Grocedy Algorithm — [wit] from = [wit] of 田 Makes locally optimal choice

Endo-anti-ingle [anti-ingle] and eneveningle

H. Once a decision made neveningle neconsidere d'espated manaixam ent s mon the solution of the given the given the given.

The thick be achieved with the given. Home

Example: 011 knapsack st ni public asta

| Item | Value | Weight | White. | ILION | |
|------|-------|--------|--------|----------|----|
| 1 | \$100 | 20 | - 09B | 1 8 | |
| 0 | \$120 | 30 | 9,100 | Capacity | 50 |
| 3 | \$60 | 070 | \$120 | 2 | |

Objective: Max profit

constronint: capacity

step-1: calculate value by weight for each item Step-2; sont items based on the above matio Paul = 460. descending order.

Step-3: Take item on noto (0/1). molt (5)

PICK THEM 1. CAPOCITY = MO-20 = 20

| Solut | ion \Rightarrow | oan | | | 1009 = \$100 + |
|-------|-------------------|-------|--------|--------------------|-------------------------|
| | Item | Value | weight | Value/weight | |
| | 1 | \$100 | 20 | 5 08< 08 | 3) Item $2 \rightarrow$ |
| | 2 | \$120 | 30 | 141 | Item 2 n |
| , | 3 | \$ 60 | 10 | 6 | 7 1131-2 |

(3) Item 2 -> Ilem 2 n

: Max Profit = Item 3 + Item I

460 + \$200

After solvting in descending onder -

| Item | value. | Weight | Value/weight |
|-------|--------|--------|--------------|
| 3 | \$60 | 10 | 6 |
| 12040 | \$100 | 20 | 5 |
| 2 | \$120 | 30 | 14 |

CONSTROMINE: CAPACITY

If weight <= capacity, pick item. Then find remaining capacity.

(1) Item 3
$$\rightarrow$$
 10250 and a columbia : 1 and Pick item 34: capacity = 50-10=40

Profit = \$60.

(2) Item 1
$$\rightarrow$$
 20240
Pick item 1. Capacity = $40-20=20$
Profit = \$60 + \$100 = \$150 \$160

(3) Item
$$2 \rightarrow 30 > 20$$
.

Item 2 nejected.

Hene, we can see that, maximum if we took item 1 and 2, then we the maximum profit would be \$220 within the given capacity. If we took item 2 and 3, then the maximum sprofit would be \$180 within given capacity. \$220 and \$180 ane greater than \$160. So, we can say that greedy algorithm doesn't give optimal solution of 0/1 knapsack.

Fractional knapsack - NE EN SH

Them-2 nejected 212 at 12020 capacity

Them-2 nejected 212 at 12020 capacity

Them-2 =) Fraction $\Rightarrow 20$.

Max Profit \Rightarrow = Item 3 + Item 1 + Item 2 $\begin{pmatrix} 20 \\ 30 \end{pmatrix}$ = $160 + 100 + 126 \times \frac{20}{30}$

-\$240

5215

84.10

£.79

| | Example ? i mountainement doubt see no sou south |
|------|--|
| | Item 1 2 2 3 1400 5 1 260 7 MUMIKAM |
| | Value 11 6 16 8 7 1 29 40 0000 navis |
| | Weight 3" 4 86 98 12 5 2 3H NOW |
| | Value/ 3.67 1.5 2.67 .1 3.5 3.8 2 16 |
| HON | weight no 2 6 4 7 3 1 5 nothang |
| | Manually Ax 3200 |
| | X (1 0 5/ 0 1. 1 100 80 0 1 110 90 |
| | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ |
| | Item Value Weight Remaining Total Propriet |
| 5215 | 6 19 X 51 m 15-5-10 19 5 mol I |
| 3410 | $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ |
| | $\frac{1}{7}$ $\frac{1}$ |

527 675

| Item | Value. | Weight | Remaining capacity | Total Profif | 3 | symo |
|------|--------|----------|--------------------|---------------------|--------|----------------------|
| 6 | 19 0 | TK 51 71 | 15-5-10 | 19 | | · Item - 2 |
| 1 | 11 | 3 | 10-3=7 7-2=5 | 19+11=30 30+7=37 | ાનું ર | Zq) N.O. |
| 5 | 5 ×16 | 5 X 6 | | 37+13.3 = 50.3 | | Item-2 Max Poofit |
| | = 13.3 | 18 20 0 | t Item | item 1 | + | E medI < |
| | | | 05 X 021 | L + 0 | 10 | + 000 = |
| | | | | | | 0404- |

```
coin change - Pooblem >
Algorithm:
   Objective - Minimum number ++P: n'sit; 0=i) no
     istimismis - conf prisogno = 2 thisogno ? Ti I arno fi
        C= C- onn [i]. weight;
                                    Example
        total-profit+=ann [i], value.
                     c= { 5, 10, 20, 25, 50}
 else s
                                   After sonting -
      Frac = C/arnti] weight is 00 3 =0
     total-profit total-profit + frackarne[i]. value.
                        Tokal Coins
                                      Coins used
              440-60 = 90
                                                  50Z1KO
             00-50 =40
                                         (50) (50)
Complexity:
                                                  50600
              40-25:15
                                         252 40 (60) (60)
      ton sorting => O(nlogn)
                                    10215 (50) (25) (25) (20)
      Companison = O(n)
                                   (E) (E) (E) (E) (E)
                                                  6 = 6
     Overall > O(nlogn) + O(n)
         O (nlogn) is = prominent - 90 as down
  Since
  Time complexity = of For. O(nlogn).
```

Coin Change Proplem > Objective - Minimum numbers of coins constraints - coins lane available in infinite numbers, C = C - ODD [1], weight; Example n= 140 = 113 anx=+ 112 ang - 12 tot C= { 5, 10, 20, 25, 50} After sonting -C = { 50, 25, 20, 10, 5} IF CIIIZ= n Houpibles coin florg-lated

| | Coins used | Total coins | Remaining | (|
|---------|--------------------|-------------|-------------|-------------|
| 504.140 | (50) | 1 | 140-50 = 90 | |
| 50490 | 50(50) | 2 | 90-50=40 | ·disaham |
| | | 3 | 40-25=15 | · Ptixalamo |
| 254-40 | | (n tolu) (| 15-10-5 | Fen Se |
| 10415 | (50 (50) (25) (00) | 4 | 0 | |
| 5 = 5 | 59999 | 5 (N | 5-5=000 | Compani |
| | | 6-21/11 | forms for | Overall |

Number of coins mused = 52! (moin) as sistements of coins mused = 52! (moin) a sonie

#"Greedy doesn't give optimal solution of coin change problem every time" - Explain with example.

Assume, n=6 and C= \$2,13,43.

After sorting, c= 24,3,37 (0== 0) ?;

| (I, [izo | Coins | Total | Remaining | | [1] j) ji |
|----------|-------|-------|-----------|--------|-----------|
| | 9 | 1 | 6-4=2 | aul +T | nelunn |
| | 90 | 2 | 2-1=1 | | |
| | 900 | 13 | 1-1-0 | | @156 |

Hene, we can see that, the The hook two coins of amount 3. that would be the minimum number of coins to make 6 with the available coins. But, using greedy algorithm, we Sound that 3 coins one needed for making 6 with the available coins. So, greedy doesn't always give optimal solution Br coin change problem.

> Total amount making 3 0(n) (no at (m bolus) + a (n)

Hene, nym. so, O(m) is prominent. Time complexity = O(N).

& Grosedy Losen't give optimal solution midting opin int greedy coin change (int CEI, int n, int i) } if (n = = 0) spetungs 0:0 , paidros asia if (C[i]<=n) netunn 1+ greedycoinchange (é, n-eci], i). else neturn greedy coinchange (C, n, i+1) Hene , we can see High, two doing of amount 3. that would be f Dies is a coint to make the make complexity = book griss this enter eldelieve Ampay size = m and a fall bring For sonting > 0 (mlog m) Total amount making => O(n). Overall => O(mlog m) + O(n) Hene, n >> m. so, O(m) is prominent. Time complexity = O(n).

| Charles and the control of the contr | Job sequencing with dead line = |
|--|--|
| | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| A term option to the control of the | 2 01 1 10 39 5 20 1 15 |
| b | peadling [9:5] 2 8 2 3 20 |
| | Du' 1 '3 Rejected |
| | 0 1 2 (253 25 (85) - NoHulo? |
| | Profit Timeslot: Times Kg CIdor BG |
| > | At Timeslot a only 200 Job to prixalgmos |
| 75 | 2 example 1 Timeslot 3bt - 0 to 1, 1 to 2, 2 to 3 |
| | 1Stern sonting \Rightarrow $(n)0 = 901010$ |
| | 706ID -> 3(160500 H (102 =4/1/2000) |
| | Sitt value -> 120 15 210 (ngolm) sonie |
| D | eadline -> 2 2 1 3 3 |

| - | |
|---|--|
| | |
| - | |
| - | |

| Job 3eq. | stot assigned | Deadline | Profit 6 | Job I D |
|----------|---------------|----------|----------|----------------|
| | [1,2] | 2 | 20 | 73 |
| Jobin - | [0,1] < | 2 | 15 | 75.L |
| 170a9 | Rejected. | 1 | 10 | J ₁ |
| onilba | [2,3] | 3 8 | 2 5 | 72 |
| | Rejected | 3 | 1 | Jy |

Since, o'(nlogn) ofis prominents sular Hand

Time complexity = o(nlogn).

CS CamScanner