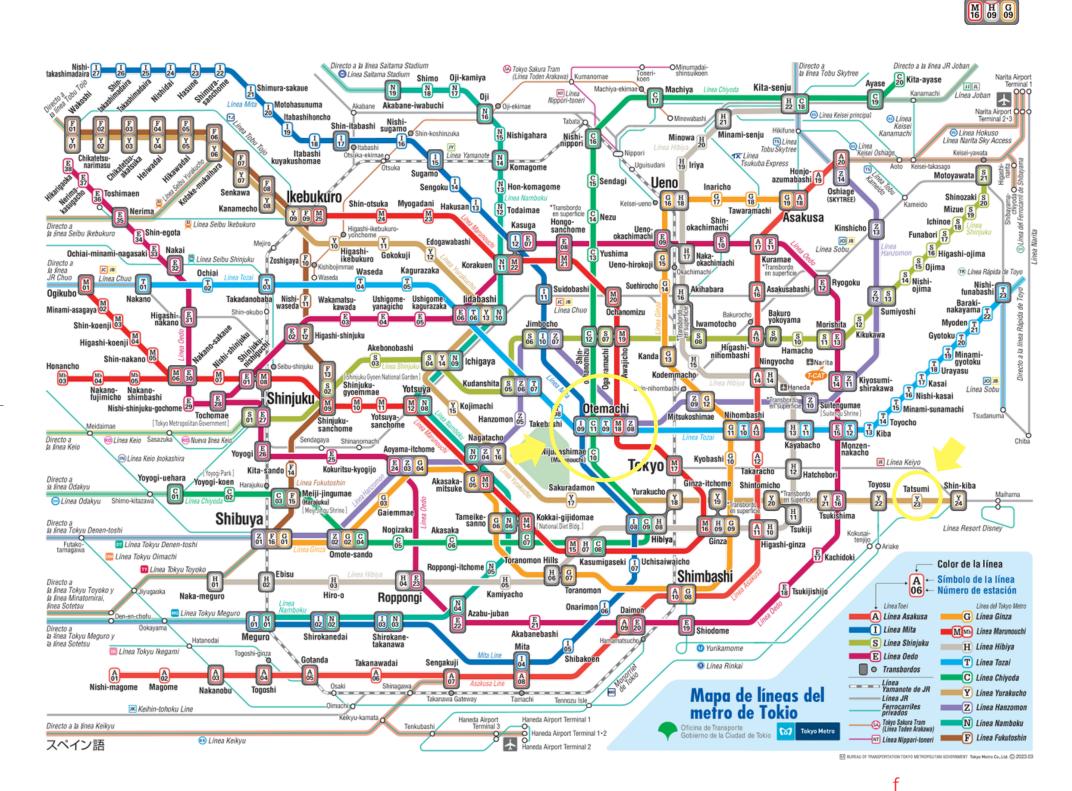
Ejercicio de búsqueda - Metro de Tokio

El objetivo es partir desde la estación Tatsumi y llegar a la estación Otemachi, recorriendo la menor cantidad de paradas posibles evitando trasbordos largos, indicados en el mapa de la siguiente manera:



$$E = \{ \} F = \{ \begin{bmatrix} Y \\ 23 \end{bmatrix} \} T(\begin{bmatrix} Y \\ 23 \end{bmatrix}) = F$$

$$E = \{ \begin{array}{c} 7 \\ 23 \\ 0 \end{array} \} \quad F = \{ \begin{array}{c} 9 \\ 24 \\ 24 \\ Y \\ 1 \end{array} , \begin{array}{c} 7 \\ 22 \\ Y \\ 1 \end{array} \} \quad T(\begin{array}{c} Y \\ 22 \\ Y \\ 1 \end{array}) = F$$

$$E = \{ \begin{array}{c} 7 \\ 23 \end{array}, \begin{array}{c} 7 \\ 22 \end{array} \} \quad F = \{ \begin{array}{c} 9 \\ 24 \end{array}, \begin{array}{c} 7 \\ 21 \end{array} \} \quad T(\begin{array}{c} Y \\ 21 \end{array}) = F$$

$$E = \{ \begin{array}{c} 7 \\ 23 \end{array}, \begin{array}{c} 7 \\ 22 \end{array}, \begin{array}{c} 7 \\ 21 \end{array}, \begin{array}{c} 7 \\ 21 \end{array} \} \quad F = \{ \begin{array}{c} 9 \\ 24 \end{array}, \begin{array}{c} 9 \\ 16 \end{array}, \begin{array}{c} 7 \\ 20 \end{array}, \begin{array}{c} 7 \\ 20 \end{array} \} \quad T(\begin{array}{c} Y \\ 20 \end{array}) = F$$

$$E = \{ \underbrace{Y}_{23}^{7}, \underbrace{Y}_{122}^{7}, \underbrace{Y}_{201}^{7}, \underbrace{Y}_{201}^{7} \} \quad F = \{ \underbrace{Y}_{24}^{9}, \underbrace{F}_{16}^{9,5}, \underbrace{H}_{11}^{12}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{19}^{7} \} \quad T(\underbrace{Y}_{19}) = F$$

$$E = \{ \underbrace{\frac{Y}{23}}_{0.7}^{7}, \underbrace{\frac{Y}{22}}_{1.623}^{7}, \underbrace{\frac{Y}{21}}_{2.522}^{7}, \underbrace{\frac{Y}{20}}_{3.421}^{7}, \underbrace{\frac{Y}{19}}_{4.320}^{7} \} \quad F = \{ \underbrace{\frac{Y}{24}}_{1.823}^{9}, \underbrace{\frac{F}{16}}_{3.6,521}^{9}, \underbrace{\frac{H}{11}}_{4.820}^{7}, \underbrace{\frac{H}{11}}_{5.521}^{7}, \underbrace{\frac{$$

$$E = \{ \begin{array}{c} Y \\ 23 \end{array}, \begin{array}{c} Y \\ 22 \end{array}, \begin{array}{c} Y \\ 21 \end{array}, \begin{array}{c} Y \\ 20 \end{array}, \begin{array}{c} Y \\ 20 \end{array}, \begin{array}{c} Y \\ 18 \end{array}, \begin{array}{c} Y \\ 18 \end{array} \}$$

$$E = \{ \underbrace{Y}_{23}^{7}, \underbrace{Y}_{22}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{20}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{18}^{7}, \underbrace{Y}_{24}^{9}, \underbrace{Y}_{3}^{9} \}$$

$$F = \{ \underbrace{F}_{16}^{9,5}, \underbrace{H}_{11}^{12}, \underbrace{M}_{16}^{10}, \underbrace{H}_{5}^{10}, \underbrace{G}_{19}^{11}, \underbrace{G}_{619}^{11}, \underbrace{G}_{619}^{10}, \underbrace{G}_{619}^{10}, \underbrace{G}_{619}^{10}, \underbrace{G}_{619}^{11}, \underbrace{G$$

$$E = \{ \begin{array}{c} Y \\ 23 \end{array}, \begin{array}{c} Y \\ 22 \end{array}, \begin{array}{c} Y \\ 21 \end{array}, \begin{array}{c} Y \\ 21 \end{array}, \begin{array}{c} Y \\ 20 \end{array}, \begin{array}{c} Y \\ 19 \end{array}, \begin{array}{c} Y \\ 18 \end{array}, \begin{array}{c} Y \\ 24 \end{array}, \begin{array}{c} Y \\ 17 \end{array}, \begin{array}{c} Y \\ 17 \end{array} \}$$

$$F = \{ \underbrace{F}_{16}, \underbrace{F}_{11}, \underbrace{H}_{11}, \underbrace{M}_{16}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{15}, \underbrace{H}_{16}, \underbrace{H}_{15}, \underbrace{H}_{16}, \underbrace{H}_{15}, \underbrace{H}_{16}, \underbrace{H}_{15}, \underbrace{H}_{16}, \underbrace{H$$

Algoritmo (a igual coste) -> FIFO

Coste

 $g = N^{\circ}$ de paradas hasta el destino

Heurística

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E = \{ (\underbrace{Y}_{23})^{7}, \underbrace{Y}_{22}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{18}^{7}, \underbrace{Y}_{24}^{7}, \underbrace{Y}_{17}^{7}, \underbrace{F}_{16}^{9}, \underbrace{F}_{16}^{
                         F = \{ \begin{array}{c} 12 \\ H \\ 11 \\ Y \end{array}, \begin{array}{c} 10 \\ 16 \\ Y \end{array}, \begin{array}{c} 11 \\ 09 \\ Y \end{array}, \begin{array}{c} 11 \\ 15 \\ 15 \end{array}, \begin{array}{c} 10 \\ 17 \\ 15 \end{array} \right\} \quad T(\frac{E}{15}) = F
                             E = \{ \underbrace{Y}_{23}^{7}, \underbrace{Y}_{22}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{21}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{18}^{7}, \underbrace{Y}_{17}^{7}, \underbrace{Y}_{17}^{7}, \underbrace{F}_{16}^{9}, \underbrace{F}_{15}^{15}, 
                     F = \{ \underbrace{H}_{11}^{12}, \underbrace{M}_{16}^{10}, \underbrace{H}_{16}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{18}^{11}, \underbrace{G}_{
                         E = \{ \underbrace{Y}_{23}, \underbrace{Y}_{22}, \underbrace{Y}_{21}, \underbrace{Y}_{21}, \underbrace{Y}_{20}, \underbrace{Y}_{19}, \underbrace{Y}_{18}, \underbrace{Y}_{19}, \underbrace{Y}_{17}, \underbrace{Y}_{17}, \underbrace{F}_{16}, \underbrace{F}_{14}, \underbrace{F}_{16}, \underbrace{F
                     F = \{ \begin{array}{c} 12 \\ H \\ 11 \\ Y \end{array}, \begin{array}{c} 10 \\ H \\ 16 \\ Y \end{array}, \begin{array}{c} 11 \\ 09 \\ Y \end{array}, \begin{array}{c} 11 \\ 09 \\ Y \end{array}, \begin{array}{c} 10 \\ 08 \\ Y \end{array}, \begin{array}{c} 11 \\ 09 \\ Y \end{array}, \begin{array}{c} 11 \\ 08 \\ Y \end{array}, \begin{array}{c} 11 \\ 10 \\ 17 \end{array}, \begin{array}{c} 11 \\ 17 \\ 17 \end{array}, \begin{array}{c} 11 \\ 17 \\ 17 \end{array}, \begin{array}{c} 11 \\ 12 \\ 17 \end{array}, \begin{array}{c} 11 \\ 13 \\ 13 \end{array}, \begin{array}{c} 11 \\ 11 \\ 11 \end{array}, \begin{array}{c} 10,5 \\ 13 \\ 11 \end{array} \} \quad T(\begin{array}{c} T \\ 12 \end{array}) = F
                E = \{ \underbrace{Y}_{23}, \underbrace{Y}_{22}, \underbrace{Y}_{21}, \underbrace{Y}_{21}, \underbrace{Y}_{20}, \underbrace{Y}_{19}, \underbrace{Y}_{18}, \underbrace{Y}_{12}, \underbrace{Y}_{17}, \underbrace{Y}_{17}, \underbrace{F}_{16}, \underbrace{F}_{14}, \underbrace{F}_{16}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{15}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{15}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{15}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{15}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{13}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{14}, \underbrace{F}_{15}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F}_{12}, \underbrace{F}_{13}, \underbrace{F
    F = \{ \begin{bmatrix} H \\ 11 \\ Y \end{bmatrix}, \begin{bmatrix} M \\ 16 \\ Y \end{bmatrix}, \begin{bmatrix} H \\ 09 \\ Y \end{bmatrix}, \begin{bmatrix} 11 \\ 08 \\ Y \end{bmatrix}, \begin{bmatrix} 11 \\ 08 \\ Y \end{bmatrix}, \begin{bmatrix} 11 \\ 11 \\ 08 \end{bmatrix}, \begin{bmatrix} 11 \\ 12 \\ 13 \end{bmatrix}, \begin{bmatrix} 10 \\ 13 \\ 14 \end{bmatrix}, \begin{bmatrix} 10 \\ 13 \\ 14 \end{bmatrix}, \begin{bmatrix} 10 \\ 13 \\ 14 \end{bmatrix}, \begin{bmatrix} 10 \\ 13 \\ 13 \end{bmatrix}, \begin{bmatrix} 10 \\ 1
            E = \{ \underbrace{Y}_{23}, \underbrace{Y}_{22}, \underbrace{Y}_{21}, \underbrace{Y}_{20}, \underbrace{Y}_{19}, \underbrace{Y}_{19}, \underbrace{Y}_{17}, \underbrace{Y}_{17}, \underbrace{F}_{16}, \underbrace{F}_{11}, \underbrace{F}_{12}, \underbrace{F}_{11}, \underbrace{F}_{11}, \underbrace{F}_{11}, \underbrace{F}_{11}, \underbrace{F}_{11}, \underbrace{F}_{11}, \underbrace{F}_{12}, \underbrace{F
F = \{ \underbrace{H}_{11}^{12}, \underbrace{M}_{16}^{10}, \underbrace{H}_{10}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{18}^{10}, \underbrace{G}_{18}^{10}, \underbrace{G}_{18}^{11}, \underbrace{G}_{
        E = \{ \underbrace{Y}_{23}, \underbrace{Y}_{22}, \underbrace{Y}_{21}, \underbrace{Y}_{21}, \underbrace{Y}_{20}, \underbrace{Y}_{19}, \underbrace{Y}_{18}, \underbrace{Y}_{18}, \underbrace{Y}_{17}, \underbrace{Y}_{17}, \underbrace{Y}_{16}, \underbrace{F}_{16}, \underbrace{F}_{14}, \underbrace{F}_{14}, \underbrace{F}_{14}, \underbrace{F}_{12}, \underbrace{F}_{11}, \underbrace{F}_{10}, \underbrace{F}_{10}, \underbrace{F}_{10}, \underbrace{F}_{11}, \underbrace{F}_{10}, \underbrace{F
    F = \{ \begin{matrix} 12 \\ 11 \\ 11 \end{matrix}, \begin{matrix} M \\ 16 \\ 19 \end{matrix}, \begin{matrix} M \\ 17 \end{matrix}, \begin{matrix} M \\ 16 \\ 19 \end{matrix}, \begin{matrix} M \\ 16 \end{matrix}, \begin{matrix} M \\ 17 \end{matrix}, \begin{matrix} M \\ 16 \end{matrix}, \begin{matrix} M \\ 17 \end{matrix}, \begin{matrix} M \\ 13 \end{matrix}, \begin{matrix} M \\ 10 \end{matrix}, \begin{matrix} M
        E = \{\underbrace{Y}_{23}^{7}, \underbrace{Y}_{121}^{7}, \underbrace{Y}_{121}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{19}^{7}, \underbrace{Y}_{18}^{7}, \underbrace{Y}_{17}^{7}, \underbrace{Y}_{15}^{7}, \underbrace{E}_{16}^{8}, \underbrace{E}_{14}^{9}, \underbrace{E}_{15}^{9}, \underbrace{E}_{11}^{11}, \underbrace{E}_{15}^{10}, \underbrace{E}_{11}^{11}, \underbrace{E}_{15}^{10}, \underbrace{E}_{14}^{11}, \underbrace{E}_{15}^{11}, 
    F = \{ \underbrace{H}_{11}^{12}, \underbrace{M}_{16}^{10}, \underbrace{H}_{16}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{19}^{10}, \underbrace{G}_{19}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{19}^{11}, \underbrace{G}_{18}^{11}, \underbrace{G}_{11}^{11}, \underbrace{G}_{
                                      Solución: \begin{bmatrix} Y \\ 23 \end{bmatrix} \begin{bmatrix} Y \\ 22 \end{bmatrix}
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