**Back Propagation based Artificial Neural Network trained with Transfer Learning for Hand Written Digits Recognition**

**Abstract**:

Complex problems like recognision of handwritten characters can be accomplished with advancements in Artificial Neural Networks. There are several real-world application for handwritten character recognition including but not limited to, digitizing of scanned application forms of bank customers, vehicle registration number extraction, reading postal addresses, bank cheque processing from scanned cheque, image textual information entry into digital libraries etc. There are several methods developed so far to achieve this goal using Neural Networks and Machine Learning algorithms. In this project we plan to implement an Artificial Neural Network by Back Propagation for limited set of characters with small number of epochs and by means of Transfer Learning, we plan to transfer this learning knowledge to another Neural Network to demonstrate faster training with higher number of epochs. We also aim to limit the hardward requirements so that ANN training can be done on a regular personal computer by optimizing the learning process.

**Key Words:** Artificial Neural Networks, Back Propagation, Character Recognition

**Tools/Technologies**:

Python 3.x,

Python Libraries (numpy, pandas, scikitlearn, seaborn, matplotlib, etc),

Anaconda-Navigator,

Jupyter Notebook,

PyCharm