UM-SJTU Joint Institute

VE281 Data Structure and Algorithm

Project 3 Report

Tianze Wang, 515370910202

I Introduction

In this project, we implement the data structure of priority queue in the means of

- Binary Heap
- Unsorted Heap
- Fibonacci Heap

And we will discuss and compare the performance of them.

II A table comparing 2 sort methods

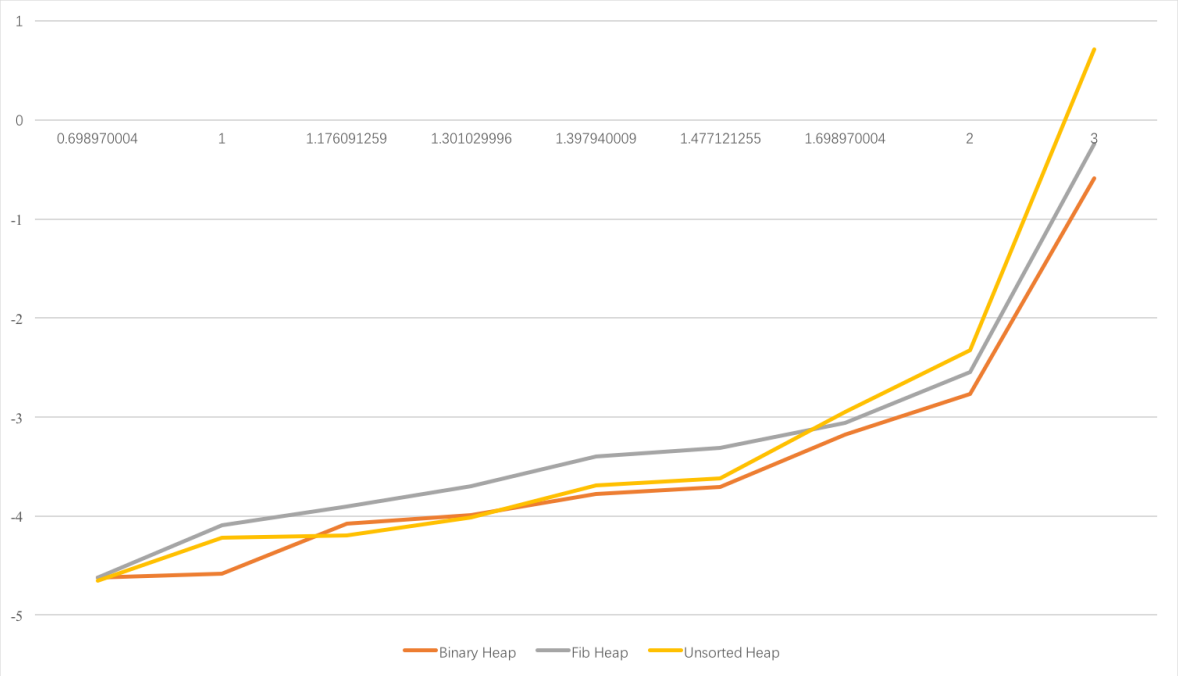
To compare the performance, we use seven maps with distinct and significant differences in size to compare. The result is shown as below.(The testcase means the single side of a map, namely 5 corresponds to 25 in map size)

Testcase	5	10	15	20	25	30	50	100	1000
Binary Heap	2.40E-05	2.60E-05	8.30E-05	0.000101	0.000165	0.000197	0.000663	0.001711	0.258891
Fib Heap	2.40E-05	8.00E-05	1.25E-04	0.000201	0.000402	4.85E-04	8.64E-04	2.82E-03	5.70E-01
Unsorted Heap	2.20E-05	6.00E-05	6.40E-05	9.70E-05	0.000202	0.000241	0.001119	0.004743	5.21586

To make intuitive, we use log for both axis.

Testcase	0.70	1.00	1.18	1.30	1.40	1.48	1.70	2.00	3.00
Binary Heap	-4.62	-4.59	-4.08	-4.00	-3.78	-3.71	-3.18	-2.77	-0.59
Fib Heap	-4.62	-4.10	-3.90	-3.70	-3.40	-3.31	-3.06	-2.55	-0.24
Unsorted Heap	-4.66	-4.22	-4.19	-4.01	-3.69	-3.62	-2.95	-2.32	0.72

And the result is shown here.



III Discussion and Conclusion

From the figure and the result, we can derive that:

- Binary heap performs best in any case.
- Unsorted heap is quick when the data amount is not so big, but slow when it becomes big enough.
- Fibonacci heap is slow at small data amount, but fast as binary heap when it becomes big.