ABSTRACT

Project title is "**Convolutional Neural Network Models for Handwritten Digit Recognition**", I explore the effective use of two well-known CNN (Convolutional Neural Network) models, **Alex Net** and **VGG**, in the context of recognizing handwritten digits within the **Modified National Institute of Standards and Technology (MNIST)** database. Handwritten digit recognition holds significant importance in various applications, such as automated document processing, signature verification, and numerical data extraction. The MNIST dataset I take has a benchmark dataset for digit recognition, comprising **42,000 training samples** and **28,000 test samples.** The data files train.csv and test.csv contain gray-scale images of hand-drawn digits, from zero through nine. Each image is 28 pixels in height and 28 pixels in width, for 784 pixels in total. The training data set, (train.csv), has 785 columns. The first column "label" is the digit that was drawn by the user. The rest of the columns contain the pixel-values of the associated image. The test data set is like the training data set except the label column, so it contains only 784 columns.

Alex Net, a pioneering architecture, and VGG, known for its depth and uniform architecture, represent two different approaches to Convolutional Neural Network Models design. Our aim is to compare their performance on the MNIST dataset to understand the impact of network architecture on digit recognition tasks.

This project involves a comprehensive analysis of training and testing phases. I will study each model's training convergence, model complexity, and computational efficiency. I will compare each model using accuracy, precision, recall, F1-score, Average and Running Time on the test set to quantify their classification performance. Moreover, I will examine their robustness concerning overfitting and their ability to generalize to unseen data.

This project's results will provide insights into the VGG and Alex Net, Convolutional Neural Network Models for handwritten digit recognition. I believe that this comparative analysis will be valuable for researchers, practitioners, and machine learning enthusiasts working on digit recognition tasks.