Shortest Path Search with *pgRouting*

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Georepublic

What is pgRouting?

PostgreSQL

PostGIS

Spatial PostgreSQL

An **Extension** for

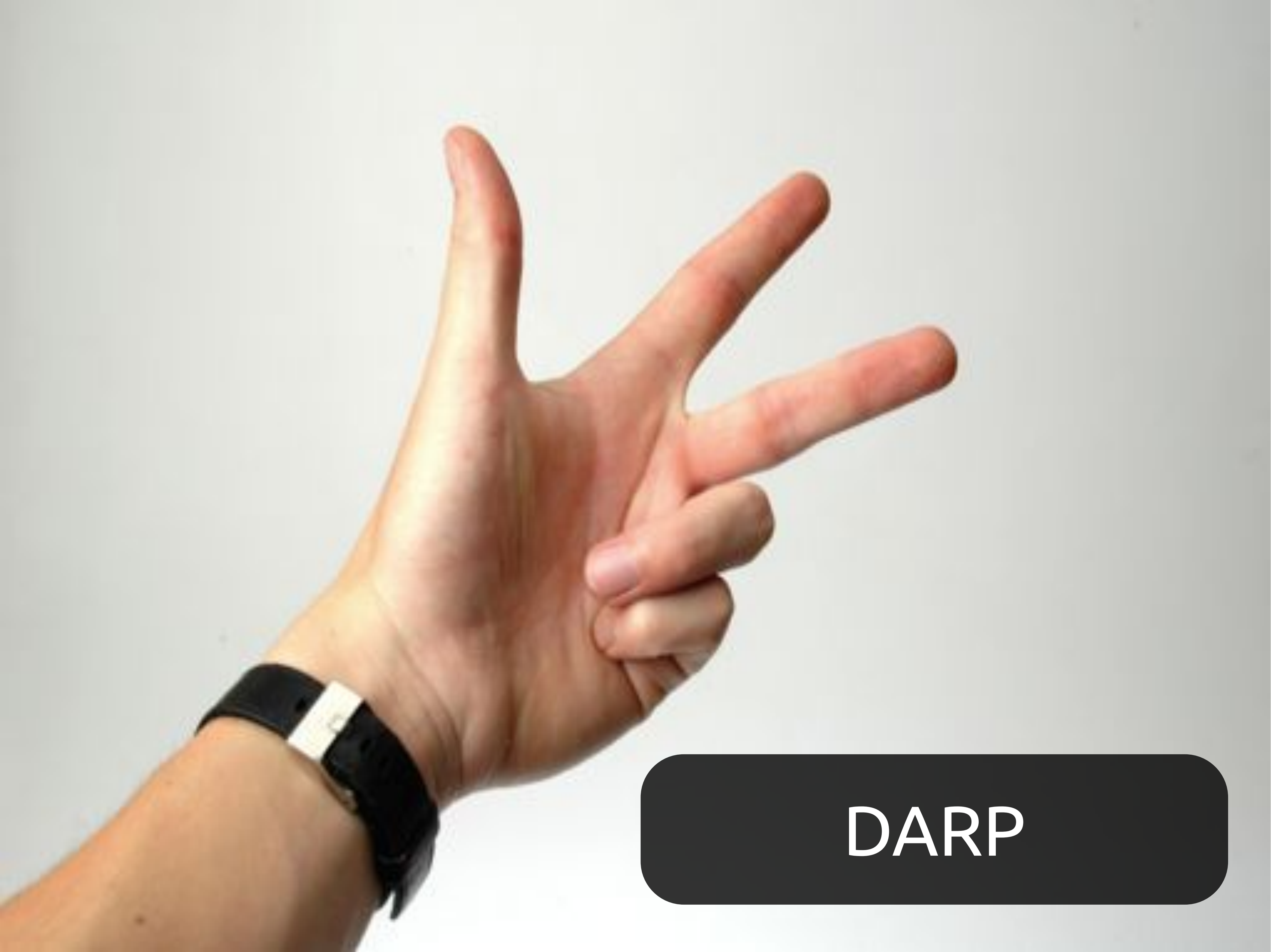
PostgreSQL / PostGIS, ...

An Open Source
project, ...

A Library providing, ...

Shortest Path

DD and TSP



DARP

@justjkk

@jay_mahadeokar

APSP and TDSP

Multi-Modal

Fork me on GitHub

github
SOCIAL CODING

https://github.com/pgRouting/pgrouting

SQL Function

```
SELECT * FROM shortest_path('
      SELECT gid as id,
             source::integer,
             target::integer,
             length::float8 as cost
        FROM ways',
    605, 359, false, false);
```

Query Result

```
 vertex_id | edge_id |        cost
-----------+---------+--------------------
       605 |     599 |   0.19925085940845
       604 |     598 |  0.100258103875674
       603 |     597 |  0.201123583387407
       602 |     596 |  0.204847680679676
       601 |     595 |  0.158334540345002
      4293 |    9602 | 0.0183273901669081
       ... |     ... |  ...
```

Most users need pgRouting for

Road Networks

How do they look like?

Like this …

… or like this …

… or sometimes like this.

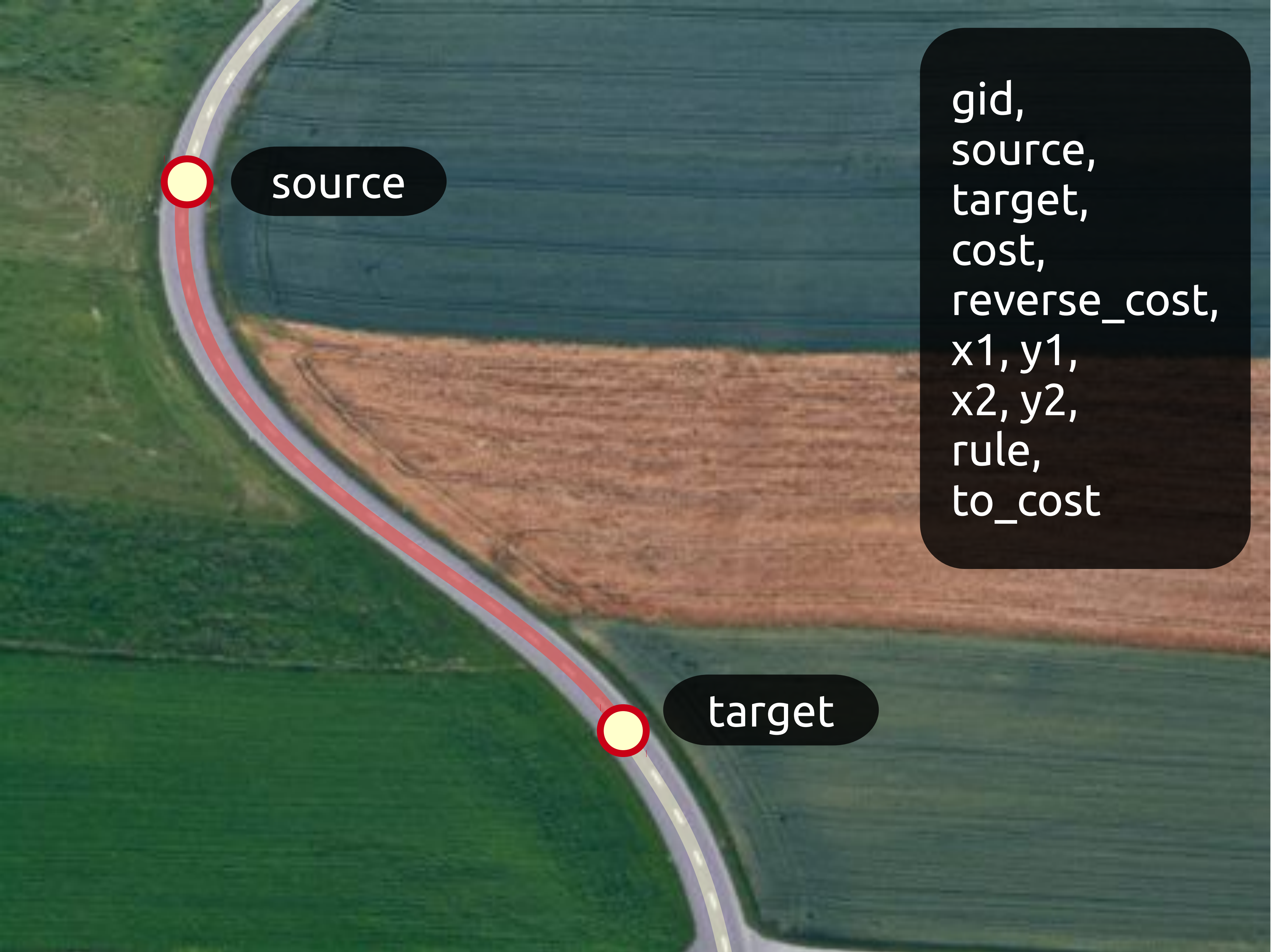
What makes them real?

Traffic lights

Signs

Road marking

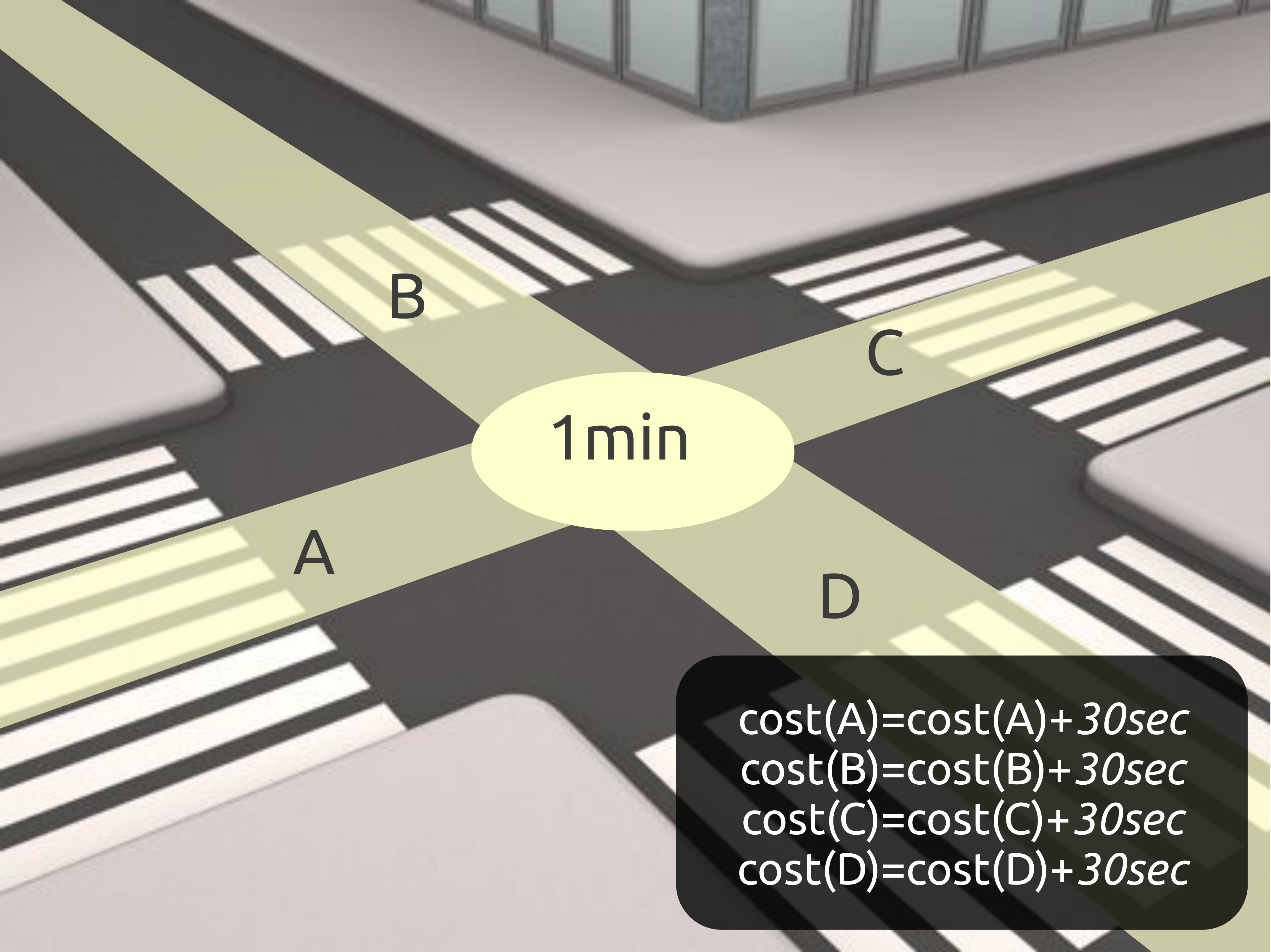
How can pgRouting help here?



gid,
source,
target,
cost,
reverse_cost,
x1, y1,
x2, y2,
rule,
to_cost

Traffic lights slow down

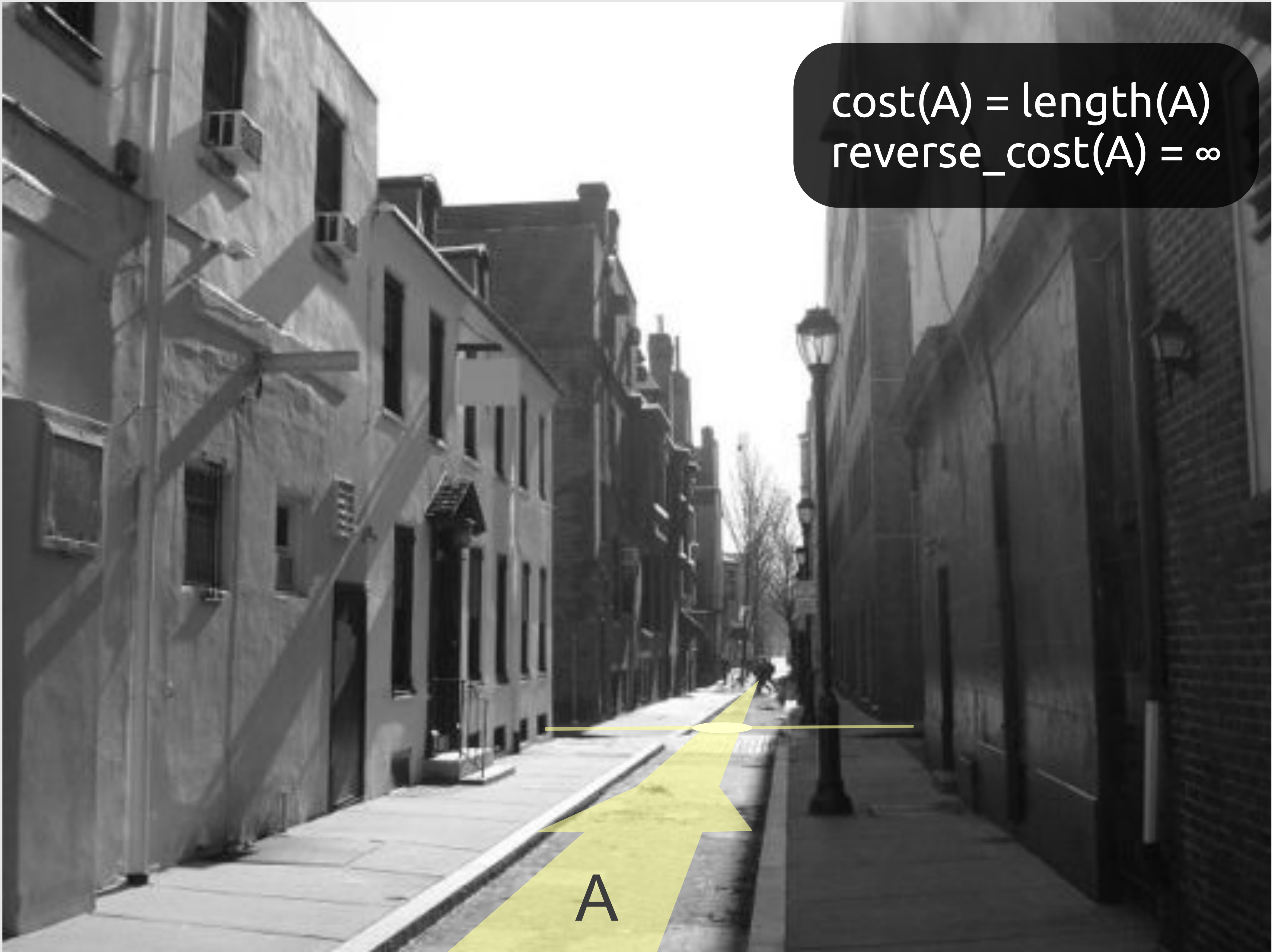
… so costs must increase.



cost(A)=cost(A)+*30sec*
cost(B)=cost(B)+*30sec*
cost(C)=cost(C)+*30sec*
cost(D)=cost(D)+*30sec*

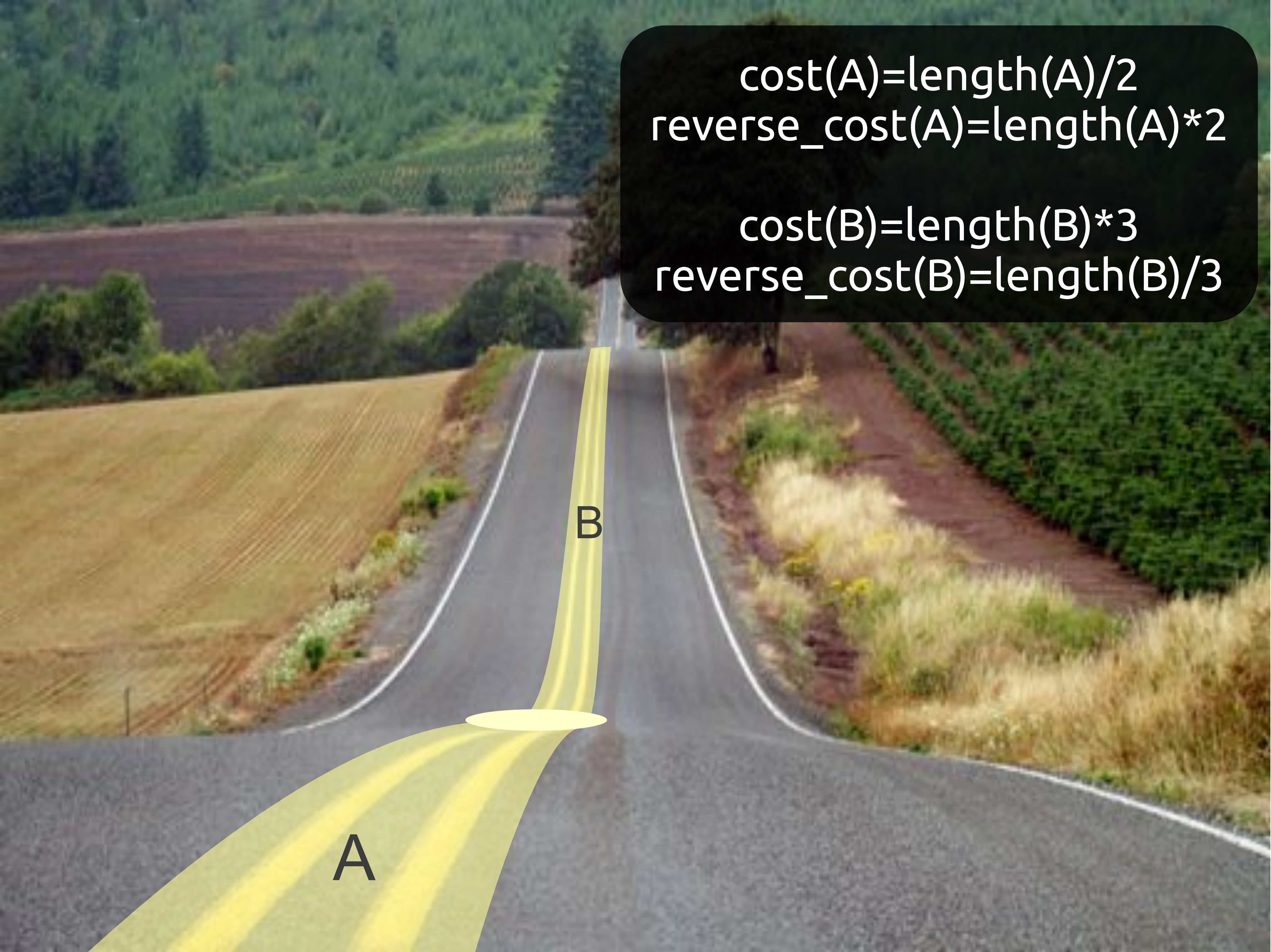
Signs inform about restrictions and rules

ONE WAY



cost(A) = length(A)
reverse_cost(A) = ∞

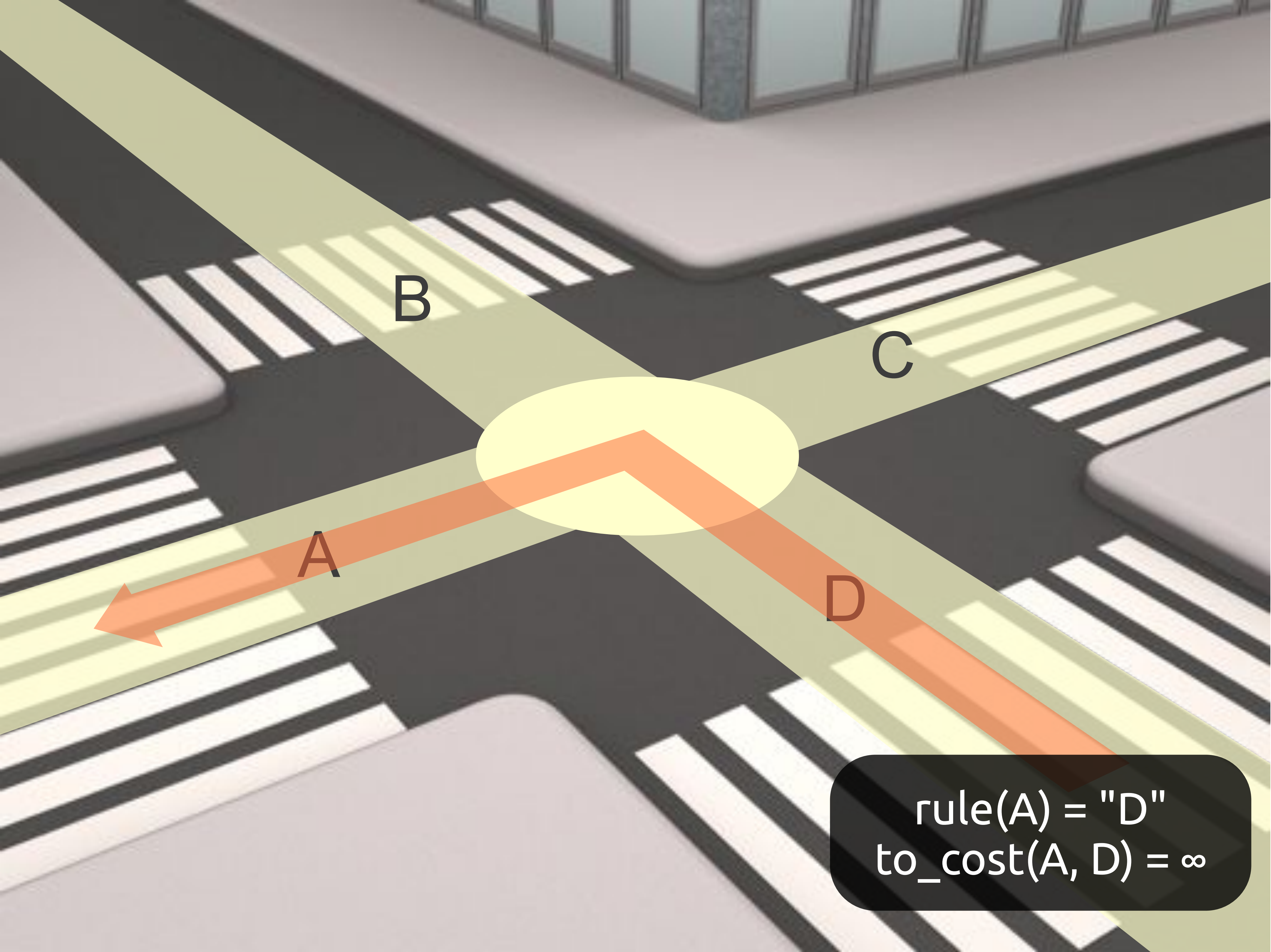
Sometimes
the costs
have *different*
meaning.



cost(A)=length(A)/2
reverse_cost(A)=length(A)*2

cost(B)=length(B)*3
reverse_cost(B)=length(B)/3

Turn restrictions obviously restrict turns.

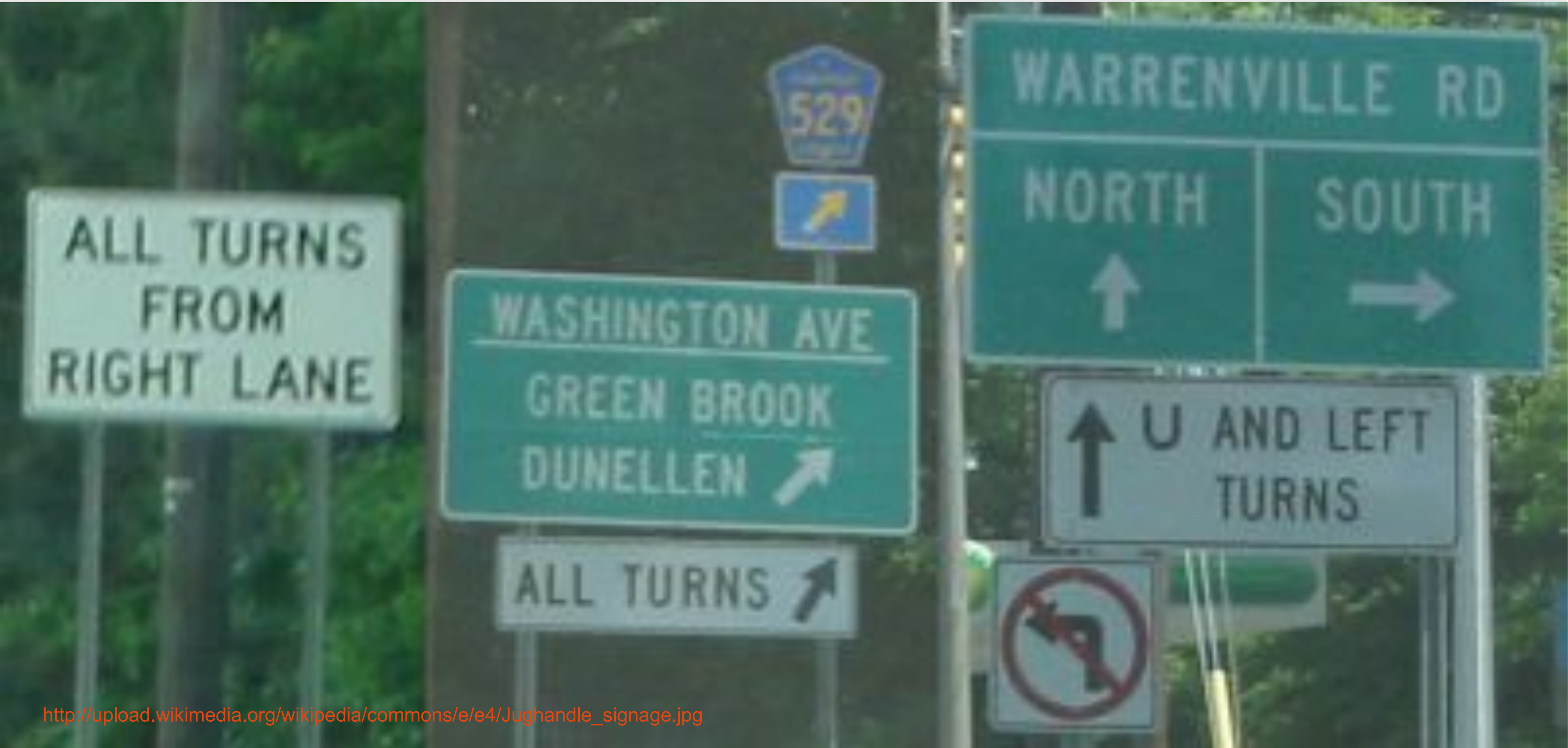


rule(A) = "D"
to_cost(A, D) = ∞

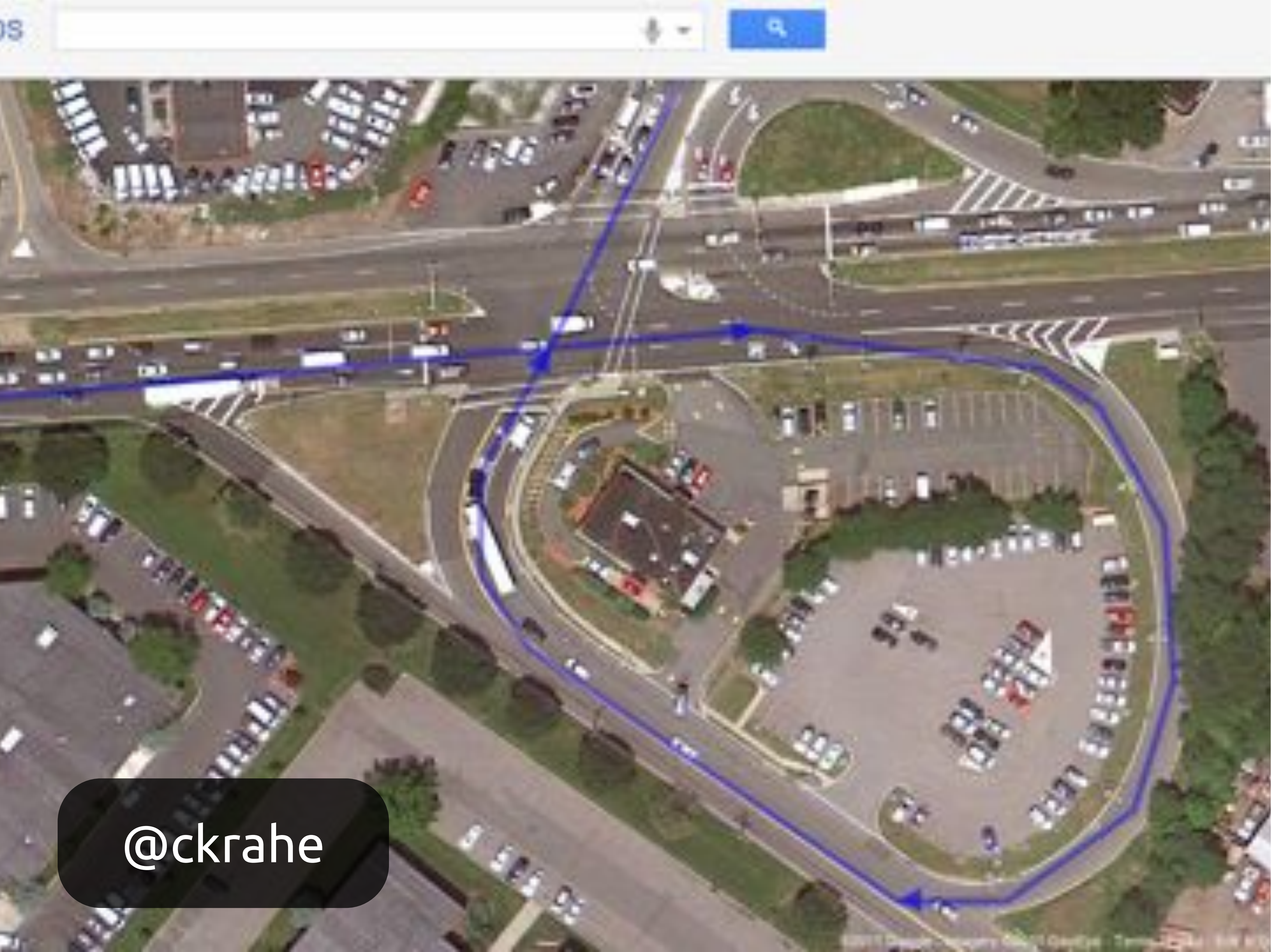
Road type can be used for cost calculation.

Not only road *types*
but also *conditions*

Jughandle intersection



http://upload.wikimedia.org/wikipedia/commons/e/e4/Jughandle_signage.jpg



@ckrahe

And you know

what is *great* about pgRouting?

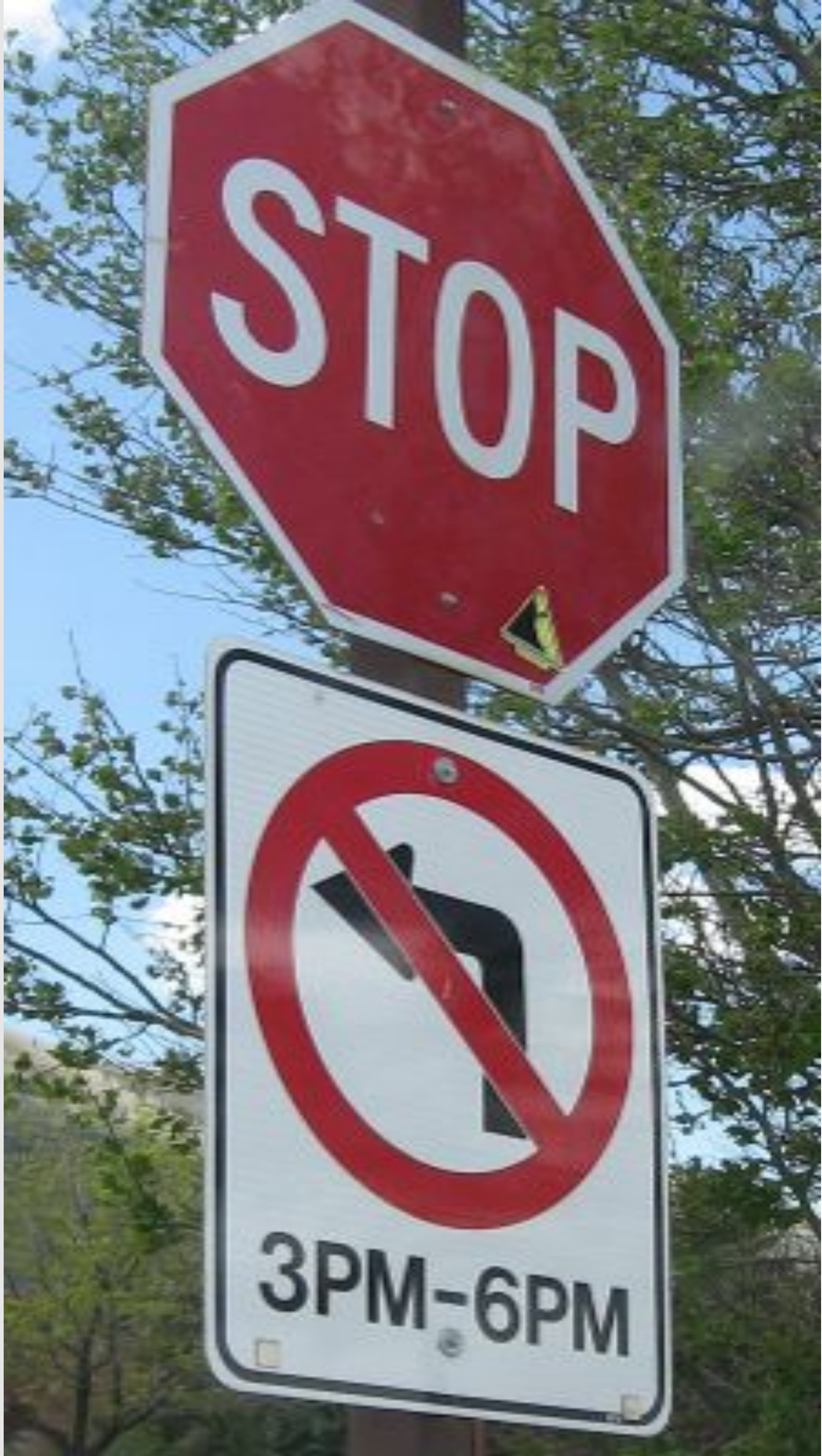
All costs are *dynamic*!

… which is the opposite to pre-calculated

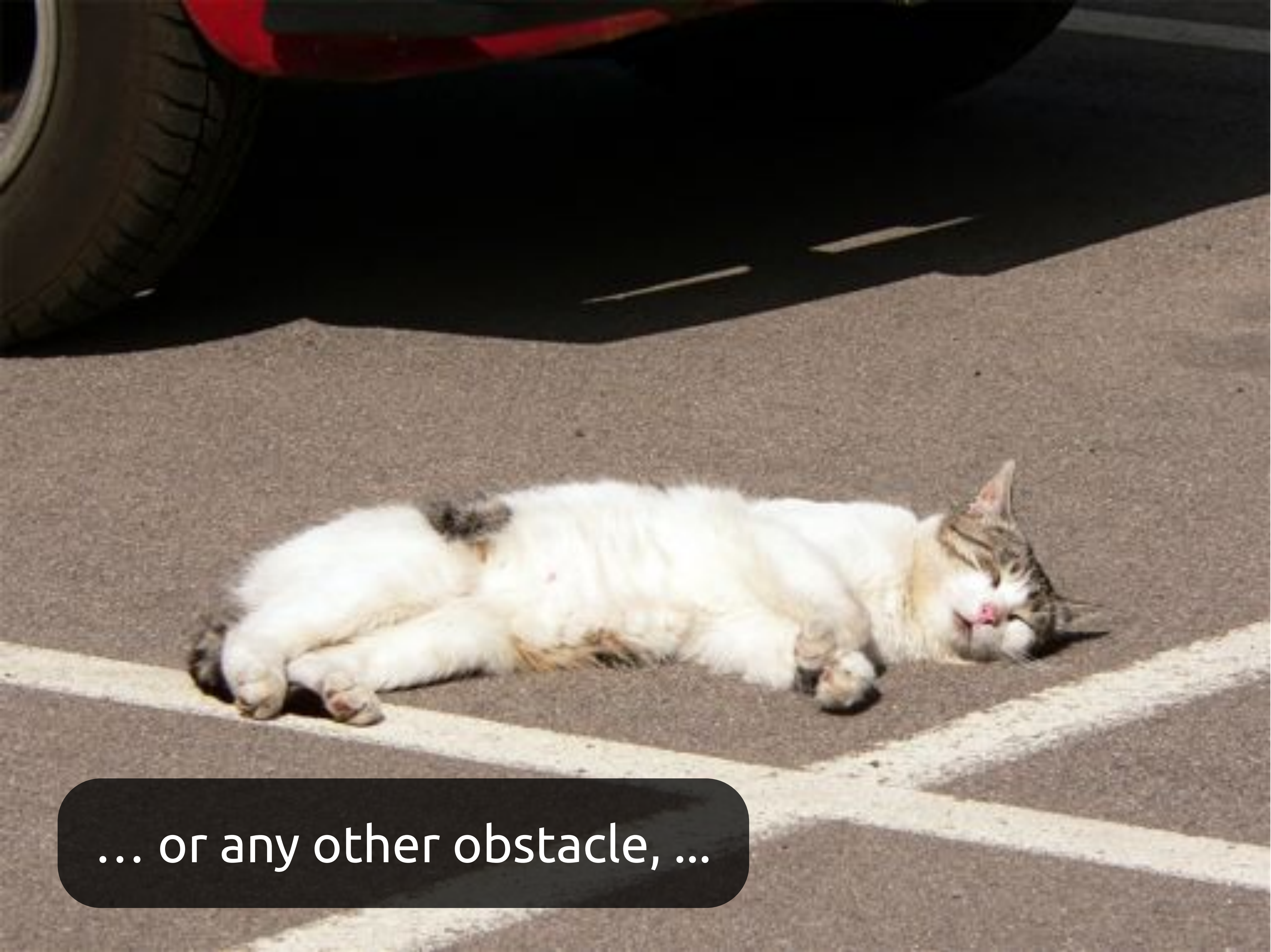
If the road is closed …

… or there is an accident, …

… there is a sign with restrictions limited to a certain time, …



… bad weather conditions ...



… or any other obstacle, …

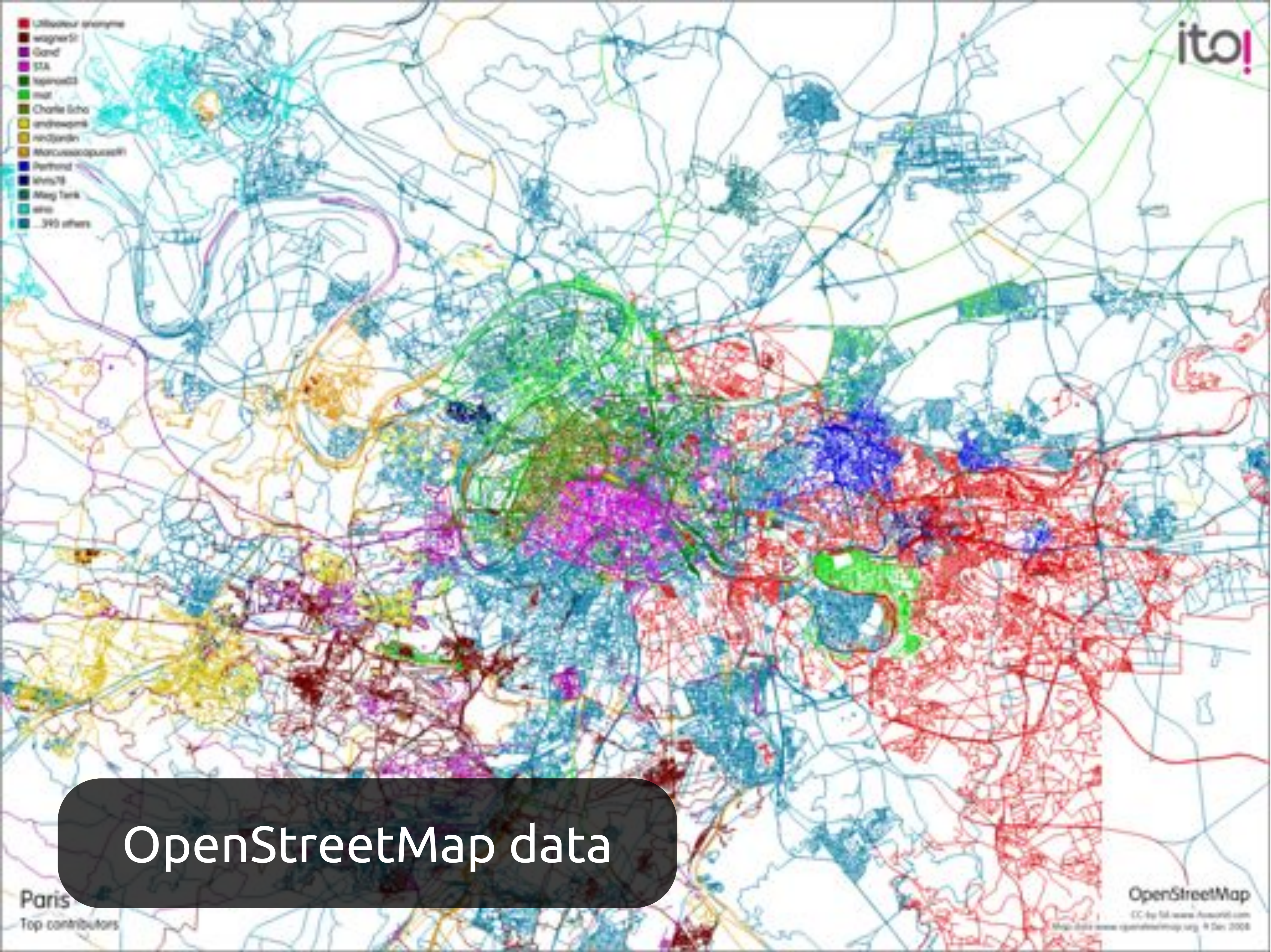
You don't need to rebuild and reload your network

… and wait forever.

You only need to adjust the cost
for this particular road,

and the next search will go another way.

Cost can be virtually anything



OpenStreetMap data

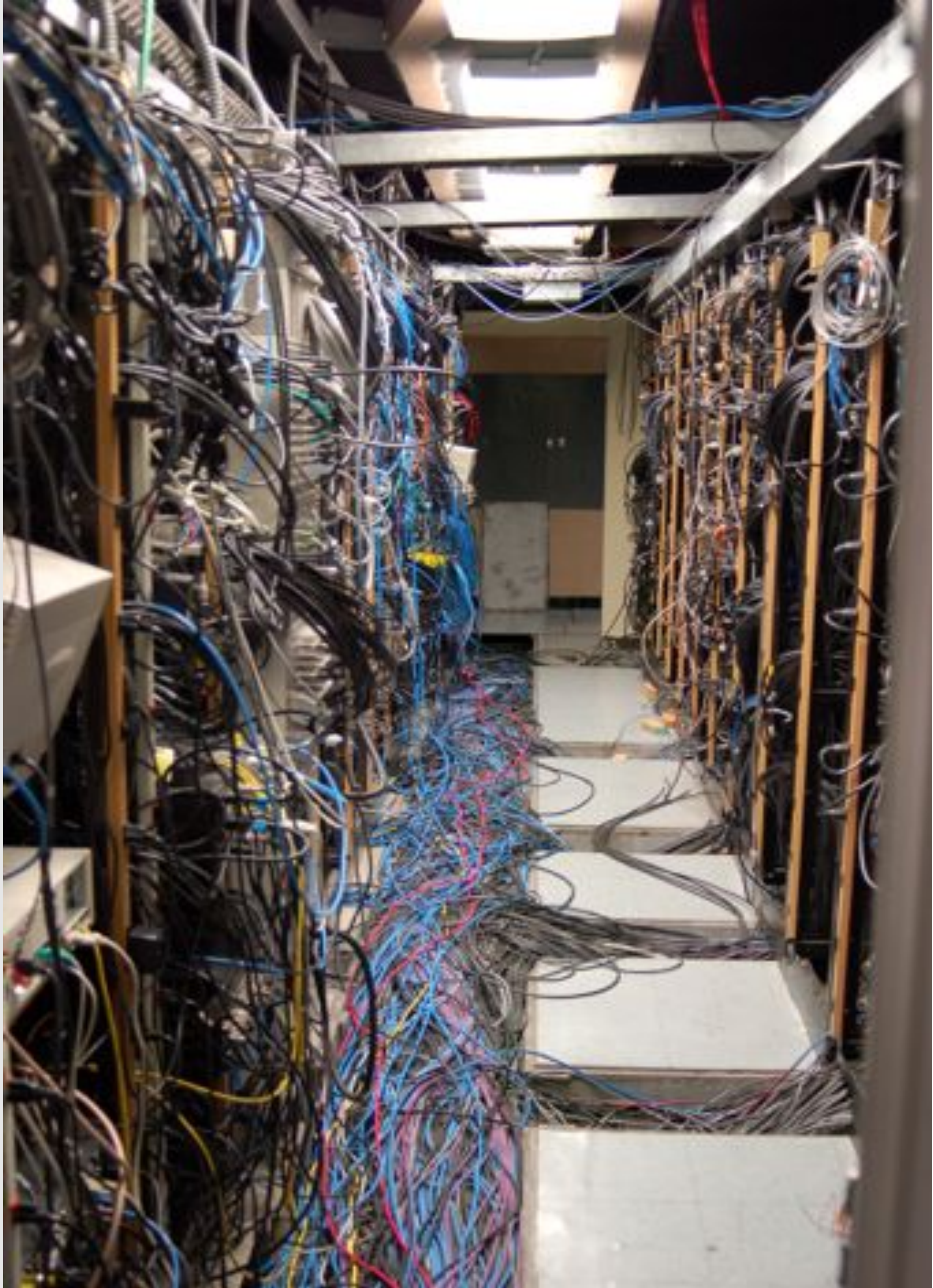
pgRouting can be used for

different kinds of networks

Canals and Rivers

Hiking trails

… or any other
kind of networks.



pgRouting Demo

http://websi.openvrp.com

http://map.veloland.ch

http://www.ridethecity.com

http://www.pgrouting.org/gallery.html

Plans until FOSS4G 2012

- Integrate new functions
  - All-Pair-Shortest-Path
  - Time-Dependent-Shortest-Path
  - Multi-Modal
  - Two-way A-Star, ...
- Drop CGAL dependency
- PostgreSQL 9.x & PostGIS 2.0 support
- Source cleanup

pgRouting Project — Open Source Routing Library - Chromium
pgRouting Project — Op
www.pgrouting.org
pgRouting
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pgRouting Project

pgRouting extends the PostGIS / PostgreSQL geospatial database to provide geospatial routing functionality.

Advantages of the database routing approach are:

- Data and attributes can be modified by many clients, like Quantum GIS and uDig through JDBC, ODBC, or directly using Pl/pgSQL. The clients can either be PCs or mobile devices.
- Data changes can be reflected instantaneously through the routing engine. There is no need for precalculation.
- The "cost" parameter can be dynamically calculated through SQL and its value can come from multiple fields or tables.

Core Features

pgRouting [illegible]

- Shortest Path Dijkstra: routing algorithm without heuristics
- Shortest Path A-Star: routing for large datasets (with heuristics)
- Shorte[illegible]uristics)
- Traveling Salesperson Problem (TSP)
- Driving Distance calculation (Isolines)

Download

Current release: 1.05

Make a Donation

Support pgRouting with some donation! Read more about how your donation will help the project.

Links

- pgRouting Workshop
- PostgreSQL
- PostGIS

www.pgrouting.org
workshop.pgrouting.org

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THANK YOU

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