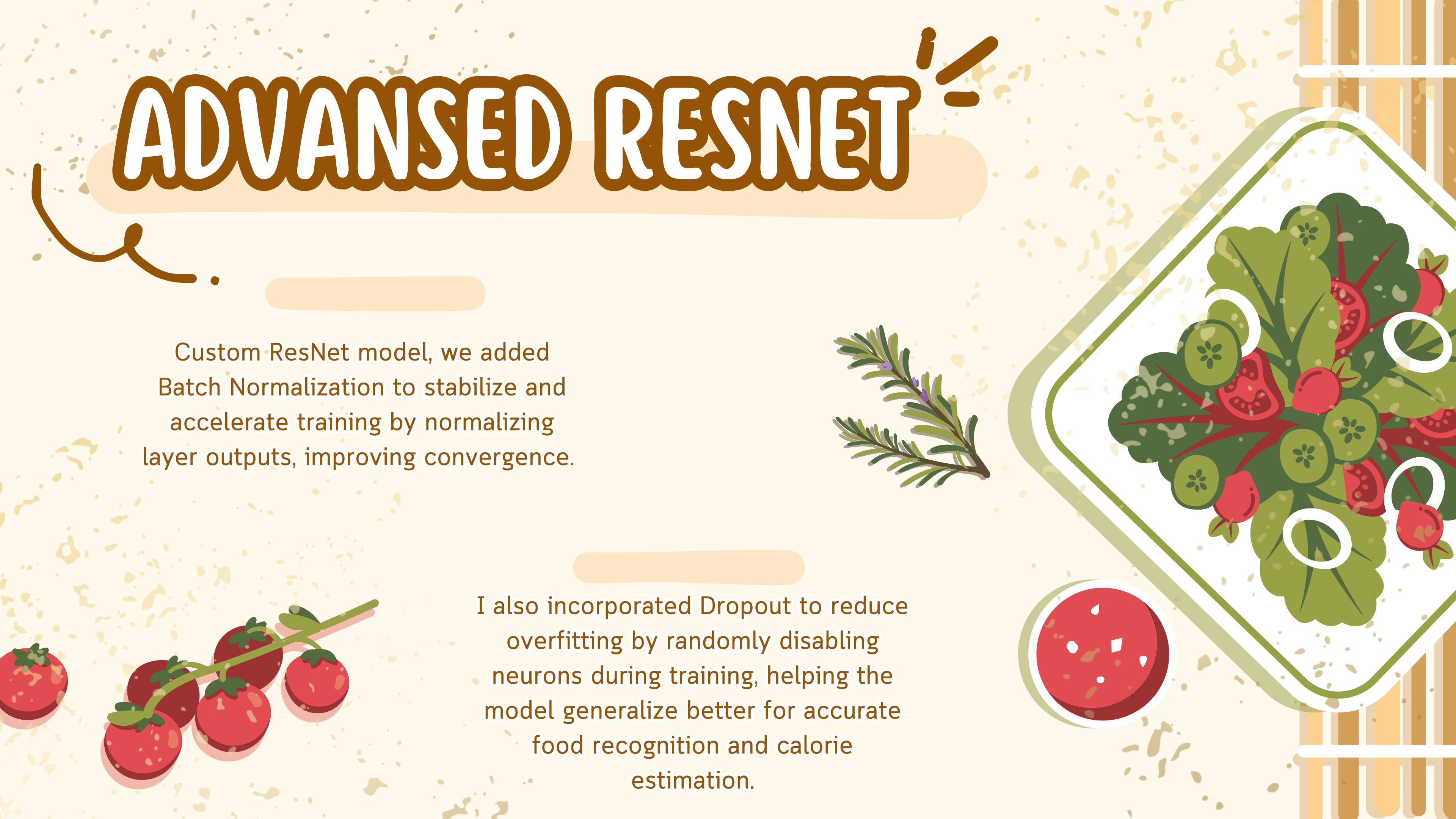
RESNET

I chose ResNet (Residual Networks) for this project due to its proven ability to handle deep neural networks effectively. ResNet's innovative skip connections allow the model to learn residual mappings rather than direct mappings, which helps mitigate the problem of vanishing gradients in very deep networks.

This makes ResNet particularly suitable for image classification tasks, as it enables the model to learn complex features without losing important information in the process. Furthermore, ResNet has demonstrated state-of-the-art performance on various image recognition tasks, making it a reliable and powerful choice for food recognition in our calorie estimation system.



ADVANCED RESNETTM



Custom ResNet model, we added Batch Normalization to stabilize and accelerate training by normalizing layer outputs, improving convergence.

I also incorporated Dropout to reduce overfitting by randomly disabling neurons during training, helping the model generalize better for accurate food recognition and calorie estimation.

SCREENSHOTS



Base

Epoch 10/10

100% |██████████| 47/47 [05:04<00:00, 6.48s/it]

train Loss: 1.0341 Acc: 0.6460

100% |██████████| 16/16 [00:34<00:00, 2.18s/it]

valid Loss: 0.9301 Acc: 0.6900

Best Validation Accuracy: 0.6900

Advansed

Epoch 10/10

100% |██████████| 47/47 [02:22<00:00, 3.03s/it]

train Loss: 0.6063 Acc: 0.7927

100% |██████████| 16/16 [00:48<00:00, 3.06s/it]

valid Loss: 0.4439 Acc: 0.8400

Best Validation Accuracy: 0.8540

**THANK YOU
FOR YOUR
ATTENTION**

