[Lab] PCA

Jae Yun JUN KIM*

Lab due: Before the end of today lab session
Evaluation: Code and explanation about the code in groups of only two or three people
Remark:

- Only groups of two or three people accepted (preferably three).
- No plagiarism. If plagiarism happens, both the "lender" and the "borrower" will have a zero.
- Code yourself from scratch **following the theory given in lecture**.
- No pre-lab/lab will be considered if any ML library is used.
- Do thoroughly all the demanded tasks.
- Study the theory for the questions.

---

1 Tasks

a. Download from the course site the initial Python code and the 2D data stored in `data_pca.txt` file.

b. Implement the PCA algorithm from the formulas seen in class.

c. Plot the training data centered to the origin and the principal components.

d. In the same figure, plot $\tilde{Y}$ on the N-dimensional space.

e. In a seperate figure, plot the original data, the principal components (around the original data), and $\hat{Y}$ on the N-dimensional space.

f. Test your model with some new data.

g. Plot test results on N-dimensional space for both the case of centered to the origin and the case of original data (i.e., away from the origin).

*ECE Paris Graduate School of Engineering, 10 rue Sextius Michel 75015 Paris, France; jae-yun.jun-kim@ece.fr