CMPS 201 5-5-10

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other sorting Algorithms

- Comparison sorts: have ability to compare $A_i < A_j$, and use no other information about A[..]. i.e. order relation $<$ is an input to algorithm.

- non-Comparison sorts: uses other information.

Comparison sorts

	Worst	avg	
• Bubble sort	n^2	n^2	}
• Selection sort	n^2	n^2	}
• Insertion sort	n^2	n^2	}
• Merge sort	$n \log n$	$n \log n$	}
• Quicksort	n^2	$n \log n$	}
• Heapsort	$n \log n$	$n \log n$	}

non-Comparison sorts

- Counting sort
- Radix sort
- Bucket sort

Counting Sort

- Assumes contents of $A[\,]$ are integers.
- Assumes values are in a fixed range

$$0 \le A[1 \ldots n] \le K$$

where K is known.

- $A[1 \ldots n]$ input array

  $B[1 \ldots n]$ output array

  $C[0 \ldots K]$ temporary storage

CountingSort(A, B, k) Pre: above bullite

1.) for i ← 0 to k
2.) C[i] ← 0
3.) for j ← 1 to n
4.) C[A[j]] ← C[A[j]] + 1
5.) for i ← 1 to k
6.) C[i] ← C[i] + C[i-1]
7.) for j ← n down to 1
8.) B[C[A[j]]] ← A[j]
9.) C[A[j]] ← C[A[j]] - 1

Rmks

- when loop 3-4 finishes, C[i] contains # of #s in A[] which are equal to i for all $0 \leq i \leq k$.

- when loop 5-6 finishes C[i]
  Contains # of #s in A[]
  which are less than or equal
  to i $(0 \leq i \leq k)$.

- note if an array element a
  is $\geq$ exactly b other elements,
  then a is the b^{th} order
  statistic