**Report on homework 3**

**ICA.**

Independent component analysis is a technique for decomposing data into independent sub-parts. Basically, ICA tries to find a linear transformation of the given feature space into a new feature space such that each of the individual new features are mutually independent.

**SVM.**

Support Vector Machine is a supervised learning approach which aims to divide space with decision boundaries. This algorithm can be used for both classification and regression purposes. SVM is based on the idea of finding a hyperplane that best divides a dataset into two classes.

**Code.**

I defined two functions:

* *transform\_images(path) –* reads the images one-by-one, reshapes them to 1d array, appends them into a common array, and creates an array for labels storage. It returns an array of reshaped images and an array with labels.
* *benchmark(labels, predictions) –* just calculates the performance of the classifier.

The main part of the code contains just one loop. I iterate over the possible number of features, train ICA on the image which was produced by the *transform\_images()* and transform the test image using the same trained ICA. Then I create the SVM classifier, train it on the train image and train labels, and predict the labels for the test data image.

I also keep track of the number of features and the corresponding benchmark score on each iteration to plot the performance graph:

