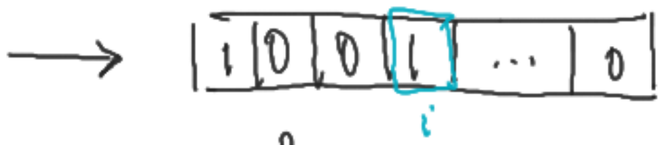
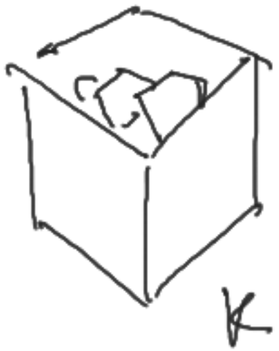
Knapsack n items, pesos w_i, valor v_i $i = 1, \dots, n$

$X = \{a_1, a_2, \dots, a_n\}$





1 = elegir a_i
0 = no elegir a_i

$S = \{$cadenas de 0's y 1's de tamaño $n\} = \{0,1\}^n$

$S = 2^X$
$= \{$subconj. de $X\}$

$|S| = 2^n$

Acciones: elegir i
agregar un item a_i $0 \to 1$
quitar algun a_i $1 \to 0$

$f: S \times A \to S$

Restricciones: $\sum_{i \in S} w_i \leq K$.

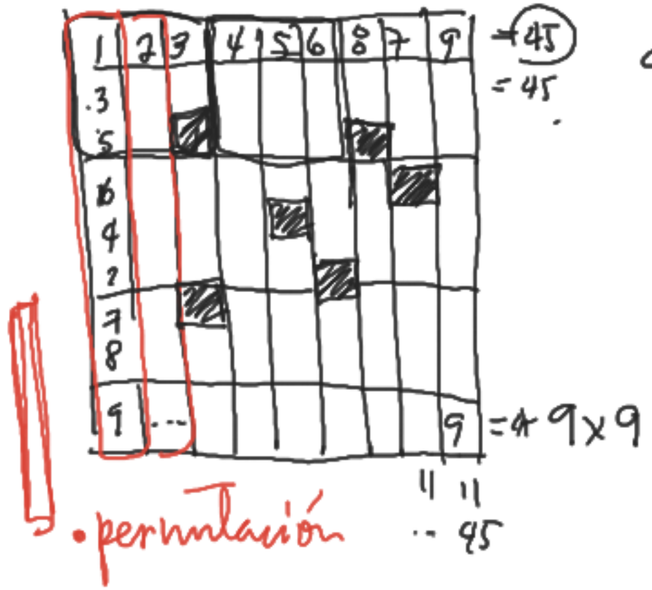
Objetivo: maximizar $\sum_i x_i v_i$

Costo: $\sum_i x_i w_i$

$$\left(\sum_i x_i w_i - K\right)_+ = \begin{cases} 0, & \sum x_i w_i \leq K \\ \sum x_i w_i - K, & \sum x_i w_i - K > 0 \end{cases}$$

$$\sum_i (1-x_i) v_i = \sum_{i \notin x} v_i = \cancel{T} - \sum_i x_i v_i$$

$$-\sum_i x_i v_i$$



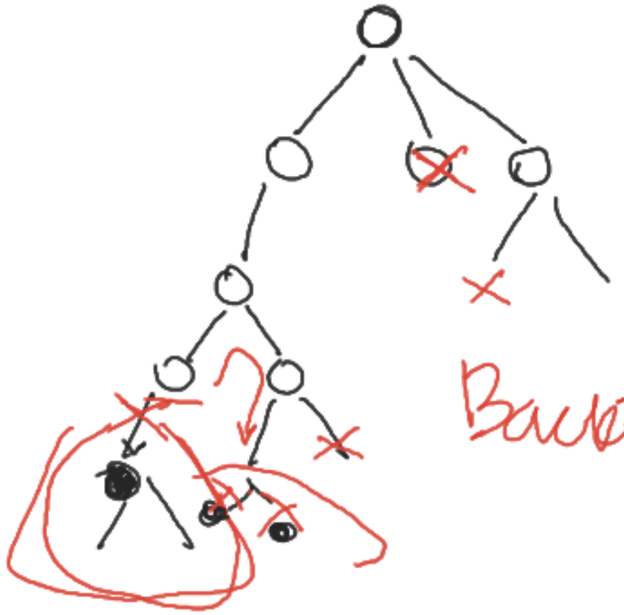
$S = \{\text{tableros } 9\times 9 \text{ con dígitos del 1 al 9}\}$

$|S| = 9^{81} \approx 1.9 \times 10^{77}$

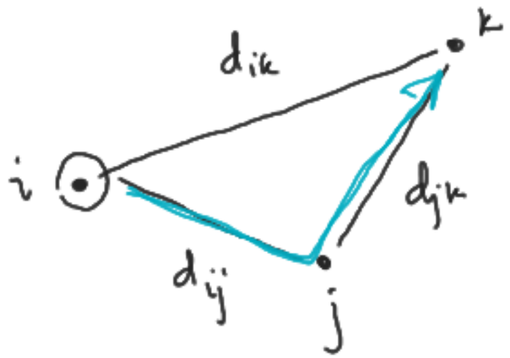
$S = \{ P_1^9 \text{ 1ª col.}\} \times \{ P_1^9 \text{ 2ª col.}\} \times \dots \times$

$|S| = (9!) \times (9!) \times \dots \times (9!)$

$= (9!)^9 \simeq 1 \times 10^{50}$



Backtracking DFS



$$d_{ij} + d_{jk} < d_{ik}$$