RGB COLOR CLASSIFIER USING FNN

FINAL PROJECT

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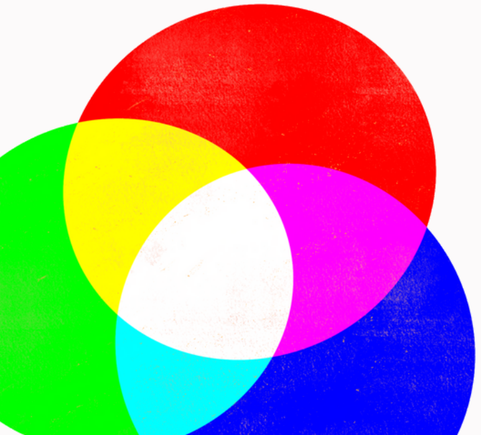


PROJECT TITLE

RGB Color classifier using Feedforward Neural Network

AGENDA

To develop a neural network model that can classify colors based on their features.

PROBLEM STATEMENT

Color classification is a fundamental task in image processing and computer vision. Based on RGB composition, every color has its own nature but we humans associate it into a handful of colors like red, green, yellow, pink and so on. There is a need to develop models that classify colors just like we do so that they can take decisions on our behalf when needed.

PROJECT OVERVIEW

This project takes an rgb pixel value and assigns a color to it out of the following: **Red, Green, Blue, Yellow, Orange, Pink, Purple, Brown, Grey, Black, White.** This is achieved through training a neural network to figure out the relationship between rgb value and the class label.

SOLUTION AND VALUE PROPOSITION

Design a multi-layer perceptron feedforward neural network that performs color classification using Tensorflow/Keras

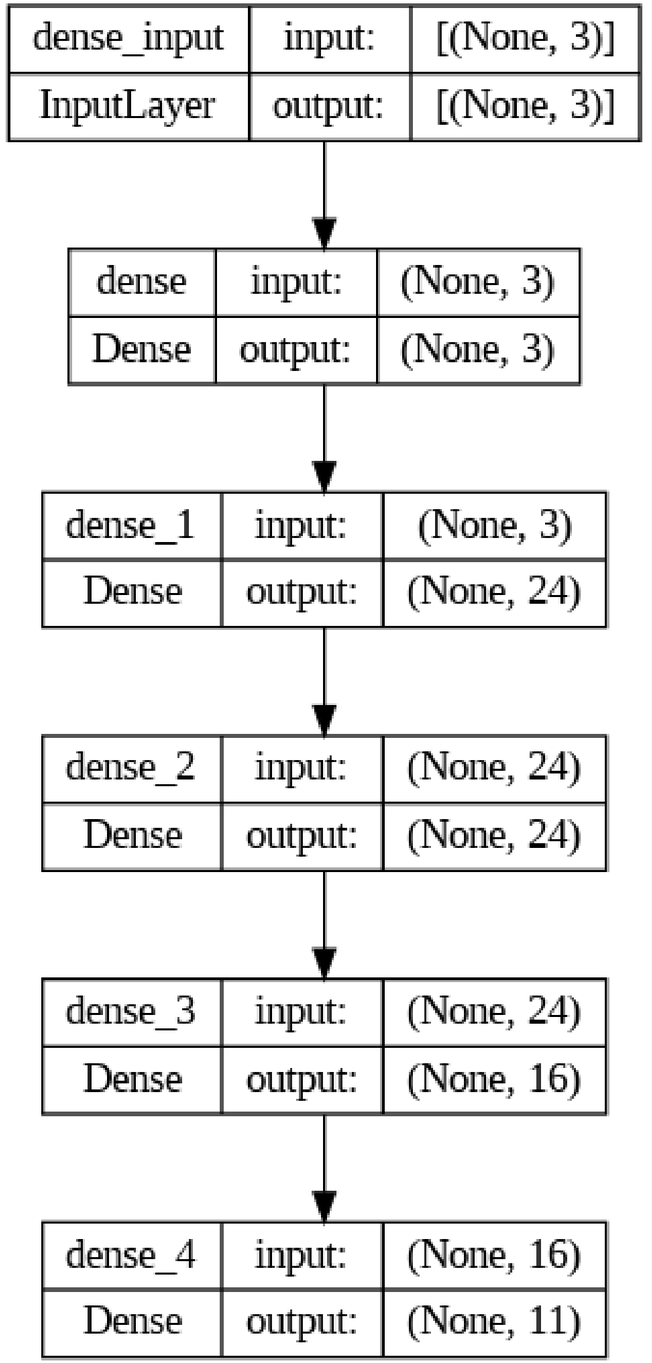
- **Sequential Model:** Utilize a sequential stack of layers.
- **Dense Layers:** Employ fully connected layers characteristic of MLPs.
- **Activation Functions**: Relies on ReLU activation in hidden layers, a common choice in MLPs.
- **Final Layer**: Lacks activation function, suggesting regression tasks or unbounded output prediction.
- **Regularization**: Applies regularization to weights of each dense layer.

THE WOW IN MY SOLUTION

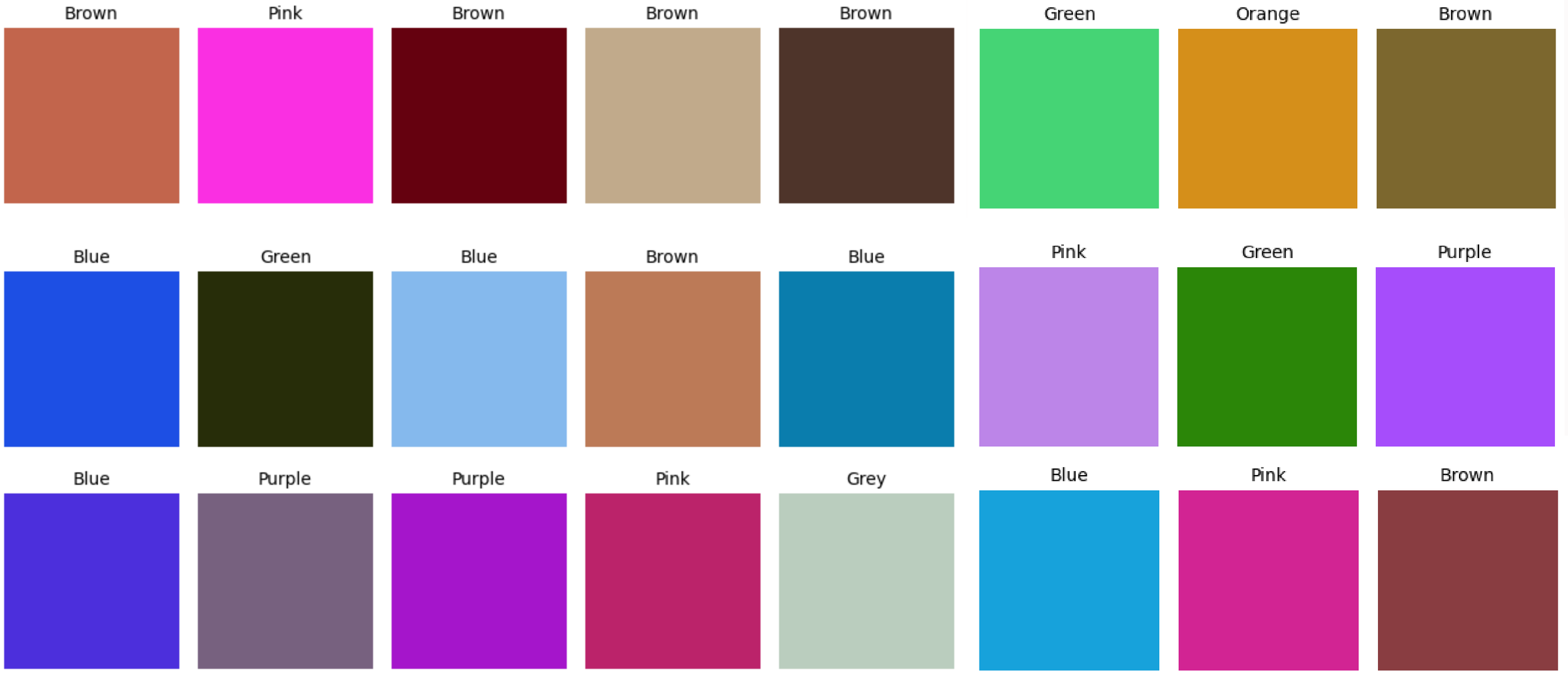
The "wow" factor in this solution stems from its ability to accurately classify colors across a wide range of categories and variations. By harnessing the power of deep learning, the model has learnt complex patterns and relationships in color data, enabling it to achieve **robustness** in classification tasks. This can also be easily integrated with object detection tasks in order to classify color of an object.

MODELLING

- Dataset of **5000+ data points** of rgb values with label was used to train the model.
- The neural network was configured as shown in the figure.
- Train test ratio of **80-20** was adopted.
- The training was carried out for **5001 epochs.**
- The model thus obtained was tested on test data and saved for future use.



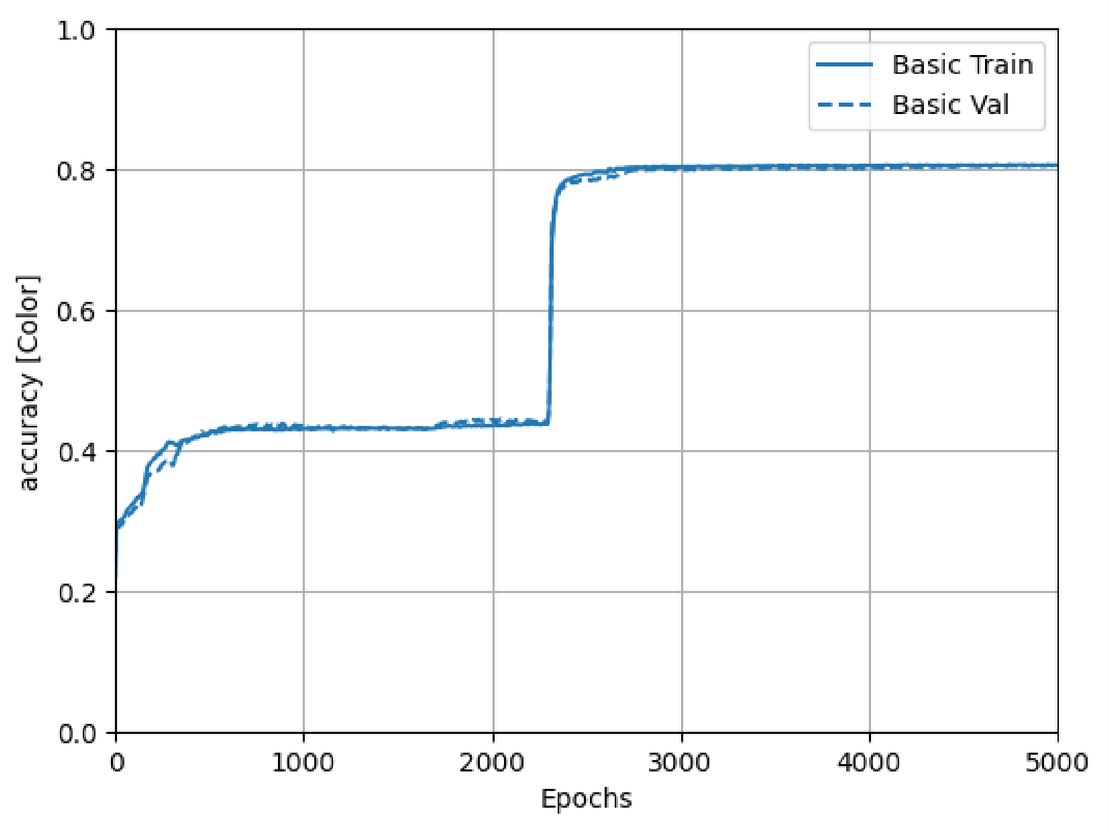
RESULTS


Brown
Pink
Brown
Brown
Brown
Green
Orange
Brown
Blue
Green
Blue
Brown
Blue
Pink
Green
Purple
Blue
Purple
Purple
Pink
Grey
Blue
Pink
Brown

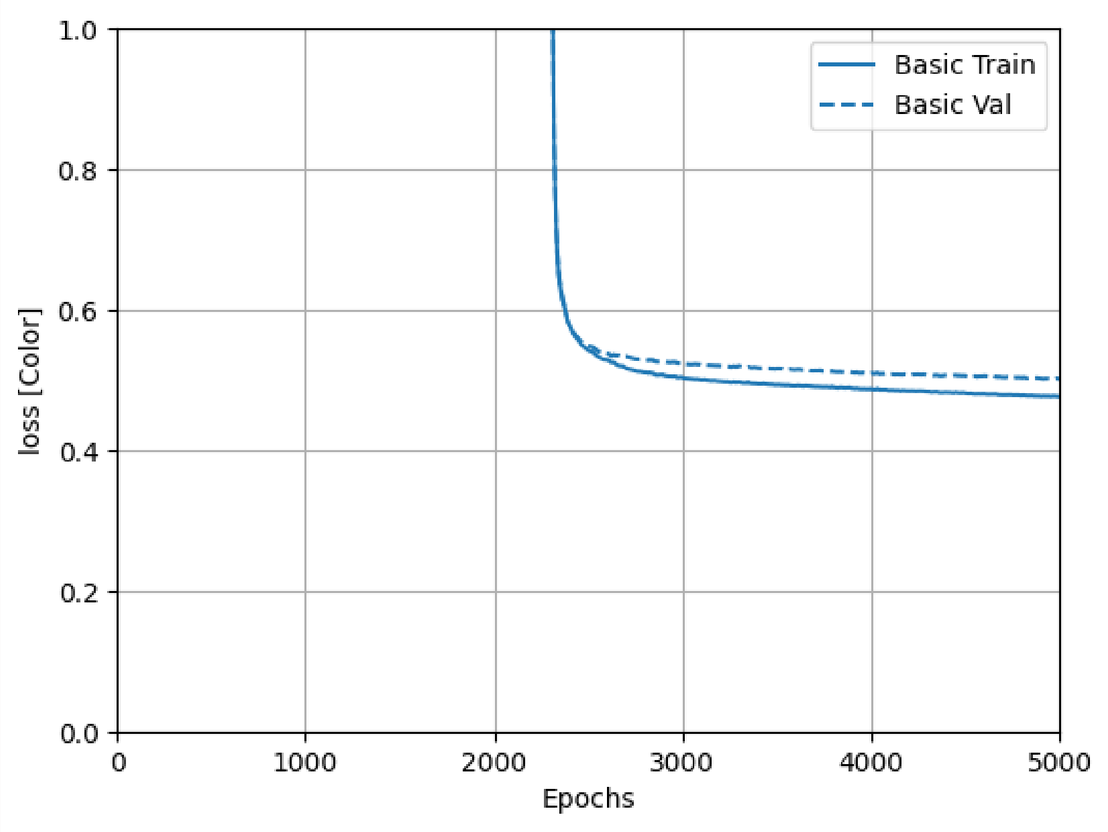
	precision	recall	f1-score	support
Red	0.78	0.70	0.74	190
Green	0.90	0.93	0.92	1152
Blue	0.90	0.88	0.89	888
Yellow	0.78	0.68	0.73	225
Orange	0.78	0.65	0.71	167
Pink	0.76	0.79	0.77	472
Purple	0.73	0.76	0.74	445
Brown	0.59	0.68	0.63	313
Grey	0.52	0.55	0.53	133
Black	0.68	0.66	0.67	38
White	0.00	0.00	0.00	19
accuracy			0.81	4042
macro avg	0.67	0.66	0.67	4042
weighted avg	0.81	0.81	0.81	4042

Accuracy: **81%**

ACCURACY CURVE



LOSS CURVE



https://github.com/yasvinippriyaa/color-classifier-with-fnn.git