
Algorithm 1 ObliviousSearch (*query, depth, dim, k, node, maxHeap, section_reached, nodeCount, c*)

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if nodeCount  $\geq \log N$  then
    exit
end if
cd = [depth mod dim]
if section_reached is false then
    if node = leaf then
        section_reached = true
    end if
    if maxHeap.size < k then
        maxHeap.insert(node.value)
    else if node.value is closer than maxHeap.max then
        maxHeap.removeMax
        maxHeap.insert(node.value)
    end if
    if query[cd] < node[cd] and node is not leaf then
        node.leftExplored = true
        nodeCount + = 1
        node.left = OMAP.retrieve(node.leftLabel)
        ModifiedSearch(query, depth+1, dim, k, node.left, maxHeap, section_reached)
    else if node is not leaf then
        node.rightExplored = true
        nodeCount + = 1
        node.right = OMAP.retrieve(node.rightLabel)
        ModifiedSearch(query, depth+1, dim, k, node.right, maxHeap, section_reached)
    end if
else
    if maxHeap.size < k then
        maxHeap.insert(node.value)
    else if node.value is closer than maxHeap.max then
        maxHeap.removeMax
        maxHeap.insert(node.value)
    end if
    if node is leaf then
        nodeCount + = 1
        node.parent = OMAP.retrieve(node.parentLabel)
        ModifiedSearch(query, depth-1, dim, k, node.parent, maxHeap, section_reached)
    else
        if both children of node explored or node.value > maxHeap.max then
            nodeCount + = 1
            node.parent = OMAP.retrieve(node.parentLabel)
            ModifiedSearch(query, depth-1, dim, k, node.parent, maxHeap, section_reached)
        else if node.leftExplored and node.value < maxHeap.max then
            nodeCount + = 1
            node.right = OMAP.retrieve(node.rightLabel)
            ModifiedSearch(query, depth+1, dim, k, node.right, maxHeap, section_reached)
        else if node.rightExplored and node.value < maxHeap.max then
            nodeCount + = 1
            node.left = OMAP.retrieve(node.leftLabel)
            ModifiedSearch(query, depth+1, dim, k, node.left, maxHeap, section_reached)
        else if node.value < maxHeap.max then
            nodeCount + = 1
            node.left = OMAP.retrieve(node.leftLabel)
            ModifiedSearch(query, depth+1, dim, k, node.left, maxHeap, section_reached)
            nodeCount + = 1
            node.right = OMAP.retrieve(node.rightLabel)

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