# AssignmentNo. 2

## ProblemStatement:

Implementing Feed forward Neural Network with keras and tensorflow.

1. Import the necessary packages
2. Load the training and testing data(MNIST)
3. Define the network architecture using keras
4. Train the model using SGD
5. Evaluate the network
6. Plot the training loss and accuracy

**Objective:**

1. Understand how to use Tensorflow Eager and Keras Layers to build a neural network architecture
2. To be able to apply deep learning algorithms to solve problems of moderate complexity
3. Understand how a model is trained and evaluated.
4. Identify digits from images.
5. Our main goal is to train a neural network (using Keras) to obtain > 90% accuracy on MNIST dataset.
6. Research at least 1 technique that can be used to improve model generalization.

**Outcomes:**

At the end of the assignment the students should able-

1. To usevariousDeepLearningtoolsandpackages
2. To buildandtrainadeepNeuralNetworkmodelsforuseinvariousapplications.

**Solution Expected**

Implement and train a feed-forward neural network (also known as an "MLP" for "multi-layer perceptron") on a dataset called MNIST  and improve model generalisation by achieving increased accuracy and descresesd loss where model gains good confidence with the prediction.

**Methodology to be used**

⮚ Deep Learning

⮚ Feed Forward Neural Network

**Infrastructure:** Desktop/ laptop system with Linux /Ubuntu 16.04 or higher (64-bit)/ Windows OS/Mac OS

**Software used:** LINUX/ Windows OS/ Virtual Machine/ IOS, Anaconda distribution, python 3.9.12

**Theory:**

Deep learning has revolutionized the world of machine learning as more and more ML practitioners have adopted deep learning networks to solve real-world problems. Compared to the more traditional ML models, deep learning networks have been shown superior performance for many applications.

The first step toward using deep learning networks is to understand the working of a simple feedforward neural network we get started with how we can build our first neural network model using Keras running on top of the Tensorflow library.

TensorFlow is an open-source platform for machine learning. Keras is the high-level application programming interface (API) of TensorFlow. Using Keras, we can rapidly develop a prototype system and test it out. This is the first in a three-part series on using TensorFlow for supervised classification tasks.

**Conclusion**

With above code we can see that, throughout the epochs, our model accuracy increases and loss decreases that is good since our model gains confidence with our prediction

This indicates the model is trained in a good way

1. The two loss (loss and val\_loss) are decreasing and the accuracy (accuracy and val\_accuracy) increasing.
2. The val\_accuracy is the measure of how good the model is predicting so, it is observed that the model is well trained after 10 epochs