

Algoritmo de Bellman - Ford

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- Se va aumentando el número de saltos permitido
 - Si no hay canal directo: $C_{ij} = \infty$
 - D_i^h : Distancia del camino del nodo i al nodo destino (1) con un máximo de h saltos

$$D_1^h = 0, \forall h$$

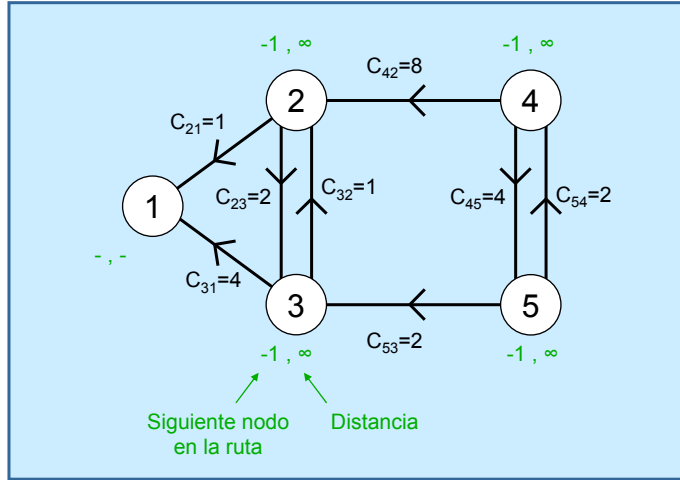
- Se busca:

$$D_i^h = \min_{j \in N(i)} \left[C_{ij} + D_j^{h-1} \right]$$

- $N(i)$: Lista de nodos con canal directo desde (backward) /hasta (forward) el nodo i
- Inicio: $D_i^0 = \infty, \forall i \neq 1$
- Acaba si: $D_i^h = D_i^{h-1}, \forall i$

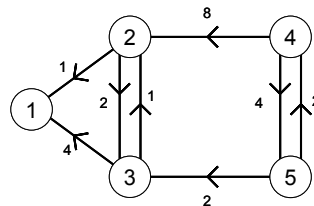
Ejemplo

h=0



Ejemplo

$$h=1 \quad D_i^1 = \min_{j \in N(i)} [C_{ij} + D_j^0]$$



$$D_2^1 = \min_{j \in \{1,3\}} [C_{2j} + D_j^0] = \min[1+0, 2+\infty] = 1 \quad \bullet$$

$$D_3^1 = \min_{j \in \{1,2\}} [C_{3j} + D_j^0] = \min[4+0, 1+\infty] = 4 \quad \bullet$$

$$D_4^1 = \min_{j \in \{2,5\}} [C_{4j} + D_j^0] = \min[8+\infty, 4+\infty] = \infty$$

$$D_5^1 = \min_{j \in \{3,4\}} [C_{5j} + D_j^0] = \min[2+\infty, 2+\infty] = \infty$$

Anterior

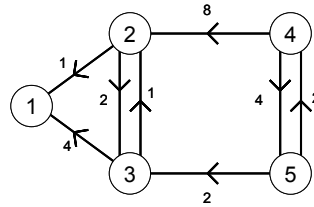
Nodo	Ruta	Dist.
2	-1	∞
3	-1	∞
4	-1	∞
5	-1	∞

Nueva

Nodo	Ruta	Dist.
2	1	1
3	1	4
4	-1	∞
5	-1	∞

Ejemplo

$$h=2 \quad D_i^2 = \min_{j \in N(i)} [C_{ij} + D_j^1]$$



$$D_2^2 = \min_{j \in \{1,3\}} [C_{2j} + D_j^1] = \min[1+0, 2+4] = 1$$

$$D_3^2 = \min_{j \in \{1,2\}} [C_{3j} + D_j^1] = \min[4+0, 1+1] = 2$$

$$D_4^2 = \min_{j \in \{2,5\}} [C_{4j} + D_j^1] = \min[8+1, 4+\infty] = 9$$

$$D_5^2 = \min_{j \in \{3,4\}} [C_{5j} + D_j^1] = \min[2+4, 2+\infty] = 6$$

Anterior

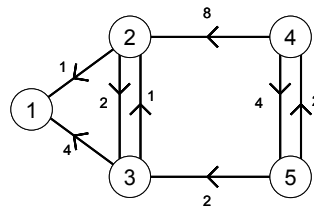
Nodo	Ruta	Dist.
2	1	1
3	1	4
4	-1	∞
5	-1	∞

Nueva

Nodo	Ruta	Dist.
2	1	1
3	2	2
4	2	9
5	2	6

Ejemplo

$$h=3 \quad D_i^3 = \min_{j \in N(i)} [C_{ij} + D_j^2]$$



$$D_2^3 = \min_{j \in \{1,3\}} [C_{2j} + D_j^2] = \min[1+0, 2+2] = 1$$

$$D_3^3 = \min_{j \in \{1,2\}} [C_{3j} + D_j^2] = \min[4+0, 1+1] = 2$$

$$D_4^3 = \min_{j \in \{2,5\}} [C_{4j} + D_j^2] = \min[8+1, 4+6] = 9$$

$$D_5^3 = \min_{j \in \{3,4\}} [C_{5j} + D_j^2] = \min[2+2, 2+9] = 4$$

Anterior

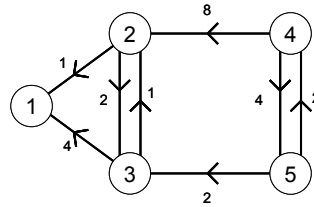
Nodo	Ruta	Dist.
2	1	1
3	2	2
4	2	9
5	2	6

Nueva

Nodo	Ruta	Dist.
2	1	1
3	2	2
4	2	9
5	3	4

Ejemplo

$h=4 \quad D_i^4 = \min_{j \in N(i)} [C_{ij} + D_j^3]$



$$D_2^4 = \min_{j \in \{1,3\}} [C_{2j} + D_j^3] = \min [1+0, 2+2] = 1$$

$$D_3^4 = \min_{j \in \{1,2\}} [C_{3j} + D_j^3] = \min [4+0, 1+1] = 2$$

$$D_4^4 = \min_{j \in \{2,5\}} [C_{4j} + D_j^3] = \min [8+1, 4+4] = 8$$

$$D_5^4 = \min_{j \in \{3,4\}} [C_{5j} + D_j^3] = \min [2+2, 2+9] = 4$$

Anterior

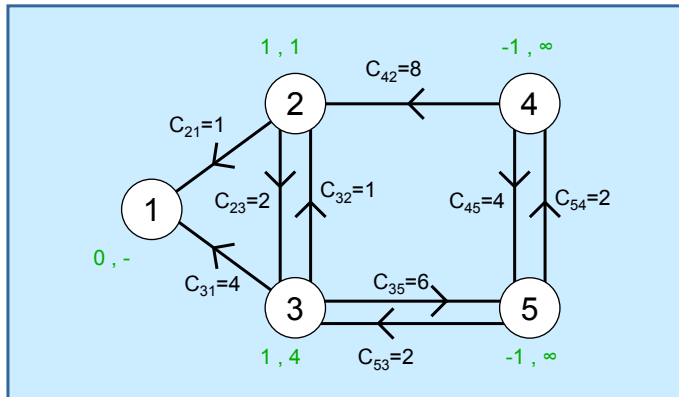
Nodo	Ruta	Dist.
2	1	1
3	2	2
4	2	9
5	3	4

Nueva

Nodo	Ruta	Dist.
2	1	1
3	2	2
4	5	8
5	3	4

Ejemplo distribuido

$h=1$



Ejemplo distribuido

