Assignment 2: Discriminative and Generative Classifiers

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1 Task Description

The goal of the assignment is to write a handwritten digit classifier for the **MNIST database**[1]. These are composed of 70000 28x28 pixel gray-scale images of handwritten digits divided into 60000 training set and 10000 test set.

We have to train the following classifiers on the dataset:

1. SVM using **linear**, **polynomial of degree 2**, and **RBF** kernels;
2. Random forests;
3. Naive Bayes classifier where each pixel is distributed according to a Beta distribution of parameters α, β:

$$d(x, \alpha, \beta) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{(\alpha-1)}(1-x)^{(\beta-1)}$$

4. k-NN.

For SVM and random forests we can use any library we want, but we must implement the Naive Bayes and k-NN classifiers.

[1] *http://yann.lecun.com/exdb/mnist/*