선형대수

Homework #04
(Least Squares: Line/Curve Fitting)

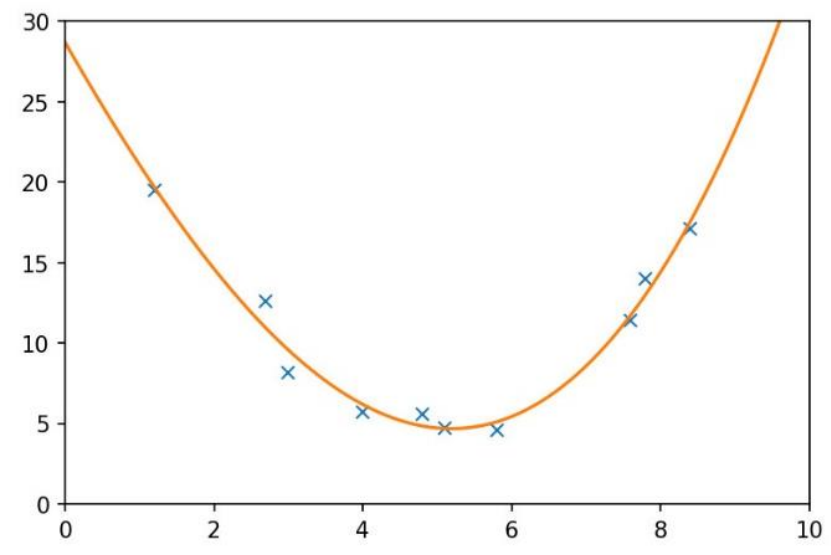
Due: 11/6 (Wednesday)

Team: 1~3 students

Problem #1 (Quadratic Function)

❑2차 곡선 Fitting using Least Squares

- Given total 11 2D points
- $y = ax^2 + bx + c$
- Find a,b,c using LS, and plot the function graphs



Problem #1 (Quadratic Function)

- 4 Approaches - Fitting 4 functions
  - 1)Using 11 points
  - 2)Using 11 points with weights
    - #4~#8 좌표 : 가중치 3
  - 3)Using left 8 points
  - 4)Using right 8 points

번호	*x* 좌표	*y* 좌표
#1	-5	2.8
#2	-4	1.0
#3	-3	-1.0
#4	-2	-2.3
#5	-1	-2.7
#6	0	-3.0
#7	1	-3.2
#8	2	-2.0
#9	3	-1.0
#10	4	0.4
#11	5	3.0

Problem #2 (Multi-lines Fitting)

- 직선 Fitting using Least Squares
  - $y = ax + b$
  - Find a,b using LS
  - Find the intersections of red and green lines respectively

Problem #2 (Multi-lines Fitting)

- How to do ?

  (1) Select some 2D points (pixel coordinates) on the same line, and find the optimal line equation using LS.

  (2) Repeat (1) for other lines in the same direction. (4 times)

  (3) Find the intersections of lines in (1)~(2) in the same direction.

  (4) Repeat (1)~(3) for other directions (red/green).

Problem #2 (Multi-lines Fitting)

- 2 different directions (red/green)
  - Select the grid points in the image

Problem #2 (Multi-lines Fitting)

- 4 Lines and 6 intersections for each direction
  - Discuss the results

Coding

- Programming / Tools
  - Python is recommended
  - Any libraries and open codes are acceptable
- Report (ppt max 18 pages)
  - Basic theory of LS and fitting (1~2 pages)
  - Core Source code (1~2pages)
  - Your results including function graphs
  - Discussion (1 pages)

Submission

- Due
  - 2024. 11. 6 (Wed.), 23:00 pm
- Submission
  - LMS upload of **pdf** file
- Team project
  - 1~3 students/team
  - One report submission for a team