Assignment - []

DAA (CSA 0666)

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oub Isub

code: Design and sanalysis of salgorithm (CSA 0666).

00. If ti(n) to (gi(n)) and te(n) to (g2(n)) other ti(n)+t2(n) E O (max &g,(n), g2(n) 3). Rouve the assertions.

> flu) & CI gi(11) for well n Ino f=(n) < (29=(n) for all nzno

8, (n)+82(n) + C19, (n) + C2 92(n) Adding

strue max 8 g, (n), g2 (n) 3 Zg, (n)

max q g, (n), g, (n) 3 2 92 (n)

quatgen) 4c, max q g, (n) , ge (n) 3 + c, max & g, (n), ge (n) 3 + (C1+(2) max of g, (h), g2(n) 3

8,(n)+82(n) 4 cmax qq,(n), q2(n) 3 for all nzno 1et (= C1+12 : 81(n)+82(n) =0 (max qg,(n), g2(n)3).

T(n) = 2T(n/2) + 1

0=2 K=1 , P=1 6=2

logab = log = 2 = 1

eagab = K

PZ-1 O(nkeagnP+1)

0 (n' logn2)

=> + (n.log n)

02.

A3).

t(n)= $a\tau(n/b) + f(n)$ Ef $f(n) = O(n \log_b a - 6)$ when $\tau(n) = O(n \log_a b)$ Ef $f(n) = O(n \log_b a \log_n k)$ when $\tau(n) = O(n \log_b a \log_n k)$ of $f(n) = O(n \log_b a \log_n k)$ then $\tau(n) = O(n \log_b a \log_n k)$

(4). Tin) = \$27(n-1) & by n70

1 otherwise

T(n) = 2T(n-1) T(n-1) = 2[2T(n-2)] $= [2^2 + (n-2)]$ $T(n) = 2^2[2+(n-3)]$ $= 2^3 + (n-3)$

 $T(n) = 2^K T(n-K)$

n-k = 0 ; n = K

T(0)=1

 $T(n) = O(2^n)$

Big 0 notation: $s+ (n)=n^2+3n+5$ is $0(n^2)$ $f(n)=n^2+3n+5$

8(n) 4 (. n2

gor vall nono

4(n)=n2+3n+5

= n2+3n+5

g(n)=n2 +3n+5 4 cn2

n2+3n+5 46. n2

3n+5 4 c.n2

3n+5 4 C.n2

.. when n is alose to 0,3n+5 \leq c.n² can be (-ve)

ab) Beg somega notation: Posove that $g(n)=n8+2n^2+4n$ is $-2(n^3)$

gin) = n3+2n2+4n

g(n) > c. n3

g(n) = n3+ 2n2++ n

= n3(n+2) +4n

gen) 6 n3

g(n) = n2(n+2) +4n 2 c. n3

n2(n+2)+4n-c.n320

12(1+2)+4n-6132 a

.. This inequality is not always tout.

when in its close to $0 \cdot n^2 (n+2) + 4n - c \cdot n^3$ can be (ve) $[:gn] \neq 2 \cdot (n^3)$

Q=). Beg Theta notation: Determine whether $A(n) = 4n^2 + 3n$ is $O(n^2)$ or not.

h(n) =4 n2 +3 n

nen) 2 c. n2

M(n) = 4n2 +3n

= n2 (4+3)

A(n) = n2 (4+3) > (.n2

1/24+3) Z C. 1/2

4+3 2 C.

This Enequality to hold for all n, we need

4+31n Z C gor vall n.

Inequality is not always true when n is alose

0.4+3/1 wan be less than L.

We can't yend a nonstant c such that

A(n)Zc.n2

[a(n) + o(n+)]

Let $g(n) = n^3 - 2n^2 + n$ and $g(n) = n^2$, show whether g(n) = -2(g(n)) is true or palse and guestfly your various

 $y(n)=n^{3}-2n^{2}+n$ $g(n)=n^{2}-2$ $g(n)=n^{2}-2$ $g(n) \ge c \cdot g(n)$ $y(n)=n^{3}-2n^{2}+n$ $=n^{2}(n-2)+n$ $=n^{2}(n-2)+n$ $=n^{2}(n-2+1/n^{2})$ $y(n)=n^{2}-(n-2+1/n) \ge c \cdot n^{2}$ $n^{2}(n-2+1/n) + c \cdot n^{2} \ge 0$ $n^{2}(n-2+1/n) + c \cdot n^{2} \ge 0$ $n^{2}(n-2+1/n+c) \ge 0$

:. n-2+++(2 0.

This unequality is not always true :. gin) = 2-(gin)).

agorous proof your vanilusion

shin) = n light n

CI. neogn & neogn+n & co. neogn

upper bond: $n \log n + n \le c_2 \cdot n \log n$ $n \log n + n \le n \log n + n \log n = 2n \log n$ $c_2 = 2$ $n \log n + n \le 2n \log n$

lower bond:

c1. nlog n = nlogn+n

c1. nlog n = nlogn+n

devede b. s by n

c1. log n = log n+1

\frac{1}{2} log n \neq log n

:: Cionlogn & nlogn+n & C2. nlogn

.: h(n) = nlogn + n + o (nlogn)

and gend the worder up governth for adultions

T(n)=HT(n/2)+n2T(0=1

By moster theorem

a=4 k=2 p=0 b=2 $g(n)=n^2$

1809 b a = leg 24 = leg 21 22 = leg 2 = 2

: 200. a= K

P > -1, 80, = $\Theta (n^{K} \log_{n}^{P^{4}})$ = $\Theta (n^{2} \log_{n}^{1})$ = $\Theta (n^{2} \log_{n}^{1})$ = T(n)

9,-1,0,-6,-8,11,-93 entegers, find maximum and minimum product that van be voltalned by multiplying 1 minimum form variay.

Maxemum product:

2 Largest nois = 11, 10

2 smalleat (-ve no's) = -9, -8.

Parodurt:

11×10=116

-9x-8 = 72

Max product = 110

Milhemum product:

111-9 = -99

10x-9 =-90

: Hen product = - 99.

Q12) Demonstrate belowy search method to search tray : 23. From the varray artity = [2,5,8,12,16,23,38,56,72,91]

Key=23

0 1 2 3 4 5 6 7 8 9

2 5 8 12 16 23 38 56 72 91

mRd = 4 + h = 0 + 9 = 4 + 5 = 5

0 1 2 3 4 5 6 7 8 9
2 5 8 12 16 23 38 56 72 91
mld

avoi [mid] = 23
avoi[mid] = Key

23=23

.. Key is found.

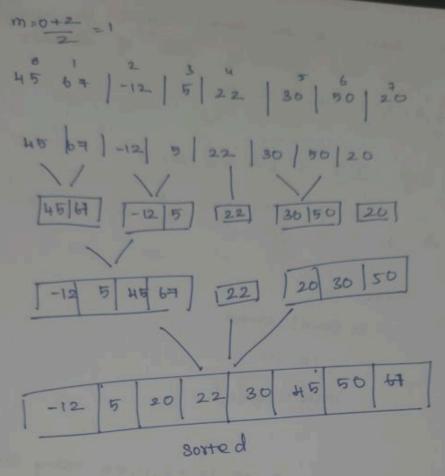
data d= (45,67, 12,5,22,30,50,20). Set up 9

recurrence relation for the shumber of key comparisons
made by mergesert.

d=(45,67,-12,5,22,30,50,20)

 $m = \frac{0+7}{2} = \frac{14}{2}$ $0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7$ $45 \quad 67 \quad -12 \quad 5 \quad 22 \quad 30 \quad 60 \quad 20$

 $m = 0 + \frac{1}{2} = 2$



Tin)=
$$2\pi(n|2) + C(n)$$

$$a=2 + K=1$$

$$b=2 + P=1$$

$$log_b a = log_2 2 = 1$$

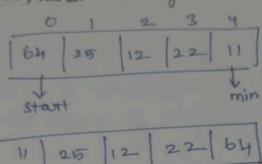
$$log_b a = K$$

QIE). Find the ordex of the tranget value to using sen search from the following that it elements E,4,6,8,19,12,14,16,18,20] 012345 6789 M= 8th = 0+9 2 4.5 25 (01) 4 Q 4 6 8 10 12 14 16 18 20 target= 10 a Conid3 = target :10=10 Tagge + found Q17)-Signet the working 64, 34,25,12,22,11,90 warng bubble west what is some somplexity of bubble soft in best, most average lases. 64 34 25 12 22 11 90 84 64 25 12 22 11 90. 34 25 64 12 22 11 90 90 34 25 12 64 22 11 34 25 12 22 64 11 90

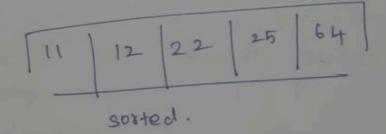
11 Ly 90

24 25

asst the variety 64, 25, 12, 22, 11 using selection want what is time complexity of selection in the least, what average cases.



start min



Time complexity:

Best case : o(n2)

Avg case: 0(n2)

worst case: O(n2)