Hints exercise 1

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February 21, 2020

Pen and paper: Problem 1

Perform least squares on the provided data. You may use a calculator.

Coding: Problem 1

Write a program that performs linear least squares on the provided data. Afterwards generate your own data and observe the behaviour of LSQ in presence of noise and outliers.

Helpful Python commands

np refers to the numpy library loaded as np (import numpy as np). plt refers to the pyplot library loaded as plt (import matplotlib.pyplot as plt).

np.linspace(a,b,step)	Returns a uniform vector from a to b with step-size step
np.array($[a_0,a_1,\ldots]$)	Returns a numpy array with the provided values
np.ones(rows,columns)	Returns a array of specified size filled with ones
A.dot(b)	Returns the dot product of A with b. • If A and b are vectors it performs the dot product • If A is a matrix and b is a vector it performs matrix-vector multiplication • If A and b are matrices it performs matrix-matrix multiplication
np.linalg.inv(A)	Returns the inverse of A.
A.T	Returns the transpose of A.
np.linalg.solve(A,b)	Returns the solution x of the equation $Ax = b$
np.random.uniform(a,b,size)	Returns an numpy array with uniform sampled random numbers of spezified size.
plt.plot(x,y)	Plots the provided x,y vectors. Check out the documentation of matplotlib for more styling options
plt.show()	Shows the previously generated plot