# Machine Learning Major Project

Topic: Image Classification using Convolutional Neural Networks (CNNs)

Objective: To build an Image Classification Model using Convolutional Neural Networks (CNNs) which are widely in the field of image processing.

Google Colab Notebook:
https://colab.research.google.com/drive/1a3MvLT5zA426Qa0bLw1EotH_BeAwgkWv?usp=sharing

Dataset: The CIFAR-10 dataset consists of 60000 32x32 colour images in 10 classes (6000 images/class). There are 50000 images in the training data, and 10000 images in the testing data.
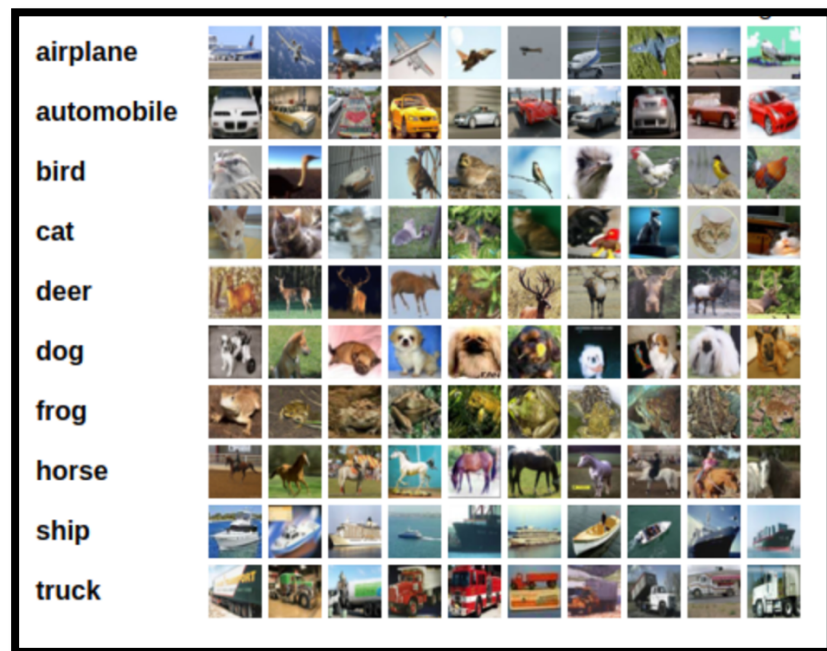
Classes are as follows:

1. Airplane
2. Automobile
3. Bird
4. Cat
5. Deer
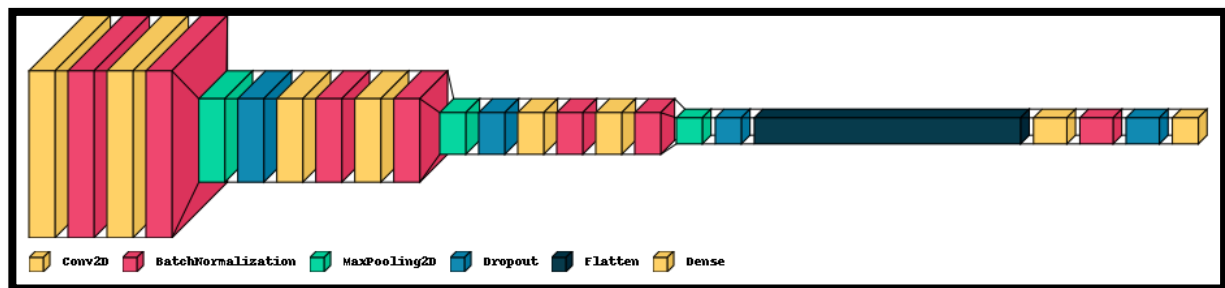6. Dog
7. Frog
8. Horse
9. Ship
10. Truck

Methodology:

Data Preprocessing & Visualization:

1. Reshape y_train and convert it into a 1D array.
2. Visualize images in X_train and y_train.
3. Normalize the training and testing data.

Data Augmentation:

Used ImageDataGenerator

CNN Model Architecture:

Activation functions: relu and softmax

Model Training:

1. Learning rate scheduler.
2. Adam optimizer and default parameters set.
3. Early Stopping callback added to prevent overfitting and overtraining.
4. **Batch_size=32 and epochs=50.**

Model Evaluation:

1. **Testing accuracy of the model is around 72.28%.**
2. Analyis using classification report, confusion matrix, and heatmap.
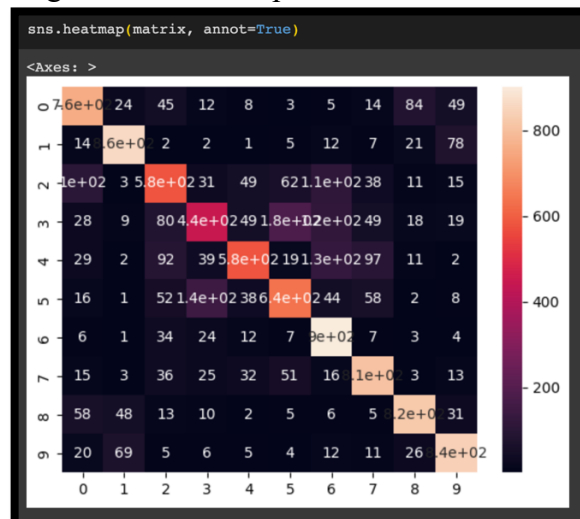
Example:

Results/Outcomes:

1. Saved the model as Model_Prediction.sav using pickle.
2. Image Classification Model using Convolutional Neural Networks (CNNs) takes as input an image and predicts the class out of the 10 classes contained in it.

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