

ASSIGNMENT NUMBER MX

1. Letting a_{ij} and b_{ij} denote the elements of row i and column j of matrices A and B , respectively, the transpose of matrix A is matrix B with $b_{ij} = a_{ji}$. Give an algorithm to transpose a matrix represented by an MX quadtree.
2. How many interchange operations are needed to transpose an MX quadtree representation of a $2^n \times 2^n$ matrix so that it is not sparse (i.e., all blocks are of size 1)?
3. Compare the savings in space and time when a matrix is represented as an MX quadtree and as an array. Use the time required to perform a transpose operation as the basis of the comparison. You should assume the worst case, which occurs when there is no sparseness (i.e., all blocks are of size 1).