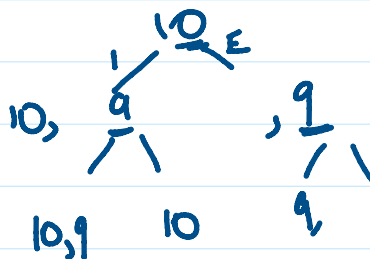


16 April 2023 09:22

[10,9,2,5,3,4,7,101,18]

$[2, 3]$


$$\begin{array}{r} 2 \\ - 3 - 7 = 101 \\ 18 \end{array}$$
$$\begin{array}{r} 7-101 \\ \underline{}-18 \end{array}$$

$$\begin{array}{r} 5 - 7 = 101 \\ \quad \quad \quad 18 \end{array}$$

$$\begin{array}{r} 3 - 7 = 101 \\ \quad \quad \quad 18 \end{array}$$

101
18

2, - 3 ✓

DP ??

↳ prev, idx
 ↳ 0 to n-1

6 min(arr)
to
max(arr)

$$-10^4 \text{ to } 10^4$$
 $2 \cdot 10^4$
$$= 2000$$

[10,9,2,5,3,4,7,101,18,5,6,7]

$[2, 3, 4, 7, 18]$ $\frac{6}{6}$

Sorted List

0-1 Knapsack

W: 4

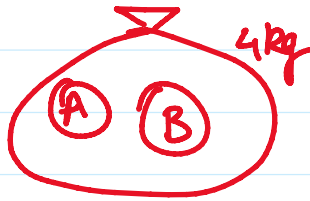
A hand-drawn diagram of a person's head and shoulders in red ink. A bag is drawn on the back, with the text "4kg" written next to it.

/ Fractional Knapsack

W: 4

(A) $1 \rightarrow 4$

(B) $3 \rightarrow 3$



5 (C)

4+3 (A)+(B)



Cap = 4

wt [1, 3, 4]

profit [4, 3, 5]

↳ Capacity, idx

↳ include:

cap - wt[idx], idx+1

↳ cap, idx+1

Bitmasking

6

$$(57)_{10} \rightarrow (??)_2$$

↓ ↓
0-9 0-1

$$1 + 25$$

$$111001$$

2	57		
2	28	1	2^0
2	14	0	2^1
2	7	0	2^2
2	3	1	2^3
2	1	1	2^4
2	0	1	2^5

Byte \rightarrow 8 bitShort \rightarrow 2 byte \rightarrow 16 bitInt \rightarrow 4 byte \rightarrow 32 bitLong \rightarrow 8 byte \rightarrow 64 bit

0, 1

$$\underbrace{-128 \text{ to } 127}_{256}$$

$$\begin{array}{cccccccc} \overline{1} & \overline{1} & \overline{1} & \overline{1} & \overline{1} & \overline{1} & \overline{1} & \overline{1} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array} \rightarrow 2^8 \rightarrow 256$$

$$2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0$$

60×255

$$a. \frac{x^n - 1}{x - 1} = (1) \left(\frac{2^8 - 1}{2 - 1} \right) = 2^8 - 1 = 255$$

Signed Bit Approach

1) MSB \leftarrow 0 $\rightarrow 127$ 0 \rightarrow +ve

X

1 \rightarrow -ve
1

-127

0	0	0	0	0	0	0	0	+ve 0
1	0	0	0	0	0	0	0	-ve 0 ??

$$127 - (-127) + 1 = \underline{\underline{255}}$$

2) $\overline{18}$ Complement
 $0 \leftrightarrow 1$ $(57)_{10}$

$(57)_{10} \rightarrow \overset{2^7}{\boxed{0}} \overset{2^6}{0} \overset{2^5}{1} \overset{2^4}{1} \overset{2^3}{0} \overset{2^2}{0} \overset{2^1}{0} \overset{2^0}{1} \Rightarrow 57$

- $\boxed{11} \begin{smallmatrix} 000110 \\ 2^7 \ 2^6 \ 2^5 \ 2^4 \ 2^3 \ 2^2 \end{smallmatrix} \rightarrow -57 \rightarrow 70X$

127

$\boxed{11101011}$

-ve

0010100

A handwritten number 1000000000 on lined paper. The number is written in blue ink, with the '1' and the first '0' separated by a space, and the remaining seven '0's grouped together. The number is positioned above a horizontal line, and there are small vertical tick marks below the line corresponding to each digit.

3) 2's complement

→ Steps : 1) 1's complement
2) Add 1

21A
C

0 0 1 1 0 0 1
1 1 0 0 1 1 0
+ 1

1 1 0 0 1 1 1

$$\begin{array}{r} 00000000 \\ + 11111111 \\ \hline 10000000 \end{array}$$

$$\begin{array}{r} 10 \\ -1 \\ \hline 1 \end{array}$$

-128

$$\begin{array}{r} 10000000 \\ + 01111111 \\ \hline 11111110 \\ - 00001111 \\ \hline 01111111 \end{array}$$

0 111 1111

$$\begin{array}{r} 2 \mid 128 \\ 2 \mid 64 \quad 0 \\ 2 \mid 32 \quad 0 \\ 2 \mid 16 \quad 0 \\ 2 \mid 8 \quad 0 \\ 2 \mid 4 \quad 0 \\ 2 \mid 2 \quad 0 \\ 2 \mid 1 \quad 0 \\ \quad 0 \quad 1 \end{array}$$

Bits operations

↳ 1 → Bitwise OR

$$1 \mid 0 = 1$$

$$1 \mid 1 = 1$$

$$0 \mid 1 = 1$$

$$0 \mid 0 = 0$$

↳ 0 → Bitwise AND

$$0 \& 0 \rightarrow 0$$

$$0 \& 1 \rightarrow 0$$

$$1 \& 0 \rightarrow 0$$

$$1 \& 1 \rightarrow 1$$

$$x \& 0 \rightarrow 0$$

$$\underline{1} \quad \underline{0} \quad \underline{1} \quad \underline{1} \rightarrow 11$$

$$\begin{array}{r} 1 \quad 0 \quad 0 \quad 0 \rightarrow 8 \\ \hline 1 \quad 0 \quad 1 \quad 1 \rightarrow 11 \\ 1011 \mid 1100 \end{array}$$

cb.lk/dp sheet

$$\begin{array}{ccccccc} 1 & 0 & 1 & 1 & 0 & 0 & \\ \wedge & \wedge & \wedge & \wedge & \wedge & \wedge & \end{array}$$

$$x \text{ b } 0 \rightarrow 0$$

$$\begin{array}{r} 101100 \\ 000001 \\ \hline 000001 \end{array}$$

↳ \wedge \rightarrow Bitwise XOR

$$0 \wedge 0 \rightarrow 0$$

$$0 \wedge 1 \rightarrow 1$$

$$1 \wedge 0 \rightarrow 1$$

$$1 \wedge 1 \rightarrow 0$$

$$\begin{array}{r} 101011 \\ 000000 \\ \hline 101011 \end{array}$$

$$x \wedge x \rightarrow 0$$

$$x \wedge 0 \rightarrow x$$

$$\begin{array}{r} 101011 \\ \wedge 000001 \\ \hline 101010 \end{array}$$

↳ Left Shift

$$x \ll \underbrace{2}_b$$

$$x \times 2^b$$

$$x00$$

$$\begin{array}{c} 2 \ll 2 \\ \downarrow \end{array}$$

$$10 \ll 2 \Rightarrow 1000$$

8

$$\begin{array}{c} 11 \ll 2 \\ \cup \\ 3 \end{array}$$

$$110 \rightarrow 6$$

$$1100 \rightarrow 12$$

Right Shift

$$x \gg _$$

$$\begin{matrix} & 5 & 4 & 3 & 2 & 1 & 0 \\ (1 & 1 & 1 & 0 & 0 & 1) \end{matrix} \gg 2 = (1110)_2$$

$$\underline{\underline{14}}$$

[0, 1, 1, 3, 2, 0, 2]