# EXERCISE 1: ROBUST ESTIMATION AND NORMS

GCT722 MATHEMATICAL METHODS FOR VISUAL COMPUTING  
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## PART 1: RANSAC FOR CIRCLE FITTING

### **Description of implementation**

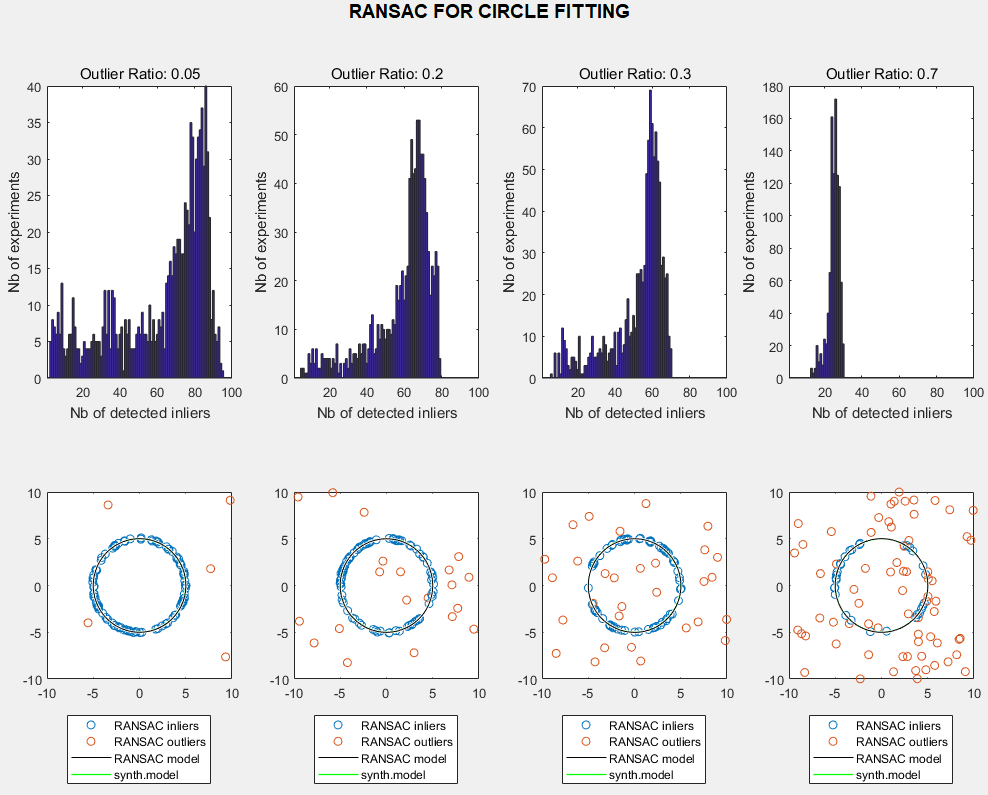
There are 1 script file & 4 function files for the exercise RANSAC.

* **Script file**
* main\_RANSAC.m
* **Function files**
* genCircleData.m  
  :   
  
  + Input Value
    - *n*: Number of data points
    - *center*: Center (x, y) value of the synthesized circle
    - *radius*: Radius value of the synthesized circle
    - *inlierThreshold*: Inlier distance threshold.
    - *outlierRatio*: Ratio of outliers in data
  + Output
    - data: data in the form of circle that contains inliers and outliers according to outlierRatio.
* doExhaustiveSearch.m
  + Input Value
    - *n*: Number of data points
    - *center*: Center (x, y) value of the synthesized circle
    - *radius*: Radius value of the synthesized circle
    - *inlierThreshold*: Inlier distance threshold.
    - *outlierRatio*: Ratio of outliers in data
  + Output
    - data: data in the form of circle that contains inliers and outliers according to outlierRatio.
* doRANSAC.m
  + Input Value
    - *n*: Number of data points
    - *center*: Center (x, y) value of the synthesized circle
    - *radius*: Radius value of the synthesized circle
    - *inlierThreshold*: Inlier distance threshold.
    - *outlierRatio*: Ratio of outliers in data
  + Output
    - data: data in the form of circle that contains inliers and outliers according to outlierRatio.
* drawRANSACPlot.m
  + Input Value
    - *n*: Number of data points
    - *center*: Center (x, y) value of the synthesized circle
    - *radius*: Radius value of the synthesized circle
    - *inlierThreshold*: Inlier distance threshold.
    - *outlierRatio*: Ratio of outliers in data
  + Output
    - data: data in the form of circle that contains inliers and outliers according to outlierRatio.

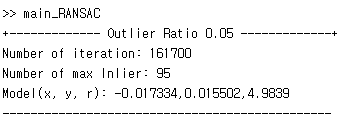
**Instructions for running**

1. Open the file “main\_RANSAC.m” in Matlab.
2. Execute that file.
   1. You can see the result of exhaustive search in command window.
   2. The another window that shows plots of RANSAC results is opened.

**Screenshots**



**Questions**

* How many combinations (exhaustive search) exist for N = 100 points?
* Ans: 161700  
    
   
* What about the number of RANSAC iterations with r = 5%, 20%, 30% and 70%?
* Ans  
    
  🡪 
* What about when N = 10,000 points?
* Exhaustive search
* RANSAC iterations

**Discuss the results**

## PART 2: IRLS AND NORMS FOR LINE FITTING

**Description of implementation**

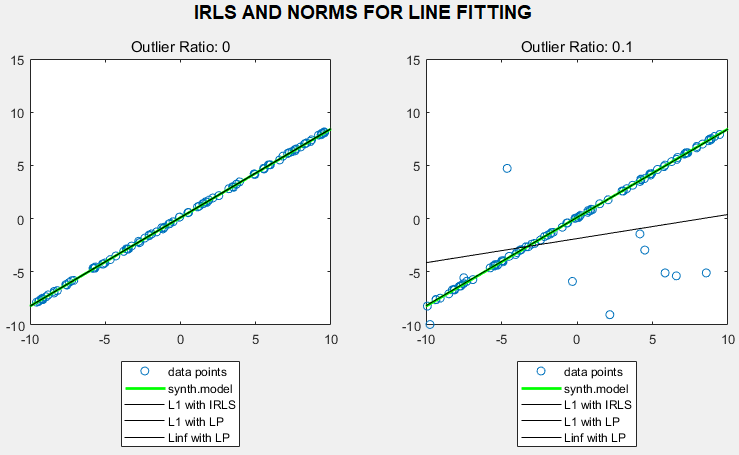
There are 1 script file & 4 function files for the exercise Line fitting.

* Script file
* main\_LineFitting.m
* Function files
* genLineData.m
* doIRLS.m
* doLP.m
* drawLineFittingPlot.m

**Instructions for running**

1. Open the file “main\_LineFitting.m” in Matlab.
2. Execute that file
   1. The another window that shows plots of IRLS with and LP with  and  norms results is opened.

**Screenshots**



**Discuss the results**