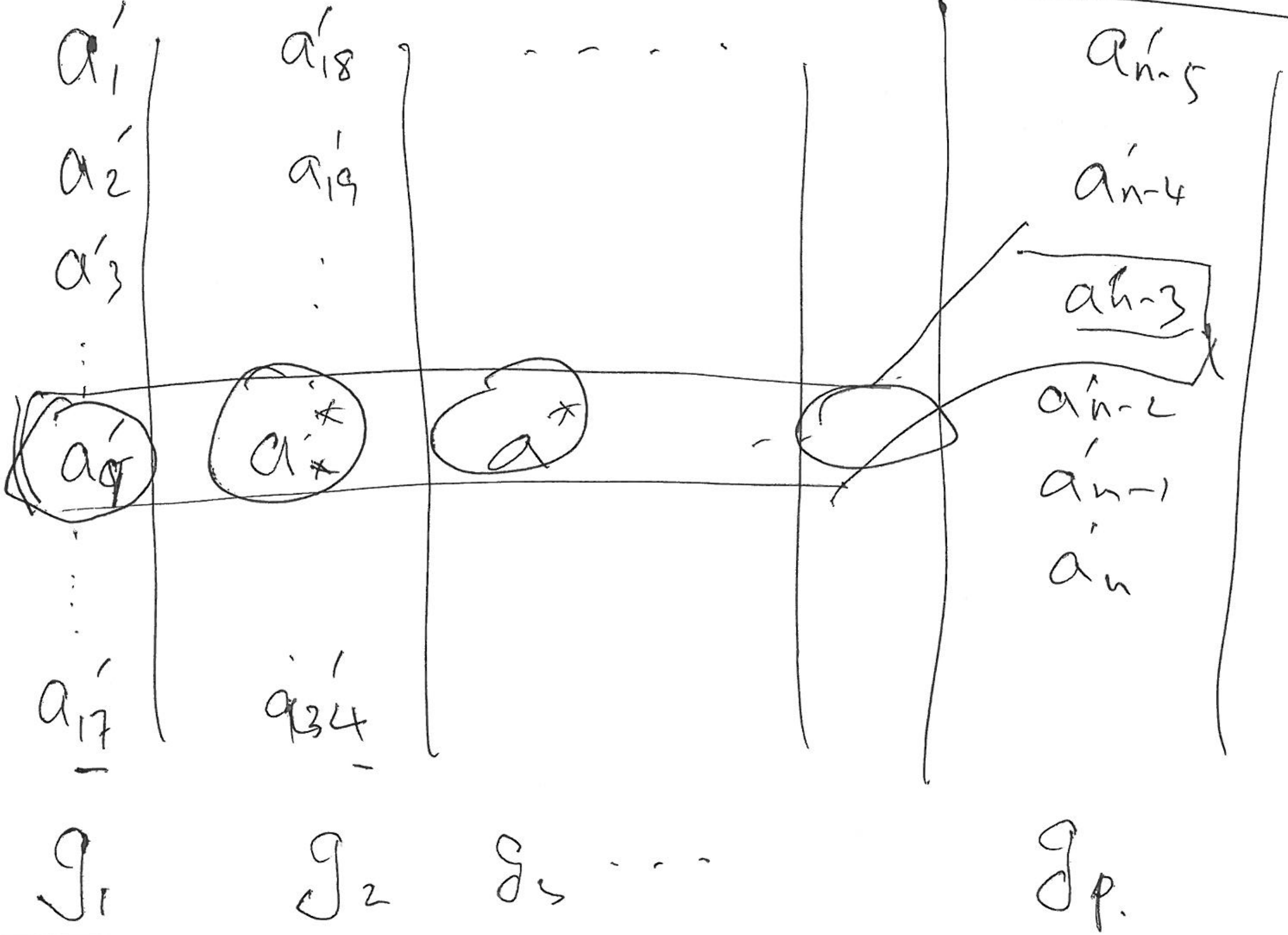
1. Divide & Conqure.

2. Dynamic Programing.

3. Greedy Policy.



$p = \lceil \frac{n}{17} \rceil$

$p \cdot O(1) = O(p)$
$= O(n)$

8

· Median sequence $\lceil \frac{n}{17} \rceil$ $T(n)$

$a_q' \quad a_x^* \quad a_i' \quad \cdots \quad a_{n-3}'$ * the median x

$R_1 = \{a_i \mid a_i < x\}$ $T(\lceil \frac{n}{17} \rceil)$

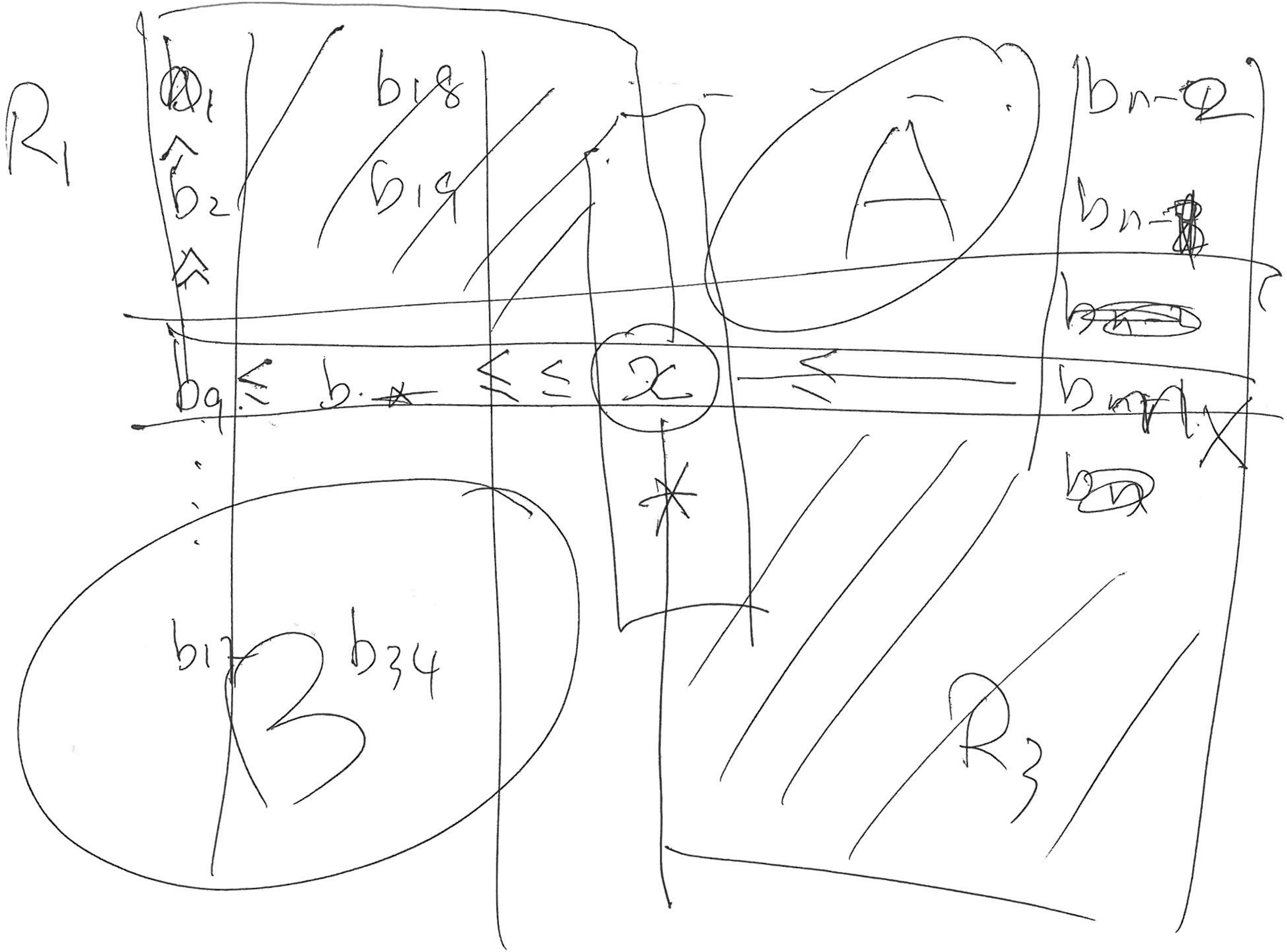
$R_2 = \{a_i \mid a_i = x\}$

$R_3 = \{a_i \mid a_i > x\}$ $O(n)$

$\max\{T(|R_1|), T(|R_3|)\}$

$|R_1| \le ?$ $|R_3| \le ?$

3



4

$$|R_3| \geq 9\left(\frac{\lceil \frac{n}{17} \rceil}{2} - 2\right)$$

$$\geq 9\left(\frac{n}{2 \times 17} - 2\right)$$

$$|R_3| \geq \frac{9n}{34} - 18$$

$$|R_1| = n - |A| - |B| - |R_3| \leq n - |R_3|$$

$$\leq n - \left(\frac{9n}{34} - 18\right)$$

$$= \frac{(34-9)n}{34} + 18 = \frac{25n}{34} + 18$$

$$T(n) = \left\lceil \frac{n}{17} \right\rceil O(1) + T\left(\left\lceil \frac{n}{17} \right\rceil\right) + cn \quad 5$$

$$+ \max(T(R_1), T(R_3))$$

$$T(n) = T\left(\left\lceil \frac{n}{17} \right\rceil\right) + T\left(\frac{25n}{34} + 18\right) + an.$$

---

iSpell | Edit distance | 1 match
-1 mismatch
-2 for a gap

Snowy
Sunny

S_NOWY	_SNOW_Y
SUNN_Y	SUN__NY
1 -2 1 -1 -2 1 = -2	-2 -1 1 -2 -2 -2 1
	= -7

(6)

$X_i = x_1 x_2 \cdots x_i$

$Y_j = y_2 y_2 \cdots y_j$

$$C(i,j) = \begin{cases} -2|Y_j| & i=0 \\ -2|X_i| & j=0 \\ C(i-1,j-1)+1 & x_i = y_j \\ \max\{\cancel{C(i-1,j)-1},\ C(i,j)-1\} & x_i \neq y_j \\ \max\begin{cases} C(i,j-1)-2 & y_j \text{ align with a gap?} \\ C(i-1,j)-2 & x_i \text{ align with} \end{cases} \end{cases}$$

$x_1 \cdots x_i$

$y_1 \cdots y_j$

$O(m \cdot n)$ $\quad \underline{C(m,n)}$ $\quad X_m \quad Y_n$

Index matrix

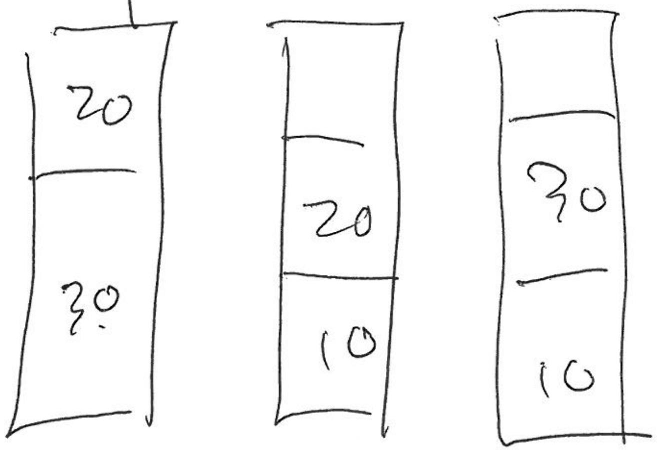
Container 50 Kilo

jewry price, weight

P_i W_i

	item 1	item 2	item 3
W_i	10	20 kilo	30 kilo
P_i	\$60	\$100	\$120.

$= \dfrac{P_i}{W_i}$



\$220 \$160 \$180

item 1	item 2	item 3
6	5	4
10	20	20
\$60	\$100	\$80

\$240

(8)

Contradiction method

assume that this solution is not optimal.

let $OPT = I_{i_1}, I_{i_2} \ldots I_{i_k}$ be the optimal solution.

$J_1 \; J_2 \; J_x \; J_L$ — our solution

p_ℓ, w_ℓ. J_ℓ in our solution

be the 1st item is not in the optimal solution

$$OPT' = OPT + \{J_\ell\} - I'_{i\ell}(w_\ell)$$

$$> OPT + \frac{p_\ell}{w_\ell} - \frac{p'_{i\ell}}{w'_{i\ell}} * w_\ell \geq 0$$

$p'_{i\ell}/w'_{i\ell} * w'_{i\ell}$