

CIFAR-100

OBJECT RECOGNITION

COURSE: IE 7615 Summer 2020

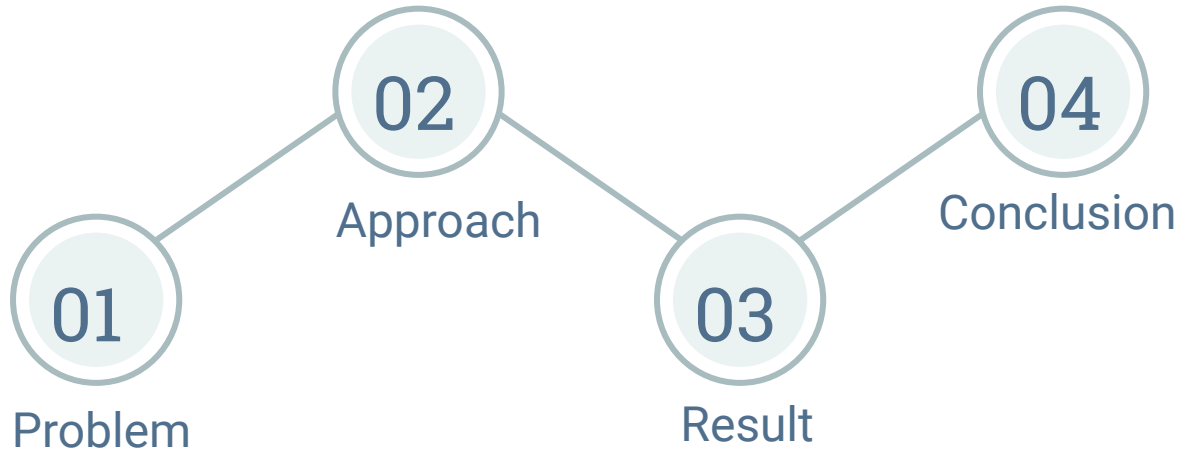
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CONTENTS



PROBLEM

Dataset: CIFAR-100

Objective: Object recognition and classification

- ❖ 60000 images
- ❖ 100 classes and 20 superclasses

Challenge:

- ❖ Small image size (32×32)
- ❖ Only 600 images in each class
- ❖ Different images for same class (at varied positions, in several postures/poses)



APPROACH

- ❖ 9-layer deep neural network

INPUT \rightarrow [[CONV \rightarrow RELU] \times 2 \rightarrow MAX-POOL] \times 3 \rightarrow [FC \rightarrow RELU] \times 2 \rightarrow FC

- ❖ Filters - 128, 256, 512
- ❖ Dense units - 1000
- ❖ 13,870,484 trainable parameters
- ❖ Dropout (0.2 - Input Layer, 0.5 - Hidden Layer)
- ❖ Adam optimizer with learning rate 0.0001

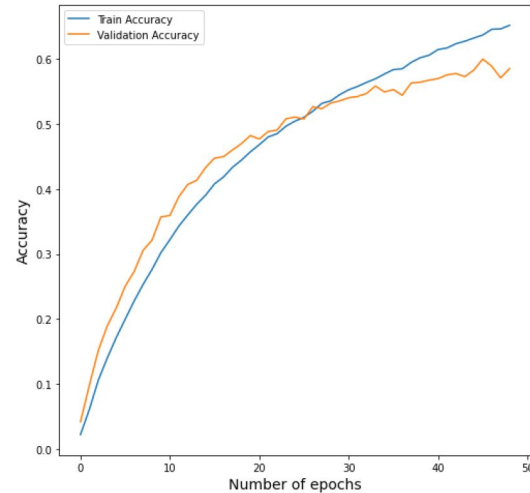
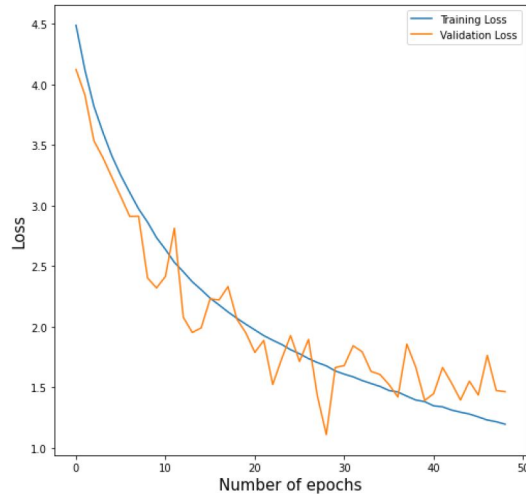
APPROACH

- ❖ ReLU activation function - Hidden Layer
- ❖ Softmax activation function - Output Layer
- ❖ Batch Size - 64
- ❖ Epochs - 100
- ❖ Early stopping (Patience - 20)
- ❖ Training and Validation split
- ❖ Image data augmentation
- ❖ Trained on GPU and 8 vCPUs with 30 GB memory

RESULT

- ❖ Training Accuracy: **65.13%**
- ❖ Validation Accuracy: **58.81%**

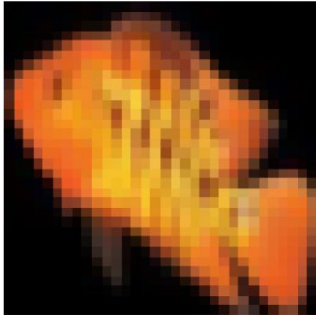
Loss and Accuracy Plots



RESULT

❖ Testing Accuracy: **59.17%**

True: Aquarium_fish
Predicted: Aquarium_fish



True: Poppy
Predicted: Poppy



True: House
Predicted: House

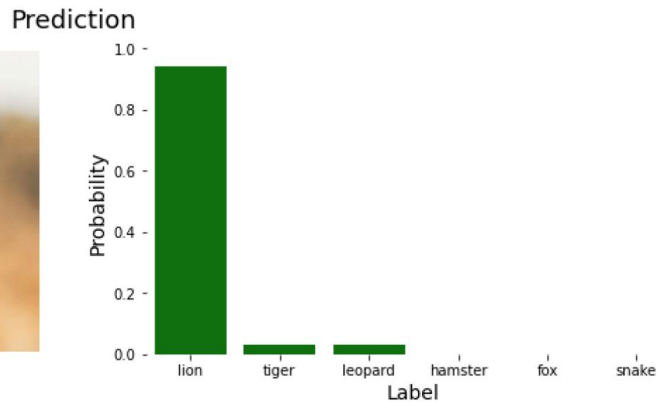


True: Crocodile
Predicted: Rocket

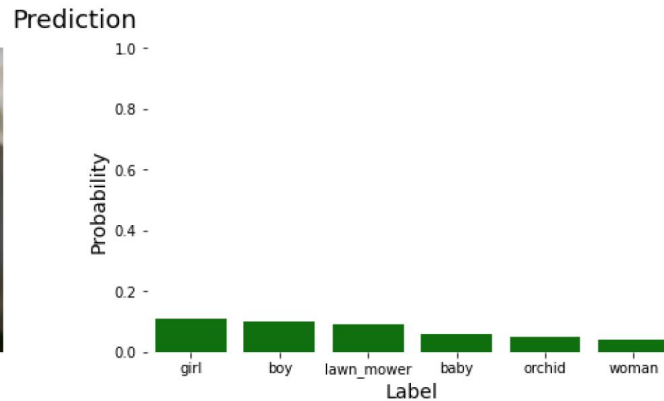


RESULT

Correct Prediction



Incorrect Prediction



CONCLUSION

- ❖ Model was created which can classify objects in images with 59% accuracy
- ❖ Many obvious objects were detected incorrectly
- ❖ Easier for humans to detect features but difficult for machines
- ❖ Availability of data likely to increase the model performance
- ❖ High computation cost, processing power and storage requirement
- ❖ Hyperparameters tuning needs experimentation
- ❖ **Future Work:** Fine tuning of EfficientNet for better accuracy

THANK YOU!