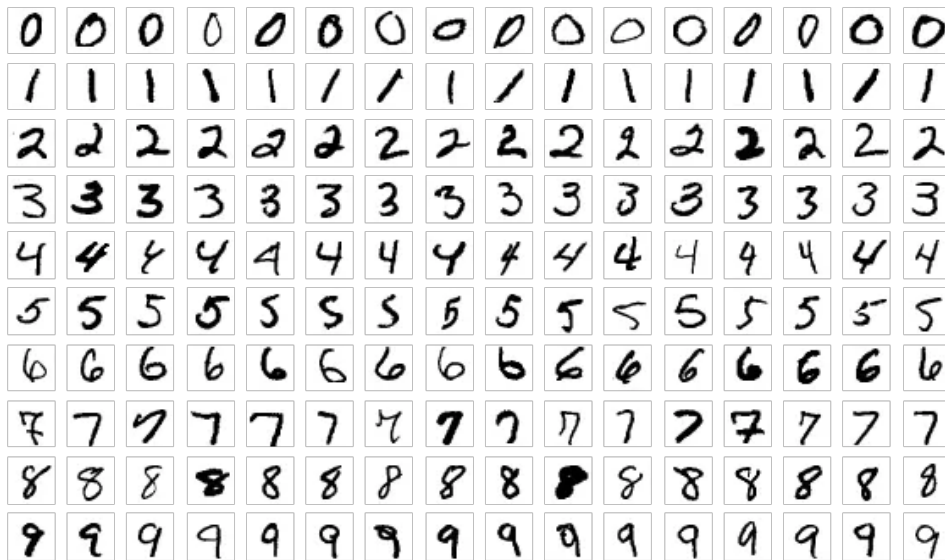# Machine Learning

Practical Project 3
Deep Unsupervised Learning

1. Consider the "MNIST" dataset, available at the course web page.

Create a "Python + Keras" script at "Google Collab" that implements the well known "DCN – Deep Clustering Network", by:

a) Create an "auto-encoder" (AE) network, exclusively with "Dense" layers. The layer at the center of this network should provide the compact representation of the input elements (latent code).

b) Perform joint optimization between the AE network, and the clustering algorithm considered. Experiments should be done in at least 2 different clustering variants (K-Means and DBScan).

    a. Obtain initial latent representations (i.e., AE without learning)

    b. Clustering optimization, using latent representations from a)

    c. Perform one AE learning iteration, using centroids from b)

    d. Repeat steps a-c, until no changes in cluster assignements occur between consecutive epochs.

c) Report the variations in performance with respect:

    a. The dimensionality of the latent representation.

    b. Different weights for the "reconstruction" and "clustering" losses.