**Abstract**

Target image recognition is the technique in which we want to input an image to a classifier model and the output tells whether the input image is the target image or not. We want to train our classifier model over a large set of pair of input image and corresponding label. If we train our classifier model over enough dataset, we can expect our classifier model to classify the input image correctly with the help of learnt parameters. The target image in this project is the image of animal cat. The dataset used in the project is a labelled dataset containing image information and the label of the image. Thus, the learning mechanism is called supervised learning. The classifier model in our project is a Neural Network model to recognize images of animal cats than that of non-cats. The learning algorithm used in the project is a logistic regression which is a binary classifier, i.e. it can classify the input data into one of two classes. In my approach, I have modelled a Four-Layer-Deep Neural Network to learn features of images over the training dataset for a number of iterations and I have tested my Neural Network model on the test dataset achieving an accuracy of 80%.

**Keywords**: Target image recognition, Classifier model, Supervised learning, Neural network, Logistic regression.

**Introduction**

1. **What is Neural Network?**

Neural Network is a network of neurons connected together in order to achieve complex tasks such as image recognition, voice recognition, object detection and so on. Neurons are basically the building blocks of the Neural Networks. They take input from the data, compute some function and provide final output or output to the neurons in the next layer. Many neurons can be stacked together in several layers in order to perform more complex tasks. Such a Neural Network is known as a Deep Neural Network. The process of training a Deep Neural Network is known as Deep Learning. Neural Networks, when trained on a large number of input data and output label pair, are extremely good at coming up with a mapping function which can map input data to the output labels.

1. **Parameters of Neural Network**

Each neuron in the Neural Network is associated with some parameters, namely weight and bias. These parameters are initially randomly initialized. Using some learning algorithm and some cost function corresponding to it, we can update the parameters such that the cost function is minimized with every iteration of our training process, and at the end of our training, we have our learnt parameters using which we can classify the input data as target data or non-target data. We train our Neural Network for sufficiently large number of iterations until our cost function is minimized. The learning algorithm used in the project is the logistic regression learning algorithm, the cost function used is the logistic regression cost function and the data is the image.

1. **How images are stored in computer?**

Images are stored in computer as three-dimensional matrices. Each dimension corresponds to one of the three colour channels – Red, Green and Blue, called as RGB channels. Each channel is a two-dimensional matrix of dimensions equal to width and height of the image in pixels. The entry in each matrix cell is the pixel intensity value of that pixel corresponding to the colour channel, ranging from 0 to 255.