# Number Image Recognition model theory

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## 1 Setup

- Load MNIST image datasets from '.pkl.gz' file (Where each image is of a number from zero to ten). (MNIST image datasets sourced from https://s3.amazonaws.com/img-datasets/mnist.pkl.gz)
  - Where each image in the input dataset, is made up from 28x28 pixels and each pixel has an RGB value from 0 to 255
  - Each image's matrice is then 'flattened' into a 1 dimensional array of values, where each element is also divided by 255 (max RGB value) to a number between 0 and 1, to standardize the dataset
  - The output dataset is also loaded, where each output for each image is an array, where the index represents the number of the image, by having a 1 in the index that matches the number represented and zeros for all other indexes.
- There is a training dataset with 60,000 pictures and a test dataset with 10,000 pictures (fewer pictures are needed for testing)
- Afterwards, the weights and the bias are all initialised to zero/s

## 2 Model

This number image recognition model uses a Perceptron Artifical Neural Network model, with the RGB values as the input array, and uses the sigmoid transfer function to obtain 10 output neurons with values between 0 and 1 (where the output neruon with the greatest value is predicted), for a multi-class classification of one of ten numbers.