TÜRKİYE CUMHURİYETİ

YILDIZ TEKNİK ÜNİVERSİTESİ

BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

ALGORİTMA ANALİZİ

ÖDEV – 1

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Ders/Grup: BLM3021 – Algoritma Analizi/ Gr-2

Ders Yürütücüsü

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Cevap-1:

```
int SequentialSearch (int A[], int n, int x)
    int i=0;
    while ((i<n) && (A[i] != x)){      } Basic
        i++;                           } Operations
    }
    if(i<n){
        return i;
    }else{
        return -1;
    }
```

a) Best Case → $C_{best}(n) = \Omega(n)$

b) Average Case :

P: $0 \le p \le 1$

P = başarılı arama

1-p = başarısız arama

i. sırada olma ihtimali = $\frac{p}{n}$

$$C_{avg}(n) = \underbrace{\left(1*\frac{p}{n} + 2*\frac{p}{n} + 3*\frac{p}{n} + \dots + n*\frac{p}{n}\right)}_{} + n*(1-p)$$

$$= \frac{p}{n} * (1+2+3+\dots+n) + n.(1-p) = \frac{p}{\cancel{n}} \cdot \frac{\cancel{n}.(n+1)}{2} + n.(1-p)$$

$P=1 \rightarrow = \frac{n+1}{2} + n.0 = \frac{n+1}{2}$ / $p=0 \rightarrow 0+n=n$ } $C_{avg}(n) = n \approx O(n)$

c) Worst Case → $C_{worst}(n) = O(n)$

Cevap-2:

$\frac{1}{2}n(n-1) \in \Theta(n^2)$

$c_1 . n^2 \le \frac{1}{2}n(n-1) \le c_2 . n^2$

$c_2 > c_1 > 0$ ✓

$n_0 > 0$ ✓

$n \ge n_0$ ✓

$2c_1 n \le n-1$

$1 \le (1-2c_1).n$

$c_1 = \frac{1}{3}$, $n_0 = 1$

$(n-1) \le 2c_2 n$

$-1 \le (2c_2 - 1).n$

$c_2 = 1$, $n_0 = 1$

Cevap-3:

a) $\sum_{i=3}^{n+1} i = \sum_{i=1}^{n+1} i - \sum_{i=1}^{2} i = \frac{(n+1)\cdot(n+2)}{2} - \frac{2\cdot 3}{2} = \frac{n^2+3n+2}{2} - 3 = \boxed{\frac{n^2+3n-4}{2}}$

b) $\sum_{i=0}^{n-1} i\cdot(i+1) = \sum_{i=0}^{n-1} i^2+i = \sum_{i=0}^{n-1} i^2 + \sum_{i=0}^{n-1} i = \frac{(n-1)\cdot(n)\cdot(2n-1)}{6} + \frac{(n-1)\cdot n}{2}$

$= \frac{(n^2-n)\cdot(2n-1)}{6} + \frac{(n^2-n)}{2}$

$= \frac{2n^3-3n^2+n+3n^2-3n}{6} = \boxed{\frac{2n^3-3n}{6}}$

Cevap 4:

$x(n) = x(n/2) + n$ for $n>1$, $x(1)=1$ (solve for $n=2^k$)

$= x(n/4) + \frac{n}{2} + n = x(n/4) + \frac{3n}{2}$

$= x(n/8) + \frac{n}{4} + \frac{3n}{2} = x(n/8) + \frac{7n}{4}$

$= x(n/16) + \frac{n}{8} + \frac{7n}{4} = x(n/16) + \frac{15n}{4}$

$\vdots$

k adım için $= x(n/2^k) + \frac{2^k-1}{2^{k-1}}\cdot n$

$n=2^k$ için;

$k=\log_2 n$

$x(n) = x(2^k/2^k) + \frac{2^k-1}{2^k\cdot 2^{-1}}\cdot 2^k = \underbrace{x(1)}_{1} + \frac{2^k-1}{2^{-1}} = 1+(2^k-1)\cdot 2 = 1+(n-1)\cdot 2$

$2n-1$

$x(n) \in \Theta(n)$

Cevap 5:

```
Algorithm decimal (x, d, m)
    carp ← 1
    topla ← 0
    for i ← 0 to m do
        digit ← x % 10
        topla ← topla + digit * carp
        x ← x / 10
        carp ← carp * d
    return topla
```

} → 2

Basic Operation → 1 + (m+1) + m → 2m+2

→ 2
→ 3 } 9 → 9m
→ 2
→ 2

1

\+

11m + 5

$11m+5 \approx O(m)$