

Universidade do Estado do Amazonas Escola Superior de Tecnologia - EST Núcleo de Computação



Algoritmos e Estruturas de Dados II

Counting sort

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Objetivos

Entender o funcionamento do algoritmo de ordenação **Counting sort**

Counting sort, bucket sort e radix sort são exemplos de algoritmos de ordenação que **não** utilizam comparações de chaves.

O **Counting sort** foi inventado por Harold H. Seward (1930-2012) em 1954 no MIT.



Harold. H. Seward

Counting sort assume que cada um dos n elementos da lista de entrada é um inteiro na faixa de 0..k

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O algoritmo determina as ocorrências de cada elemento x da lista de entrada, e verifica quantos elementos são menores que x para, assim, encontrar sua posição ordenada.

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Saída: vetor B[1..n], cópia ordenada de A.

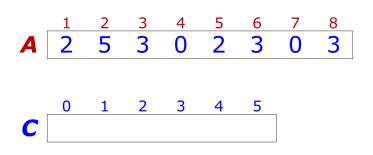
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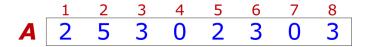
O algoritmo utiliza um vetor auxiliar C[0..k] para armazenar as ocorrências dos elementos de $A.\,$

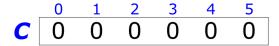
COUNTING-SORT(A, B, k)

- 1 Cria vetor C[0..k]
- 2 para i=0 até k C[i]=0
- 3 para j=1 até A.tam
- 4 C[A[j]] = C[A[j]] + 1
- 5 para i=1 até k
- 6 C[i] = C[i] + C[i-1]
- 7 para j=1 até A.tam
- 8 B[C[A[j]]] = A[j]
- 9 C[A[j]] = C[A[j]] 1

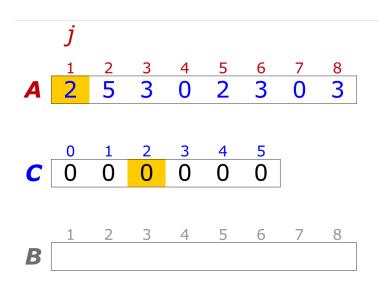


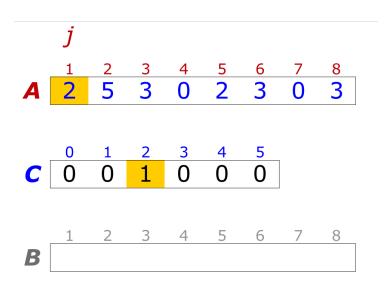
B

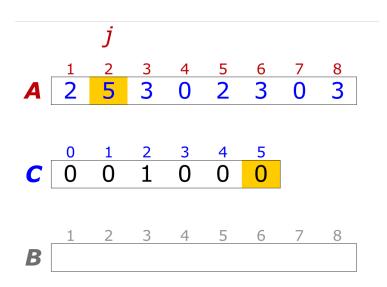


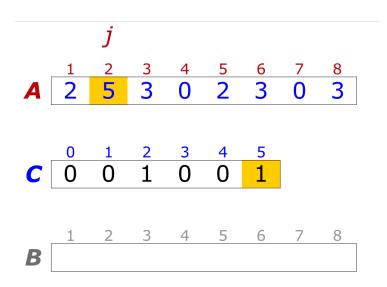


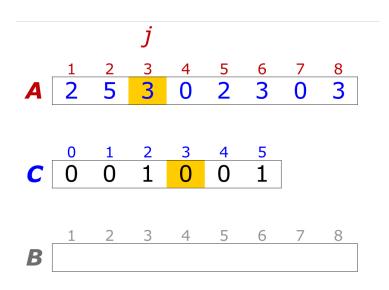
B 2 3 4 5 6 7 8

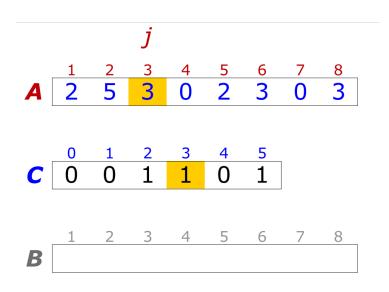


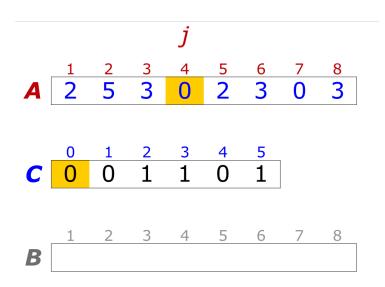


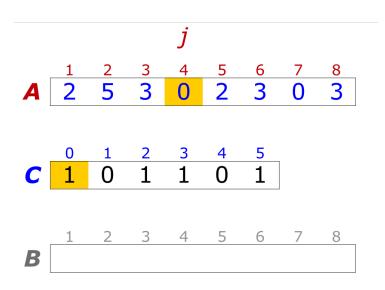


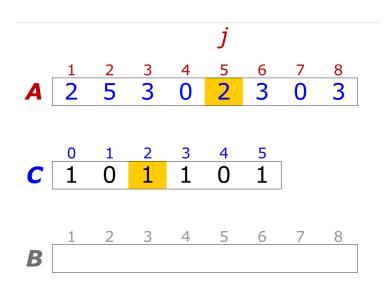


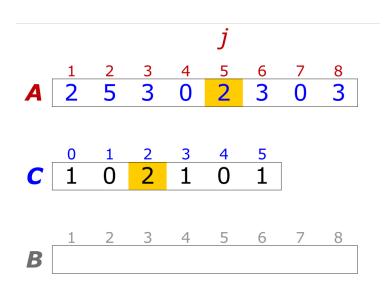


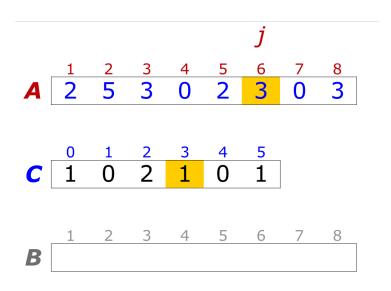


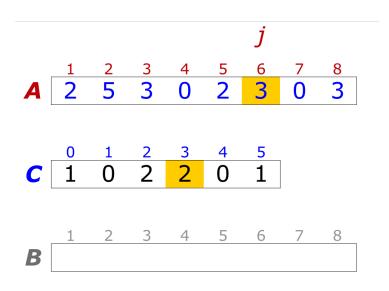


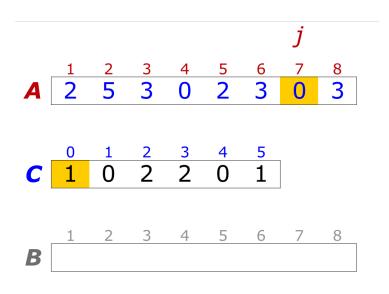


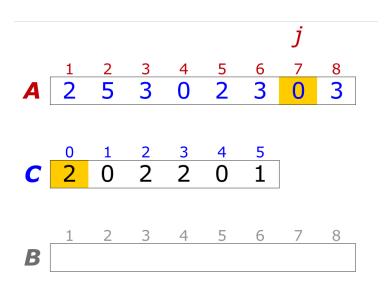


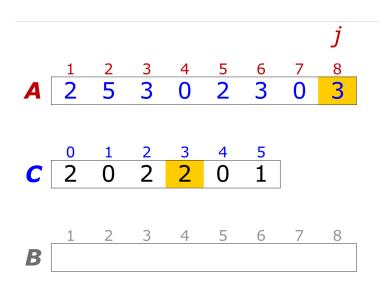


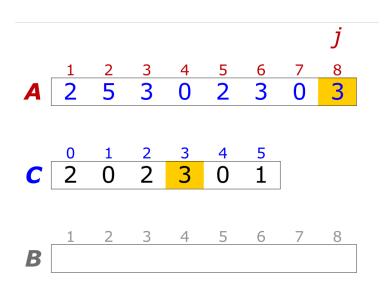


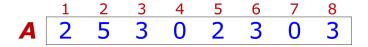






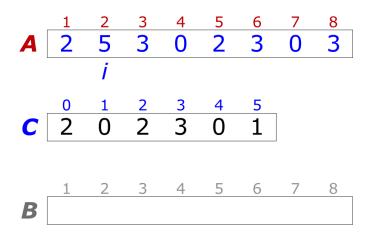


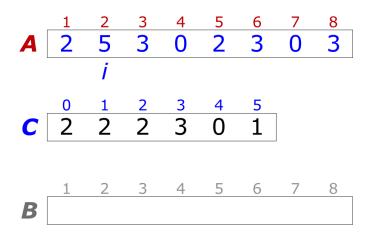


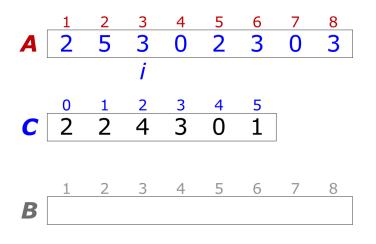


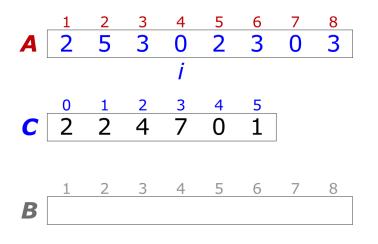


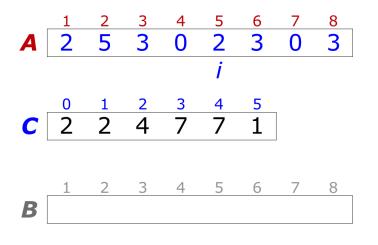
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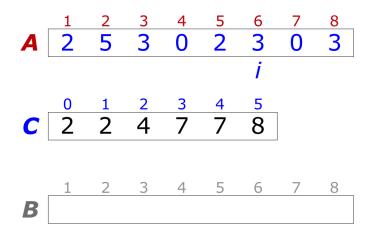


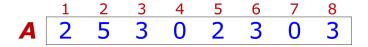


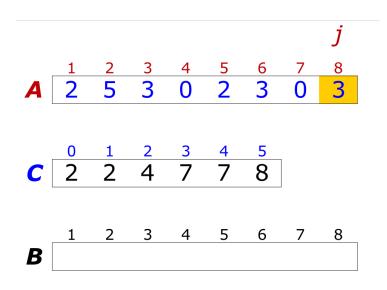


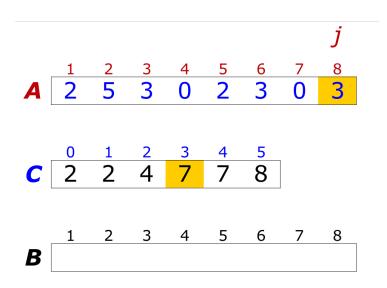


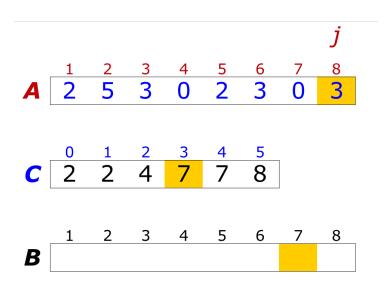


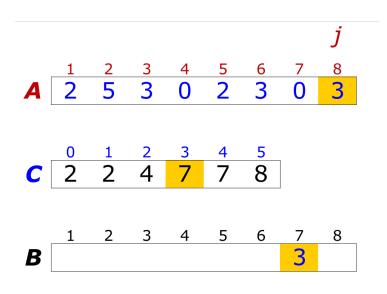


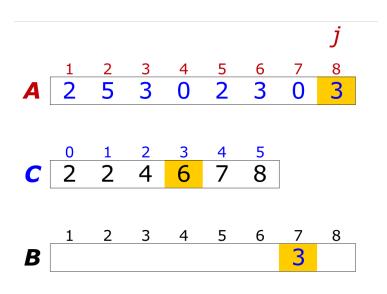


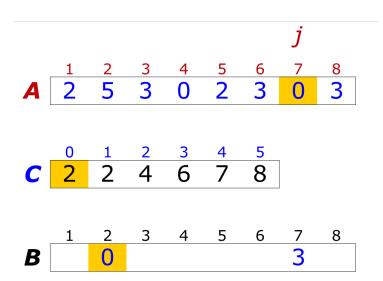


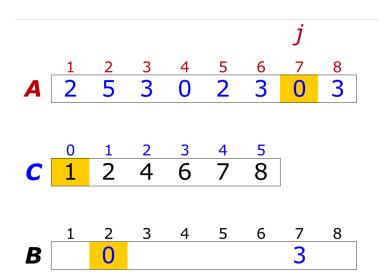


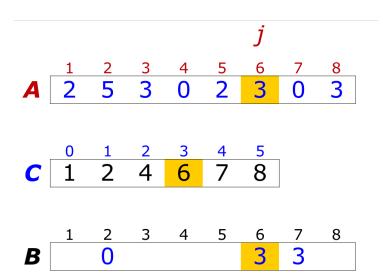


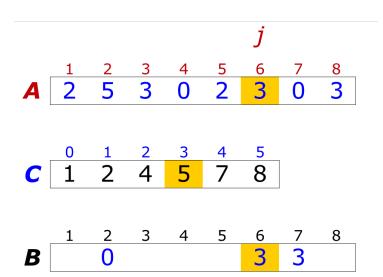


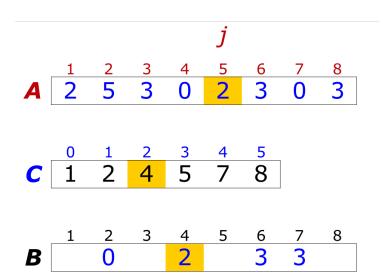


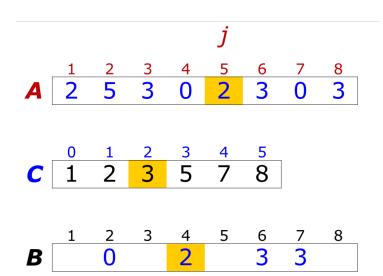


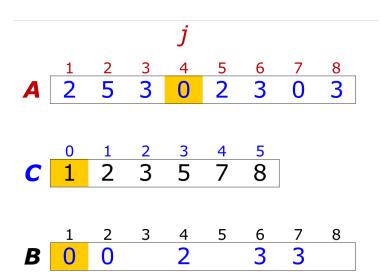


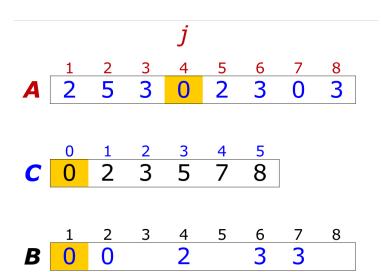


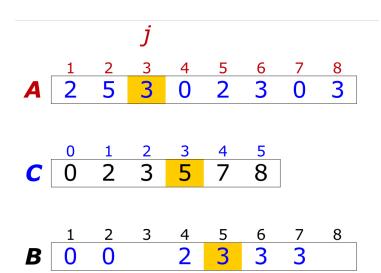


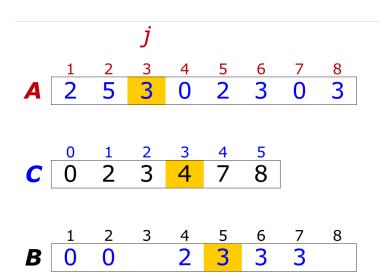


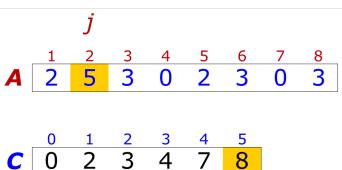




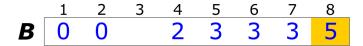


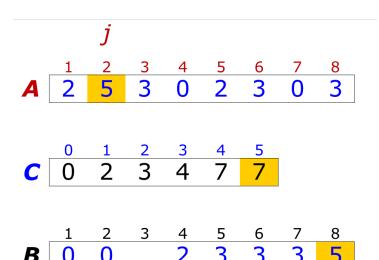


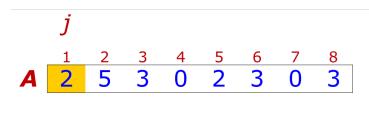




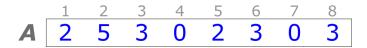




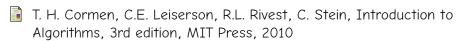








Referências



- A. Levitin. Introduction to the Design and Analysis of Algorithms. 3rd edition. Addison-Wesley,2007
- R. Sedgewick, K. Wayne. Algorithms. 4th edition, Addison-Wesley Professional, 2011
 - N. Ziviani. Projeto de Algoritmos com Implementação em Pascal C. Cengage Learning, 2012

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