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# CS502 Current papers solved spring2013

**Q: Write the STABLE OR IN-PLACE of QUICK, HEAP, COUNTING, MERGE Sorts. [5 MARKS]**
**Answer: [PAGE 54]**

| In-place | Stable |
|---|---|
| Bubble sort | Bubble sort |
| Insertion sort | Insertion sort |
| Selection sort | ---------- |
| ---------- | Merge sort |
| Quick sort | ---------- |
| Heap sort | ---------- |
| ---------- | Counting sort |

**Q: Write any 3 applications of Edit distance. [3 MARKS]**
**Answer: [PAGE 76 and 77]**
1. Spelling correction.
2. Plagiarism detection.
3. Computational and molecular biology.
4. Speech recognition.

**Q: Define MEMOIZATION? [2 MARKS]**
**Answer: [PAGE 74]**
We can avoid unnecessary repetition by write down the recursive calls and look them when we need.

**Q: Define worst case and average case of Quick sort? [2 MARKS]**
**Answer:**
**Worst case:**
We maximize over all possible values of q, means the selection of pivot q which gives the maximum (worst) time for sorting. The worst case running time is O (n2).
**Average case:**
Average case analysis of quick sort, the average is computed over all possible random choices of the pivot index q. The average case running

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Adeel Hassan
www.virtualians.pk team

time for quick sort is . (n log n).

Q:Quick sort such that sort the array in to non-increasing order? [There is no any array in this question]

Answer: Page 47 n 48

**Q-We can avoid unnecessary repetitions for recursive calls?( I thnk how can we ... ho ga.) [PAGE 74]**

**Answer:**

By using Fibonacci Sequence We can avoid this unnecessary repetition by writing down the results of recursive calls and looking them up again if we need them later. This process is called memoization.

**Q-Write a pseudo code Fibonacci With memorization? -- (3)**

**Answer:**

[PAGE 74]

MemoFIB(n)

if(n<2)

then return n

if (f[n] is undefined)

then F[n] <--- MemoFIB(n-1) + MemoFIB(n-2)

returnf[n]

**Q- Spelling correction in edit distance? 3 marks**

**Answer: [PAGE 76]**

**Spelling Correction:**

If a text contains a word that is not in the dictionary, a 'close' word, i.e. one with a small edit distance, may be suggested as a correction. Most word processing applications, such as Microsoft Word, have spelling checking and correction facility. When Word, for example, finds an incorrectly spelled word, it makes suggestions of possible replacements.

**Q-What is Bubble sort?**

**Answer: [PAGE 39]**

Bubble sort: Scan the array. Whenever two consecutive items are found that are out of order, swap them. Repeat until all consecutive items are in

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order.

**Q-What is the worst case running time for the Quick sort? What simple change is required in the algorithm to preserve its linear expected running time and makes it worst case time .(n log n).**

**Answer: Page 49 and 50**

Worst case running time is O (n).

The simple change which can change the running time of the edit distance algorithm is the number of entries n2.

**Q: In edit distance what is the simple change that can change the worst case time?**

**Answer: [Page 49 and 50]**

The simple change which can change the running time of edit distance algorithm is the number of entries n2, or you can say the term n. In other words you can say the length of the strings determine the running time of the computation.

**Q:Define the worst case of edit distance algorithm?**

**Answer:**

The worst case running time of edit distance DP algorithm is O (n2), which is the number of entries in the table n2 as each entry need constant time to compute.

**Q:Draw the Cost table for chain multiplication problem with initial states.**

**Answer:**

Cost table for chain multiplication problem in initial stage is the diagonal entries (all m [i, i]) filled with zeros and rest of the table entries are empty which are to be filled in next steps of the table calculation.

**Q:Average-case Analysis of Quicksort**

**Answer:**

Average case analysis of Quick sort: The running time of Quick sort depends on the selection of pivot q which is done randomly. For average case analysis of quick sort, average is computed over all possible random

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choices of the pivot index q. The average case running time for quick sort is . (n log n).

**Q: Worst case Analysis of Quick sort?**

**Answer:**

Worst case analysis of Quick sort: For worst case we maximize over all possible values of q, means the selection of pivot q which gives the maximum (worst) time for sorting. The chances are that the pivot values q=1 (start) or n (end) or n/2 (middle) happen to give maximum time values. The worst case running time is O (n2).

**Q: What is radix sort and explain it with examples.**

**Answer:**

**Radix sort:**

In linear time sorting, counting sort is used for the numbers in the range 1 to k where k is small and it is based on determining the rank of each number in final sorted array. But it is useful only for small integers i.e., 1 ..k where k is small. But if k were very large, then the size of the rank array formed would also be very large which is not efficient. So solution for such cases is the Radix sort which works by sorting one digit at a time.

**Example:**

841 84[1] 8[4]1 [1]85
185 è 37[3] è 3[7]3 è [3]73
373 18[5] 1[8]5 [8]41

**Q: Essential constraint for the counting sort.**

**Answer:**

Essential constraint for the counting sort is that numbers to be sorted must be small integers i.e., 1...k where k is small.

**Q:Better appropriate to cope with chain matrix multiplication.**

**Answer:**

Better appropriate to cope with chain matrix multiplication is to do its Dynamic Programming formulation. It is breaking up the problem into sub problems, solving and string and then combining solutions to those sub

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problems to solve the global problem.

**Q: Heapify procedure and Build Heap explain in simple words with example.**

**Answer:**

If an element in the Heap is not at its proper place means it is violating the Heap Order, the Heapify procedure is used to fix it and place it at its proper position. In Heapify, we recursively swap the element with its larger one child and stop at a stage when this element is larger than both of its children or it becomes the leaf node.

Build Heap procedure is used for building Heap from any list and it is done by applying the Heapify procedure on each element starting from bottom and going upward to the root. Starting is done at second last level as the leaf nodes have no children so already in heap order.

**Q: Difference between worst case \Average case Analysis of Quicksort explain in simple words with example.**

**Answer:**

The running time of Quick sort depends on the selection of pivot q which is done randomly. For worst case we maximize over all possible values of q, means the selection of pivot q which gives the maximum (worst) time for sorting. The chances are that the pivot values q=1 (start) or n (end) or n/2 (middle) happen to give maximum time values. The worst case running time is O (n2). For average case analysis of quick sort, the average is computed over all possible random choices of the pivot index q. The average case running time for quick sort is . (n log n).

**Q: Edit Distance in Speech Recognition**

**Answer: [PAGE 77]**

Algorithm is similar to those for the edit-distance problem is used in some speech recognition systems. Find a close match between a new utterance and one in library of classified utterance.

**Q: What is sorting? Describe slow running sorting algorithms. 5 marks**

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**Answer:**

Sorting is the process of arranging items in sequence.

Slow running sorting algorithms: [PAGE 39]

There are a number of well-known slow O(n2) sorting algorithms.

**1.** Bubble sort: Scan the array. Whenever two consective item are found that are out of order, swap them. Repeat until all consecutive items are in order.

**2.** Insertion sort: Assume that A[1..i-1] have already been sorted. Insert A[i] into its proper position in this sub array. Creat this position by shifting all larger elements to the right.

**3.** Selection sort: Assume that A[1.i-1] contain the i-1 smallest element in A[i.n] swap it with A[i].

**Q: What is Catalan Numbers and write their formula. 3 marks**

**Answer: [PAGE 85]**

The Catalan numbers are famous functions in combinatrics.

**Formula:** $$C(n) = \frac{1}{n+1}\binom{2n}{n}$$

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