## 1 4th of October 2018 — F. Poloni

This lecture is about practical usage of the singular value decomposition and takes place almost wholly on Matlab.

For example, given a certain image, that can be represented as a matrix of values in the range [0, 255], the rank-1 SVD of such image, results in a very abstract picture, see Figure 1.1. The more we increase the rank, the better is the similarity of the approximated image with respect to the original one.

## Something on Matlab ...

Given a certain matrix A, we can compute the SVD decomposition using the command [U, S, V] = svd(A)

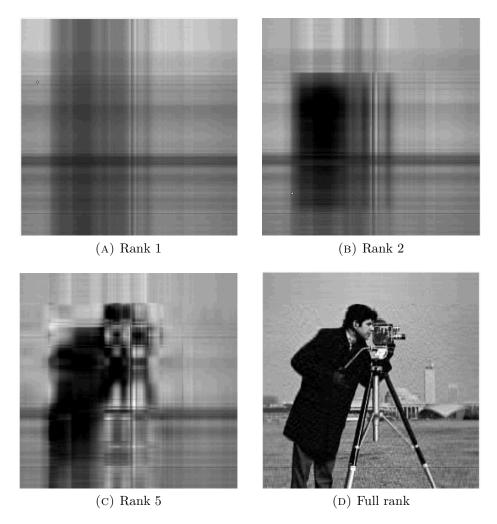


FIGURE 1.1: How the approximation of a matrix changes with respect to the different ranks.

**Definition 1.1** (Principal component analysis). Given a matrix A, we term **principal** component analysis the analysis of features of such matrix via the rows and columns of U and V respectively, where U and V are the matrices of the SVD decomposition.