

Design and Analysis of Algorithm Laboratory

Assignment 1: Searching

1. Sequential Search

Following is the algorithm for sequential search:

Algorithm: SSearch

Input: A list of records R_1, R_2, \dots, R_n , identified by keys K_1, K_2, \dots, K_n
 K (the search key)

Output: 'No' if record does not exist; corresponding record, otherwise

Step 1: Set $i \leftarrow 1$
Step 2: If $K=K_i$, Output the record R_i and exit
Step 3: $i \leftarrow i+1$
Step 4: If $i \leq n$, Go to Step 2, Otherwise output "No".

- i) Implement the above algorithm considering a list of arbitrary records as input. Find the searching time in nanoseconds when the record, you are searching for, does not exist in the list (that is, the worst case time). Plot the time against the input size (which is n , the number of records in the list). Take n as much large as possible (say 10^8).
- ii) Suggest some improvements in the above algorithm of sequential searching. Implement the improvements, and get the searching as you have above. Compare both the results.

2. Binary Search

Implement binary searching algorithm. As above, collect the worst case searching time of your program for different values of n . Plot these time values against the input size, and also plot the curve for $c \cdot \log_2(n)$ where c is positive constant. Do your time values have any relation with $c \cdot \log_2(n)$? Justify your answer.

3. Fibonacci Search

What is Fibonacci searching? Write down the algorithm for Fibonacci search algorithm. Implement the same. Compare this searching technique with binary searching.