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Introduction to Algorithm Analysis

16 March 2017

1.) $[2,7,3,4][1,8,5,6]$
$[2,1,8,5,6,7,3]$

2.)

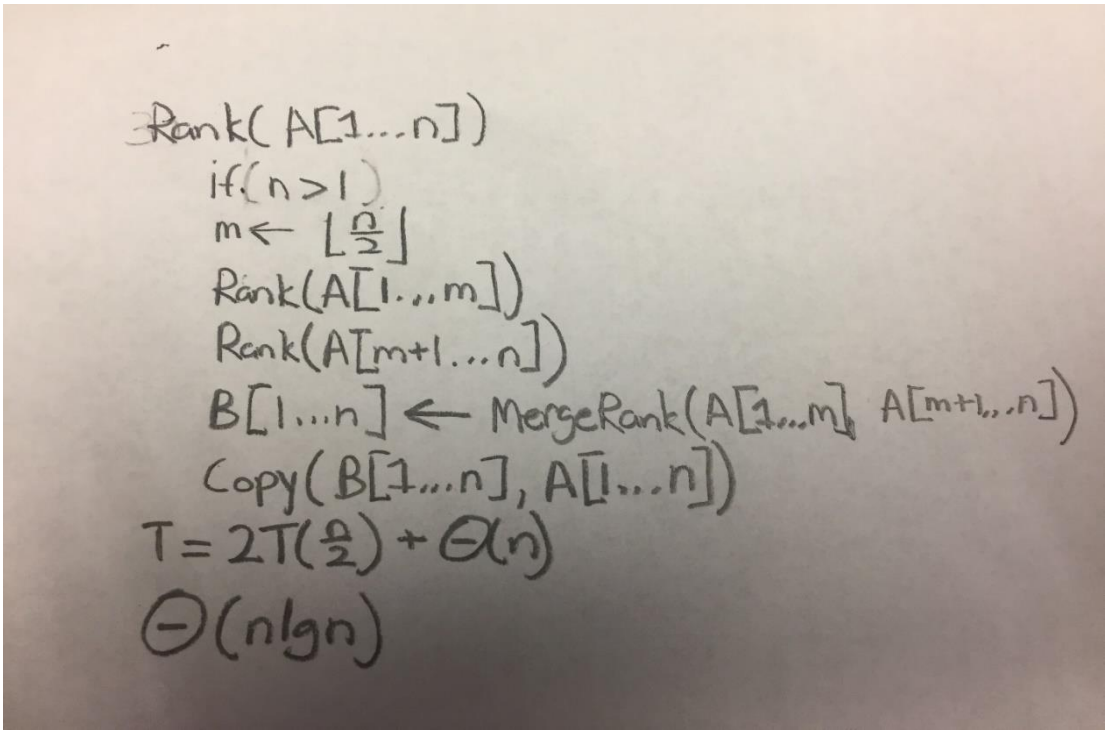
MergeRank(A[1…n] , B[1…m])

$i, j\ k, z\ \leftarrow 1, 1, 1, p+q$
$while(z > k)$
$if\big(M[p[i], q[j]\big] = 1)$
$R[k] \leftarrow p[i]$
$k \leftarrow k+1$
$i \leftarrow i+1$
$else\ if\big(M[q[j], q[i]\big] = 1)$
$R[k] \leftarrow q[j]$
$k \leftarrow\ k+1$
$j \leftarrow j+1$
$else$
$R[k] \leftarrow p[i]$
$k \leftarrow k+1$
$i \leftarrow i+1$
$j \leftarrow j+1$
$z \leftarrow z-1$

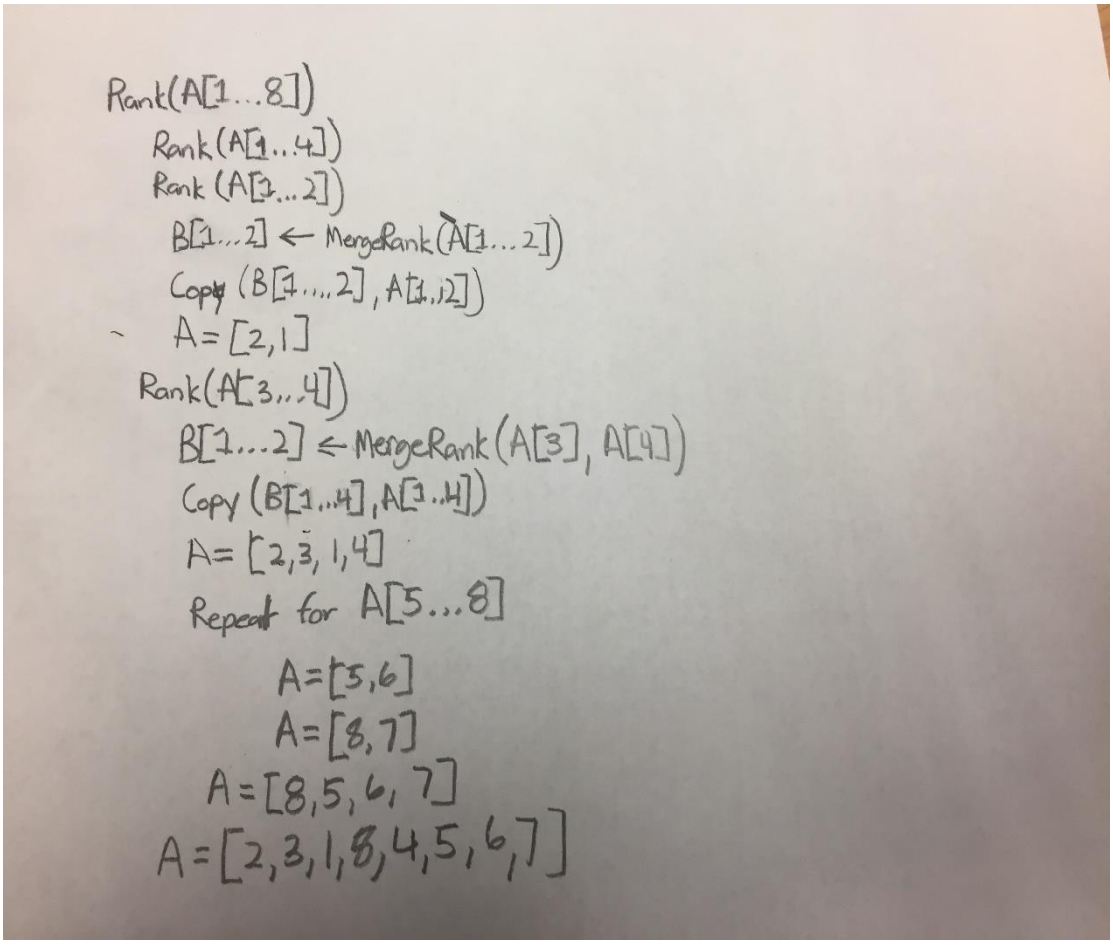
This algorithm is correct because given two ranked arrays it will always give a ranking the player i is ranked higher then j, if i beat j. It also controls for duplicates.

$$\ominus\ (p+q)$$

3.)


Rank(A[1...n])
if(n>1)
m ← ⌊n/2⌋
Rank(A[1...m])
Rank(A[m+1...n])
B[1...n] ← MergeRank(A[1...m], A[m+1...n])
Copy(B[1...n], A[1...n])
T = 2T(n/2) + Θ(n)
Θ(nlgn)

4.)


Rank(A[1...8])
Rank(A[1..4])
Rank(A[1...2])
B[1...2] ← MergeRank(A[1...2])
Copy(B[1...2], A[1..2])
A=[2,1]
Rank(A[3..4])
B[1...2] ← MergeRank(A[3], A[4])
Copy(B[1..4], A[1..4])
A=[2,3,1,4]
Repeat for A[5...8]
A=[5,6]
A=[8,7]
A=[8,5,6,7]
A=[2,3,1,8,4,5,6,7]