

Q1. Assume that you have given input array of integers

$$A = (2,5,3,0,2,3,0,3),$$

write an algorithm to sort the array in  $\theta(n)$  times, without comparison. Also show the time complexity of the algorithm.

ANS:

## ***Counting Sort***

COUNTING-SORT

( array A, array B,int k)

```
1   for i ← 1 to k
2   do C[i] ← 0   [k times]
3   for j ← 1 to length[A]
4   do C[A[j]] ← C[A[j]] + 1 [n times]
5   // C[i] now contains the number
      of elements = i
6   for i ← 2 to k
7   do C[i] ← C[i] + C[i - 1] [k times]
8   // C[i] now contains the number
      of elements ≤ i
9   for j ← length[A] downto 1
10  do B[C[A[j]]] A[j]
11  C[A[j]] C[A[j]] - 1    [n times]
```

Time Complexity of Counting Sort:

$$k + n + k + n$$

Where the  $k$  and  $n$  is the maximum length of the loop; we can say its  $\theta(n)$

Q2.

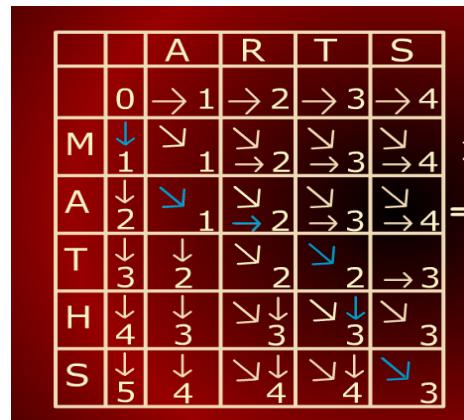
- a. Using *Edit Distance*; model the transformation of string ALGORITHM to ALTRUISTIC. The above model should reflect the *Edit transcript*.

Ans:

M	M	D	S	M	I	M	I	M	S	S
A	L	G	O	R	-	I	-	T	H	M
A	L	-	T	R	U	I	S	T	I	C

- b. Show matrix model which reflects the possibilities of Edit Transcript which helps in the transformation of MATHS into ARTS.

Ans:



Possible paths are three (3)

1. S S M D M
2. D M I M D M
3. S D I M D M