

Mathematical Foundations for Computer Vision and Machine Learning

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Assignment 07

Jupyter Notebook

- Create a new notebook for Python 3
- Include your name and the student ID in the notebook
- Write python 3 codes for the given assignment
- Try to separate the codes into meaningful blocks
- Write a comment for each block of codes
- Plot the important intermediate results
- Write a short description for each graphical result
- Use LaTeX for mathematical comments in the notebook
- Save the notebook file as [assignment07.ipynb](#)
- Download the notebook as a PDF file [assignment07.pdf](#)

Assignment 07

github

- Start a project or a directory for the [assignment07](#)
- Include the link to the giuhub for the assignment in the notebook
- Upload the notebook [assignment07.ipynb](#) to the github after the deadline (Note that your github project is visible to public)

Assignment 07

Submission to *eclass*

- Submit the PDF file [assignment07.pdf](#) to [eclass](#)
- Deadline is 11:59 pm on next Thursday. No extension
- Score ranges from 0 to 5

Assignment 07

Score Table

- The results should be correct
- The codes should be written in a modulated way
- The comment should be made for each block of the codes
- The important intermediate results should be presented
- The link to the github project should be included

Assignment 07

Polynomial fit

- A set of data $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ is generated by the python code assignment07.py
- Define a model $\hat{f}(x) = \theta_0 x^0 + \theta_1 x^1 + \dots + \theta_p x^p$ by the polynomial function with model parameters $(\theta_0, \theta_1, \dots, \theta_p)$
- Find an optimal set of model parameters that provide the least square approximate solution

Assignment 07

Essential Visualisation: line fitting

- Plot the noisy data (x, y_1)
- Plot the clean data (x, y_2)
- Plot the polynomial curves that fit the noisy data by the least square error with varying $p = 0, 1, 2, 3, \dots, 9$
- Plot the error $\sum_{j=1}^n r_j^2$ where $r_j = y_j - \hat{f}(x_j)$ is the residual with varying $p = 0, 1, 2, 3, \dots, 9$