

4 Kernel PCA

You can use external libraries for linear algebra operations but you are expected to write your own algorithms.

4.1 Exercise 1

Use the `data_kPCA.2022-2023.txt` and `labels_kPCA.2022-23.txt` uploaded in the `Datasets` folder. The first file contains the variables describing the data, while the second one contains the labels of the classes associated to it.

- Apply PCA to the dataset and plot the eigenvalue spectrum.
- Project the data in the first two principal components and color by class.
- Implement your own version of Kernel PCA.
- Apply Kernel PCA to the dataset. Test both a Gaussian kernel with width in $[0.05, 2.0]$ and a polynomial kernel varying the value of δ .
- Plot the transformed data in 2d and 3d for the different kernels.