Phase -1: Intermediate Report

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COMP 455: Extreme Computing

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# **Project Topic**

Our topic for the term project is Image Classification.

# **Group Members**

Group 5 has two members:

* Chinmay Sharma (300157594)
* Sahibdeep Singh (300156800)

# **Goals/Results**

The model is going to be able to classify the input image according to 10 classes and will provide high accuracy in classified images.

# **Libraries/Tools**

We are using tools like TensorFlow, Keras and Convolutional Neural Networks for image classification. We have also used numpy for data processing and matplotlib for data visualization.

For python libraries, we haven’t really decided what we will be using for certain but for image classification we think that libraries like Scikit-image, Matplotlib and OpenCV would be great choices. Along with these, we will also use scikit-learn, pandas and numpy for data processing.

# **Dataset**

For our dataset we are using CIFAR-10, which consists of 60,000 32 \* 32 colour images in 10 classes, with 6000 images per class. There are 50,000 training images and 10,000 test images.

# **Algorithms/Models**

Our project up till now trains a convolutional neural network to perform multi-class classification on images at random. Right now, the average accuracy of our model is about 70% but we hope to create and fine-tune the model ourselves to provide results with higher accuracy.

# **Screenshots**

# **Questions Answered**

1. How can you build models on this dataset

CIFAR10 (Canadian Institute for Advanced Research) is the standard image classification dataset. It consists of 60000 32x32 colour images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images. The dimension of each image is 32x32x3 as each color image contains 3 dimensions of RGB and we use CNNs which employs filters to extract only the information required for classification from the image and uses it for that purpose.

1. Where would be the source of raw dataset

The CIFAR-10 and CIFAR-100 are labeled subsets of the 80 million tiny images dataset. They were collected by Alex Krizhevsky, Vinod Nair, and Geoffrey Hinton.

The raw dataset can be found on: <https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz>

1. How to detect outliers

One of the most common outliers we found were misclassification between animals like cat/dog/horse. We believe that this may be due to the fact that our CNN is not much deep, and we cannot detect the dividing features between these animals.

1. How can you analyze data? what tools or APIs you used and which ones works the best for you (compare them in your report)

For data analysis we have used numpy and matplotlib. We also tried using pandas or seaborn, but we found that numpy and matplotlib were a lot more easier to use and we were able to find support for our obstacles easier.

1. How did you train the system (if applicable)?

We tried using educated guesses for tuning our neural net and we also tried to use advanced optimizer algorithms like Stochastic Gradient Descent (SGD) to fine tune our network. Using tools like tensorflow and keras made the job a lot easier and we were able to quickly iterate to find the current optimal values.

# **Future Results**

We will make a simple visualization web app using streamlit.

The web app will take an image as input from the user and will give its prediction to classify the image.

We will also try to base our network on previously made networks like ResNet and try to achieve a similar accuracy but with less layers.

# **References**

As soon as ur done with this file, I will be reference everything