

Computer Science 130B
Spring 2022
Programming Assignment #4

Due: 11:59pm, June 4, Saturday

You are given a number of sample points (around 100-1000) along the flight path of a missile. Unfortunately the samples are noisy and may contain an unknown number of outliers (less than 30% for sure).

The input sample points will be given to you on the stdin as n 2D coordinates in the flight plane (x_i, y_i) , one per line. You are to output the coefficients (a, b, and c) of the best fitting parabolic equation $y = ax^2 + bx + c$ on the stdout. Again, the randomized algorithm should look like the following:

Repeat a number of times

- Select seed points (3) randomly from the input
- Compute the parabolic equation based on the chosen seed points
- Calculate the distances of the remaining n-3 points to the best fitting curve and record the median error, and
- Retain the current trial solution if the median error is less than that of all previous trials

For the retained best solution from the randomized trials above

- Perform a least-square line fit using all sample points with a fitting error less than the median (i.e., the best half of the sample). Output the fitting coefficient (a,b,c) as the best estimate.

You should design your algorithm to fill in all missing details - your algorithm should handle noise and outliers and should be reasonably efficient.