



Task Presentation

Classification Problem

Introduction :-

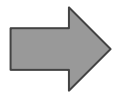


What is Classification ?

It's about teaching computers how to group data together by particular criteria and classify them based on predetermined characteristics.

A common example of classification comes with detecting spam emails or not.





Problem :-

We have a dataset of 10 classes.

Airplane , automobile , bird , cat , deer , dog , frog , horse , ship , truck

We want to build a machine learning model based on deep learning

to train on dataset and be able to predict label of future images based on experiences and features that have been learned.

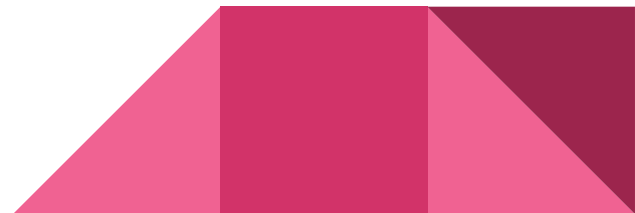


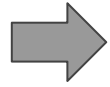
➡ **Dataset :-**

Dataset consists of 60,000 images of our 10 classes with shape of (32, 32, 3).

We have 6,000 images of each class .

The data is split to 50,000 images for training phase, and 10,000 images for testing phase.





Key Findings :-

Because we have image dataset, so the best solution to build a model and train it is to using **Convolution Neural Network**

After training our model on training dataset, the model learn to extract unique feature that identify the object

Using more than one conv layer make the model best to fit the data.

Dropout and Batch Normalization is very important to avoid overfitting.

→ Approach :-

Convolution Neural Network model approach starts with :-

First : add convolution layer starts with **32** feature detectors with (3 , 3) dimension to produce 32 feature maps and applying **relu** activation function and **BatchNormalization**.

Second : add second convolution layer as first layer followed by **maxpooling** layer with (2 , 2) dimension and **dropout**.



Third : add third convolution layer starts with **64** feature detectors with (3 , 3) dimension to produce 64 feature maps and applying **relu** activation function and **BatchNormalization**.

Fourth : add conv layer as third layer followed by **maxpooling** layer with (2 , 2) dimension and **dropout**.

Fifth : add fifth convolution layer starts with **128** feature detectors with (3 , 3) dimension to produce 128 feature maps and applying **relu** activation function and **BatchNormalization**.



Sixth : add conv layer as fifth layer followed by **maxpooling** layer with (2 , 2) dimension and **dropout**.

Seven : adding **flatten** layer to transform feature maps to one feature vector to feed into FC layer and adding first FC Layer with **512** units and **relu** activation.

Finally : adding output FC layer with **Softmax** function.

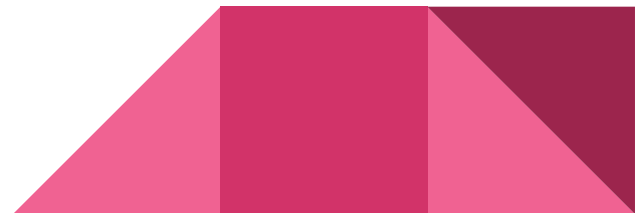


Results :-

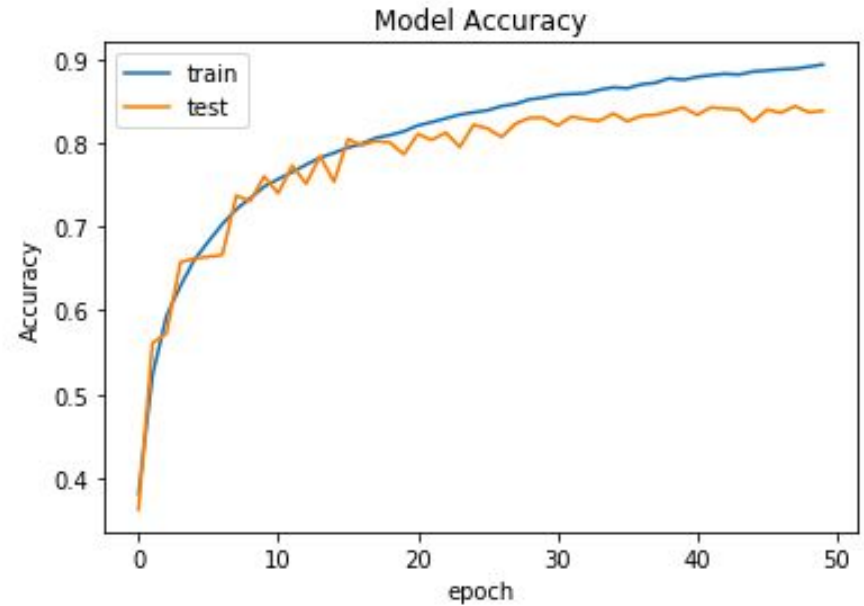
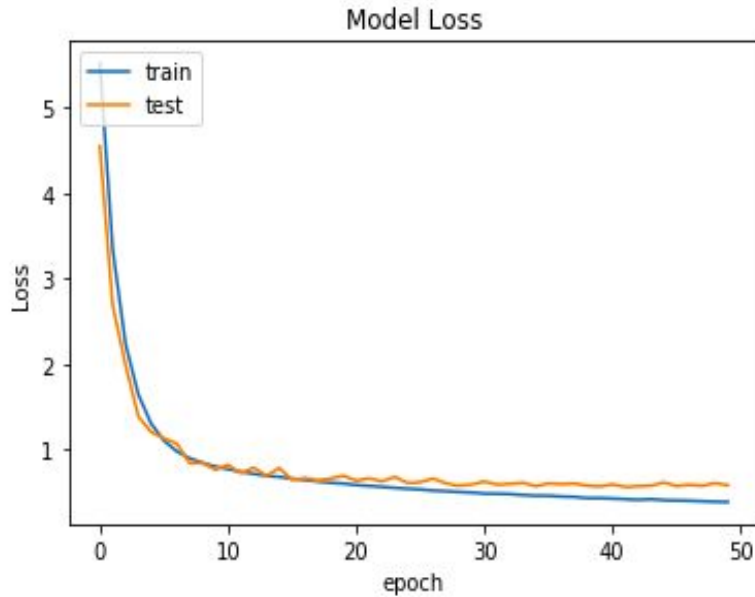
After training our model for **50 epochs**, we reach to the final results :-

Model accuracy on training set is **89.33%**

Model accuracy on testing set is **83.82%**



Visulaisation of model accuracy



Thank You

