

Hacettepe University
Computer Engineering Department



BBM 204

1. Homework Report

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Problem Definition

In this homework, we are supposed to implement three different sorting algorithms and test their running time on different lengths of data. The data has lengths of 100, 1,000, 50,000, 100,000 and 250,000. I have implemented insertion sort, quick sort and heap sort.

Algorithms we choose work on a real dataset that contains information about traffic flows. Each flow has 84 different features. Data is given as a csv file. Each row in csv file represents an element. Each column represents a feature. First row contains variable names. After first row, each row represents an element.

Algorithms sort data with respect to one feature that has to be specified as an argument. Also data file has to be specified as an argument. Another argument which can be "T" or "F" has to be written. T means save the file and F means don't do anything at all.

Starting program: java assignment1 <dataset path> <feature index> <save T/F>

Findings

Algorithm & Data Set	TrafficFlow100.csv	TrafficFlow1000.csv	TrafficFlow50000.csv	TrafficFlow100000.csv	TrafficFlowAll.csv
Insertion Sort	0	10	1571	26634	171083
Quick Sort(3-way)	1	4	36	62	112
Heap Sort	1	2	28	69	106

*Time is shown as milliseconds.

Discussion

For all three algorithms, needed extra space is constant.

Insertion Sort: Time complexity for worst and average case $O(n) = n^2$. Best case is $O(n) = n$. If data is nearly sorted, its complexity is $O(n)$.

Quick Sort: Time complexity for worst case $O(n) = n^2$. Best and average case $O(n) = n * \log(n)$.

Heap Sort: Time complexity for best, average and worst case $O(n) = n * \log(n)$.

