Medians of Median Analysis

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Q1.

We shall start with n=7

Similarly, we will have the first part in the master theorem to be for finding the true median of the medians.

Of the groups half of them have their median smaller/bigger than the median of the median, . In each group there are 4 elements that are smaller than the pivot. The extreme case would be that the in these groups containing one group with less than seven elements and the one with the true medians in it.

Thus if we look at the elements number smaller/bigger than the true median, the formula will be giving elements smaller/bigger than the median of medians.

Therefore, the worst-case will be a & cut.

Therefore, we have , suppose meets the condition, will satisfy the condition. that there exists constant such that , giving that the algorithm running time .

Similarly, when b=9, the minor side will be , giving in the worst case, therefore, will require a k meeting the condition that will satisfy the condition, for example, .

When b=11, , b=13, . Therefore, the recursive formula will be for .

Q2.1

Following the formula provided in the assignment, we have

When m=7, ignoring the constants in Q1 when n is big, we will have & cut,

When m=9, we will have & cut and .

When m=11, we will have .

When m=13, we will have .

Q2.2

Using the derived equations in Q2.1, the minimum is dependent on the constant for n. If we compare the constants for , we can see that when m=9, the constant has the smallest value. Therefore, there must be an optimal m for to be smallest.

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Following the recursive formula derived in Q1, we can see that given any n would like to have b>3 for the denominator in the recursive formula to be positive, the minimum cut number b should be 5. The minimum k for given n with respect to be is , the minimum is achieved when , and we shall choose the odd number closest to this value.

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