Algoritmo A*

Fecha:15-may.-20

La búsqueda A* emplea una función matemática a fin de seleccionar el camino que tenga el menor coste posible.Para este caso se va a tratar este algoritmo heurístico, ya que una de sus principales características es que hará uso de una función de evaluación heurística, mediante la cual etiquetará los diferentes nodos de la red .Donde:

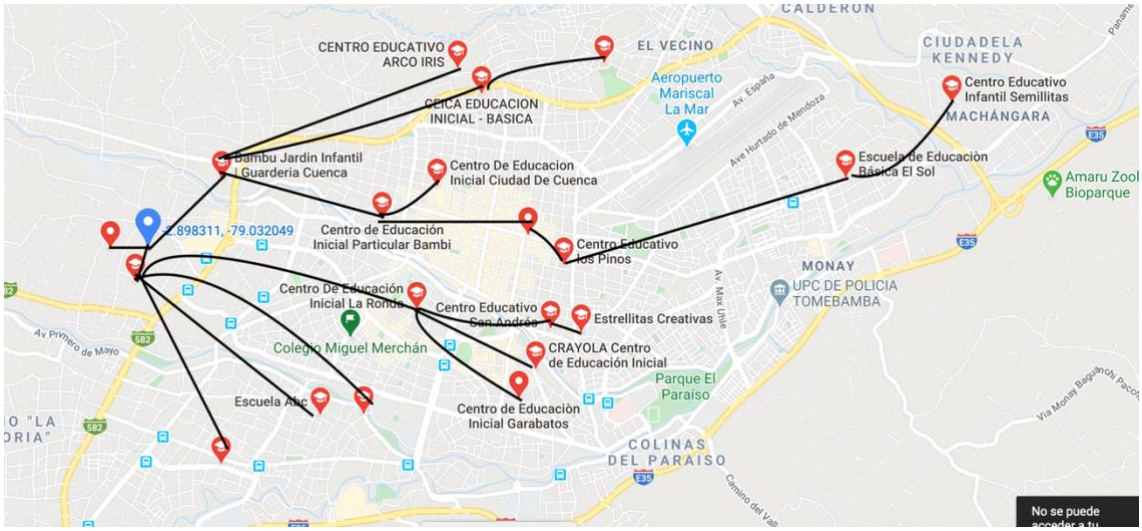
- **f(n)** = es el **estimador del camino** de menor coste (considerado desde el **estado inicial** hasta un nodo meta pasando por el nodo **n**).
- **g(n)** = es el **coste del camino real** hasta el nodo **n**.
- **h(n)** = es la **estimación del coste** de llegar a un estado meta desde el nodo **n**.

Datos

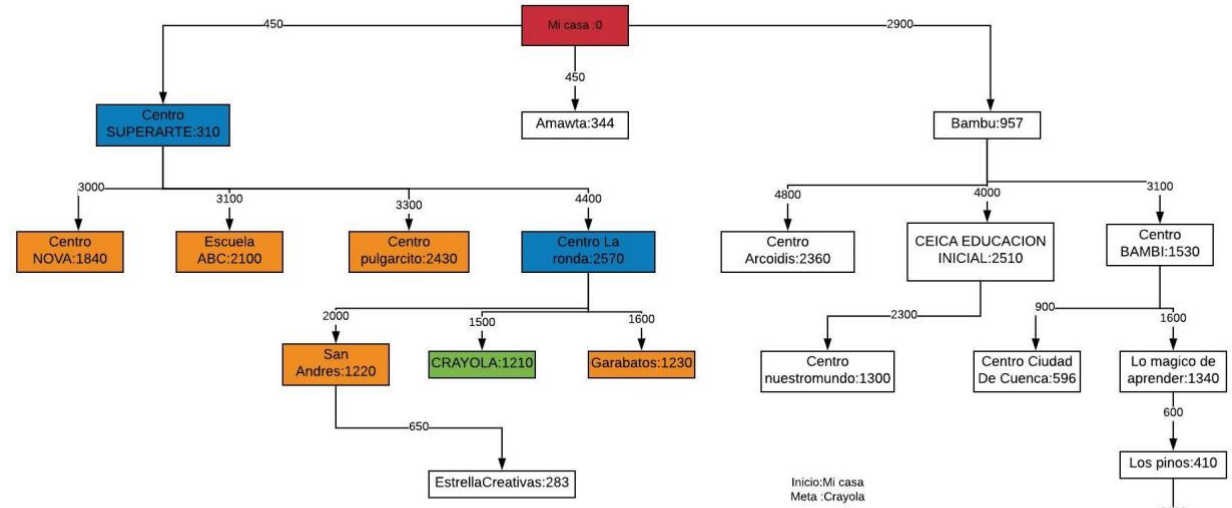
A: Mi casa latitud:-2,898311 Longitud :-79,032049

B: Centro SUPERARTE G(N)=450 H(N)=310 -2.900910, -79.033094
C: Amawta G(n)=450 H(N)=344. -2.898207, -79.035169
D: Bambu G(N)=2900 H(N)=947 -2.892361, -79.025931
E: Centro NOVA G(N)=3000 H(N)=1840 -2.915944, -79.026007
F: Escuela ABC G(N)=3100 H(N)=2100 -2.911994, -79.017732
G: Centro pulgarcito G(N)=3300 H(N)=2430 -2.911914, -79.014101
H: Centro La ronda g(n)=4400 H(N)=2570 -2.903254, -79.009732
I: Centro Arcoidis g(n)=4800 H(N)=2360 -2.883258, -79.006340
J: CEICA EDUCACION INICIAL g(n)=4000 H(N)=2510 -2.885337, -79.004307
K: Centro BAMBI G(N)=3100 H(N)=1530 -2.895763, -79.012603
L: Centro nuestromundo g(n)=2300 H(N)=1300 -2.882824, -78.994116
M: Centro Ciudad De Cuenca g(n)=900 H(N)=596 -2.893036, -79.008021
N: Lo magico de aprender g(n)=1600 H(N)=1340 -2.897035, -79.000471
O: Los pinos g(n)=600 H(N)=410 -2.899513, -78.997458
P: El sol g(n)=3000 H(N)=2710 -2.892296, -78.974039
Q: Centro cemillitas g(n)=3500 H(N)=1210 -2.886132, -78.965160
R: Garabatos g(n)=1600 H(N)=1230 -2.910659, -79.001201
S: CRAYOLA g(n)=1500 H(N)=1210 -2.908137, -78.999805
T: San Andres g(n)=2000 H(N)=1220 -2.904806, -78.998562
U: Estrella Creativas g(n)=650 H(N)=283 -2.905164, -78.996023

Grafica Google



Algoritmo A*



Inicio:Mi casa
Meta :Crayola

A: Mi casa latitud:-2,898311Longitud :-79,032049
B: Centro SUPERARTE G(N)=450H(N)=310 -2.900910, -79.033094
C: Amawta G(n)=450 H(N)=344. -2.898207, -79.035169
D: Bambu G(N)=2900 H(N)=947 -2.892361, -79.025931
E: Centro NOVA G(N)=3000 H(N)=1840 -2.915944, -79.026007
F: Escuela ABC G(N)=3100 H(N)=2100 -2.911994, -79.017732
G: Centro pulgarcito G(N)=3300 H(N)=2430 -2.911914, -79.014101
H: Centro La ronda g(n)=4400 H(N)=2570 -2.903254, -79.009732
I: Centro Arcoidis g(n)=4800 H(N)=2360 -2.883258, -79.006340
J: CEICA EDUCACION INICIAL g(n)=4000 H(N)=2510 -2.885337, -79.004307
K: Centro BAMBI G(N)=3100 H(N)=1530 -2.895763, -79.012603
L: Centro nuestromundo g(n)=2300H(N)=1300 -2.882824, -78.994116
M: Centro Ciudad De Cuenca g(n)=900H(N)=596 -2.893036, -79.008021
N: Lo magico de aprender g(n)=1600H(N)=1340 -2.897035, -79.000471
O: Los pinos g(n)=600 H(N)=410 -2.899513, -78.997458
P: El sol g(n)=3000 H(N)=2710 -2.892296, -78.974039
Q: Centro cemillitas g(n)=3500 H(N)=1210 -2.886132, -78.965160
R: Garabatos g(n)=1600 H(N)=1230 -2.910659, -79.001201
S: CRAYOLA g(n)=1500 H(N)=1210-2.908137, -78.999805
T: San Andres g(n)=2000 H(N)=1220 -2.904806, -78.998562
U: Estrella Creativas g(n)=650 H(N)=283 -2.905164, -78.996023

Desarollo:
A-B=450+310=760
A-C=450+344=795
A-D=2900+957=3857
Cola={Centro SUPERARTE(760) ,Amawta(795) ,Bambu(3857)}
Visitado={Mi casa}

A-B-E=450+(3000+1840)=5290 f
A-B-F=450+(3100+2100)=5650 f
A-B-G=450+(3300+2430)=6180 f
A-B-H=450+(4400+2570)=7420
A-C=450+344=795
A-D=2900+957=3857
Cola={Amawta(795) ,Bambu(3857),Centro NOVA (5290),Escuela ABC(5650) ,Centro pulgarcito(6180) ,Centro La ronda(7420)}
Visitado={Mi casa,Centro SUPERARTE}

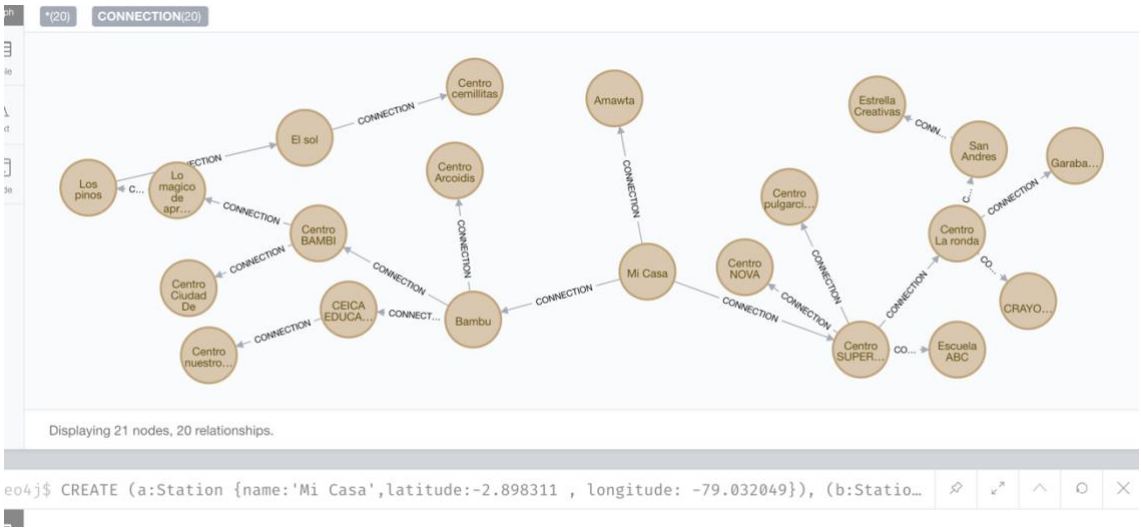
A-B-H-T=450+(4400+(2000+1220))=8070f
A-B-H-S=450+(4400+(1500+1210))=7560R
A-B-H-R=450+(4400+(1600+1230))=7680f
A-B-E=450+(3000+1840)=5290 f
A-B-F=450+(3100+2100)=5650 f
A-B-G=450+(3300+2430)=6180 f
A-C=450+344=795
A-D=2900+957=3857
Cola={Amawta(795) ,Bambu(3857),Centro NOVA (5290),Escuela ABC(5650) ,Centro pulgarcito(6180) Garabatos(8070),San Andres(7680)}
Visitado={Mi casa,Centro SUPERARTE,Centro La ronda,CRAYOLA}

Codigo en NEO4J:

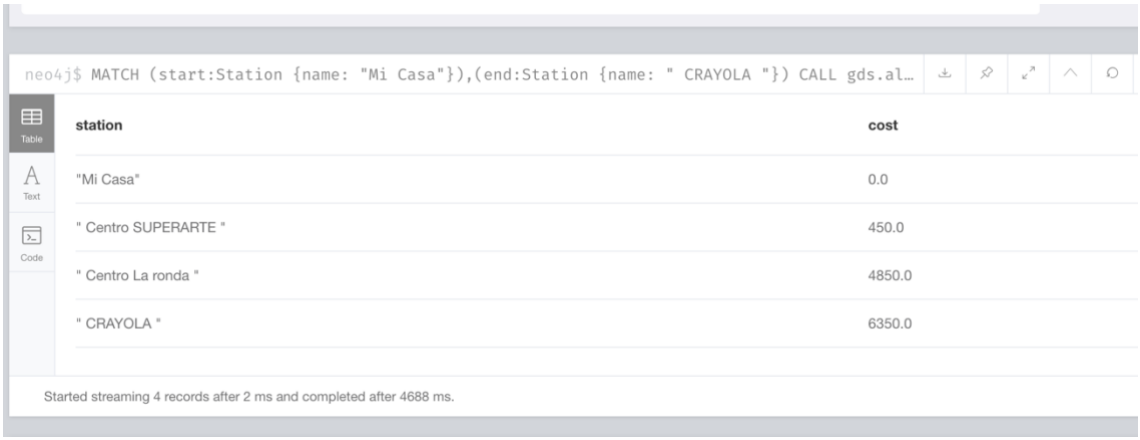
```
CREATE (a:Station {name:'Mi Casa',latitude:-2.898311     , longitude: -
79.032049}),

(b:Station {name: 'Centro SUPERARTE',latitude: -2.900910, longitude: -
79.033094}),

(c:Station {name: ' Amawta ', latitude:

-2.898207, longitude: -79.035169 }),

(d:Station {name: ' Bambu ',latitude:

-2.892361, longitude: -79.025931}),

(e:Station {name: ' Centro NOVA ', latitude: -2.915944,

longitude: -79.026007}),

(f:Station {name: ' Escuela ABC ', latitude: -2.911994, longitude: -
79.017732}),

(g:Station {name: ' Centro pulgarcito ',latitude: -2.911914,
longitude: -79.014101}),
(h:Station {name: ' Centro La ronda ',latitude: -2.903254, longitude:
-79.009732}),

(i:Station {name: ' Centro Arcoidis ', latitude: -2.883258, longitude:
-79.006340}),

(j:Station {name: ' CEICA EDUCACION INICIAL ',latitude: -2.885337,
longitude: -79.004307}),

(k:Station {name: ' Centro BAMBI ',latitude: -2.895763, longitude: -
79.012603}),

(l:Station {name: ' Centro nuestromundo ', latitude: -2.882824,
longitude: -78.994116}),

(m:Station {name: ' Centro Ciudad De Cuenca ', latitude: -2.893036,
longitude: -79.008021}),

(n:Station {name: ' Lo magico de aprender ', latitude: -2.897035,
longitude: -79.000471}),

(o:Station {name: ' Los pinos ', latitude: -2.899513, longitude: -
78.997458}),

(p:Station {name: ' El sol ', latitude: -2.892296, longitude: -
78.974039}),

(q:Station {name: ' Centro cemillitas ', latitude: -2.886132,
longitude: -78.965160}),
```

```
(r:Station {name: ' Garabatos ', latitude: -2.910659, longitude: -
79.001201}),

(s:Station {name: ' CRAYOLA ', latitude: -2.908137, longitude: -
78.999805}),

(t:Station {name: ' San Andres ', latitude: -2.904806, longitude: -
78.998562}),

(u:Station {name: ' Estrella Creativas ', latitude: -2.905164,
longitude: -78.996023}),



(a)-[:CONNECTION {time: 450}]->(b),

(a)-[:CONNECTION {time: 450 }]->(c),

(a)-[:CONNECTION {time: 2900}]->(d),

(b)-[:CONNECTION {time: 3000}]->(e),

(b)-[:CONNECTION {time: 3100}]->(f),

(b)-[:CONNECTION {time: 3300}]->(g),

(b)-[:CONNECTION {time: 4400}]->(h),

(d)-[:CONNECTION {time: 4800}]->(i),

(d)-[:CONNECTION {time: 4000 }]->(j),

(d)-[:CONNECTION {time: 3100}]->(k),

(j)-[:CONNECTION {time: 2300}]->(l),

(k)-[:CONNECTION {time: 900}]->(m),

(k)-[:CONNECTION {time: 1600}]->(n),

(n)-[:CONNECTION {time: 600}]->(o),

(o)-[:CONNECTION {time: 3000}]->(p),

(p)-[:CONNECTION {time: 3500}]->(q),

(h)-[:CONNECTION {time: 1600}]->(r),

(h)-[:CONNECTION {time: 1500}]->(s),

(h)-[:CONNECTION {time: 2000}]->(t),

(t)-[:CONNECTION {time: 650}]->(u)
```

Grafico de Nodos




```
MATCH (start:Station {name: "Mi Casa"}),(end:Station {name: " CRAYOLA
"})

CALL gds.alpha.shortestPath.astar.stream({

nodeQuery: 'MATCH (p:Station) RETURN id(p) AS id',

relationshipQuery: 'MATCH (p1:Station)-[r:CONNECTION]->(p2:Station)

RETURN id(p1) AS source, id(p2) AS target, r.time AS weight',

startNode: start,
endNode: end,
relationshipWeightProperty: 'weight',
propertyKeyLat: 'latitude',
propertyKeyLat: 'longitude'

})

YIELD nodeId, cost

RETURN gds.util.asNode(nodeId).name AS station, cost
```



Conclusión:

Mediante este algoritmo, se pudo apreder a buscar las rutas de menor coste siempre y cuando se cumplan ciertas condiciones.Auque es un algorinmo complicado de entender pero al final se buelbe de fasil comprencion