Humboldt University of Berlin

Projektpraktikum

Documentation of qr.py

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Contents

The following is the documentation for the module `qr.py`.

1 qr(A)

This function computes the QR-decomposition.

Arguments

A (ndarray): Two dimensional ndarray.

Returns

(ndarray): Two dimensional ndarray of the QR-decomposition, Q.
(ndarray): Two dimensional ndarray of the QR-decomposition, R.

2 full_rank(A)

A boolean-function to check if the matrix has full column rank.

Arguments

A (ndarray): Two dimensional ndarray.

Returns

(boolean): True if A has full column rank and False otherwise.

3 solve_QR(A, b)

Solves the equation Ax = b for x with the QR-decomposition.

Arguments

A (ndarray): Two dimensional ndarray. Should have full column rank.
b (ndarray): One dimensional ndarray.

Returns

(ndarray): One dimensional ndarray for x.

4 norm(A, b)

Computes the normed error induced by solving the linear equation with the function above.

Arguments

A (ndarray): Two dimensional ndarray. Should have full column rank.
b (ndarray): One dimensional ndarray.

Returns

(float): The normed difference between Ax and b.

5 condition(A)

Calculates the condition of A and $A^T A$.

Arguments

A (ndarray): Two dimensional ndarray.

Returns

(float, float): The condition of A and $A^T A$.

6 input_data(file_name, indices=None)

Takes a properly formated text file and builds a two dimensional ndarray. Additionally, a list of indices can be passed to return specific entries.

Arguments

file_name (String): The path and the name of the text file.
indices (list): List of indices.

Returns

(ndarray): The entries of the matrix with the passed indices. If the argument indices were left out, this returns the entire matrix.

7 draw(data)

Draws the plot of the linear regression according to the data passed.

Arguments

data (ndarray): Two dimensional ndarray.

8 norm_residuals(data)

Computes the residuals for the solution with and without p_2.

Arguments

data (ndarray): Two dimensional ndarray.

Returns

(float, float): The residuals for Ax = b without taking p2 into consideration and with.

9 main()

The main-function to demonstrate the capabilities of the module.