Traffic Noise Explorer

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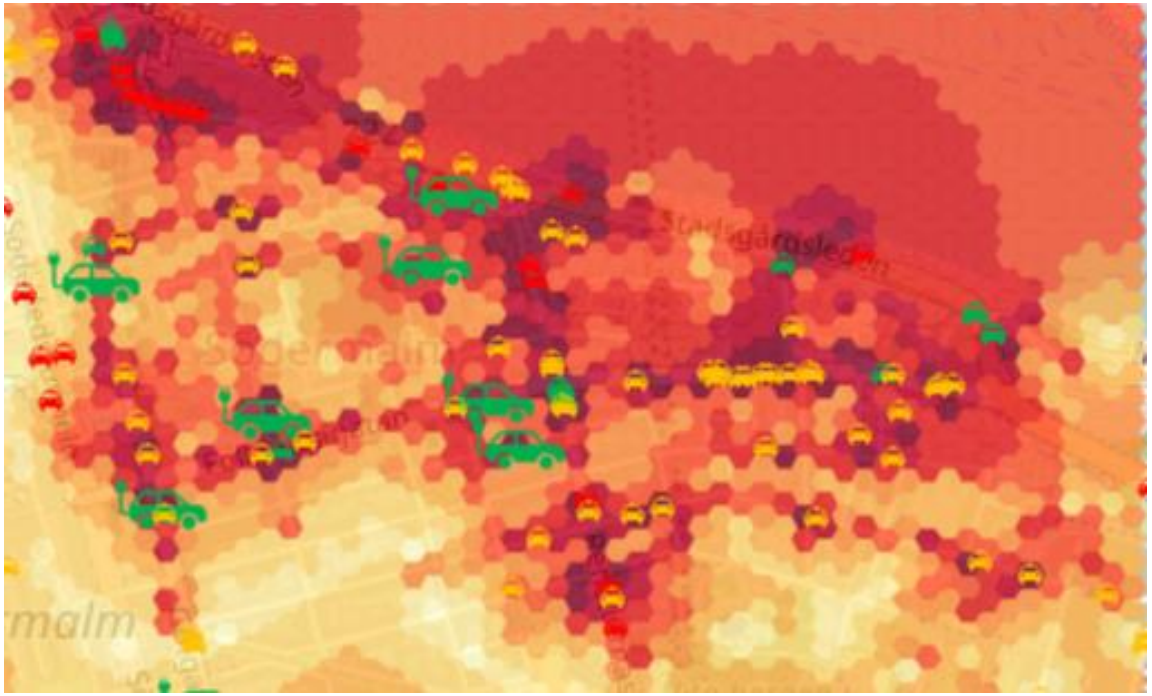
AG2417 - Web and Mobile GIS

TRAFFIC NOISE EXPLORER

A DYNAMIC WEB MAP APPLICATION



Agenda

- Team members
- Application idea
- Data provided by the GEOMETRIC Project
- Implemented functionalities
- Demonstration
- Architecture and components
- Choice of design
- Problems encountered and improvements

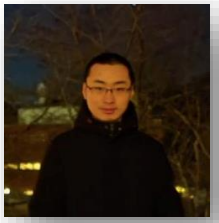
Team members

Alba LUNNER - Sweden

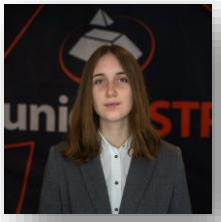
Jakob Pelle RAUCH - Germany

GIS Project

Yu GAO - China



Lola VOIGNIER-SIMON - France



Application idea

"Noise pollution from road traffic is the second most harmful environmental stressor in Europe." European Environment Agency, 2020

- Monitor and analyze noise pollution correlated to traffic could contribute to deeper knowledge of its effect and offer solutions on how to lower it

Our web app allows to

Visualize data
on traffic and associated noise in
a neighbourhood of Stockholm

Carry out analyses
by varying certain parameters of
the vehicles

Application idea

Users

Individuals	See where noise pollution is most prominent	Decide where to go for a walk OR where to buy an apartment
Organizations or governments	Analyze the road traffic effect on noise levels	Decide how to organize the city and regulate the roads

Data provided by the GEOMETRIC Project

GEO-based **M**ulti-layer **E**nvironmental Modelling of Urban **TR**aff**IC**

12 nodes for traffic and environmental sensors

- ***Vision***: Framework for dynamically optimized traffic control and reduced footprint
- ***Objectives***:
  - ✓Contribute to quality program of Stockholm City: Smart and connected city
  - ✓Collect, process, and visualize traffic and emission data
  - ✓Refine and validate advanced modelling tools

Data used for our project

- 5 minutes sample: 1 time step = 1 second
- Traffic data (Södermalm)
  - Coordinates x and y in EPSG:4326 (WGS84)
  - Information given: time, acceleration, angle, id, lane, position, slope, speed, vehicle type, x and y coordinates

- Noise data (North-East Södermalm)
  - Projection in EPSG:32633 (UTM Zone 33N)
  - Information given: id receiver, timestep, noise level (in dBA)

Choice of design

Back-end:

Node.js

Database: PostgreSQL + PostGIS

Front-end:

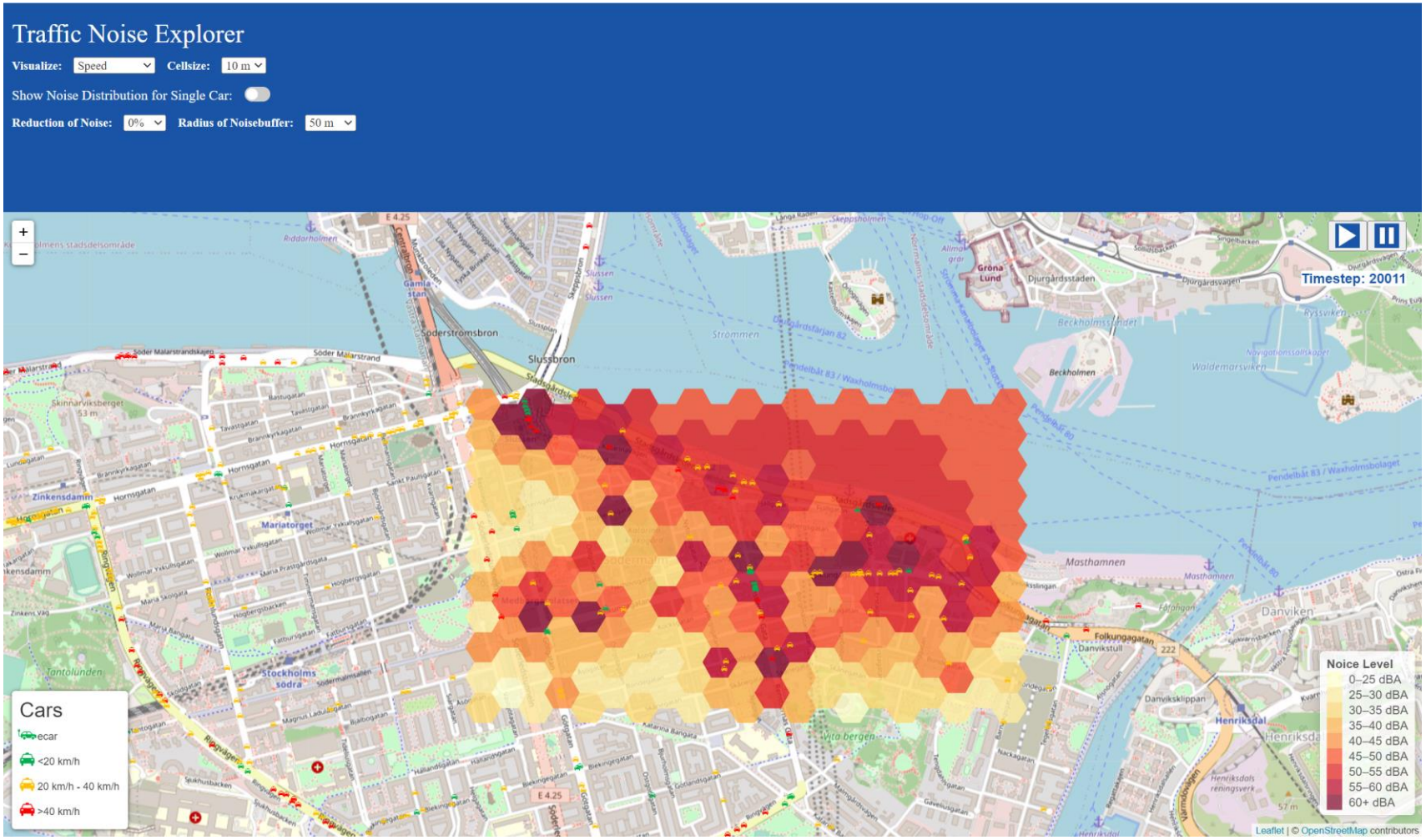
HTML, CSS, JavaScript

Bootstrap, Leaflet, Turf.js

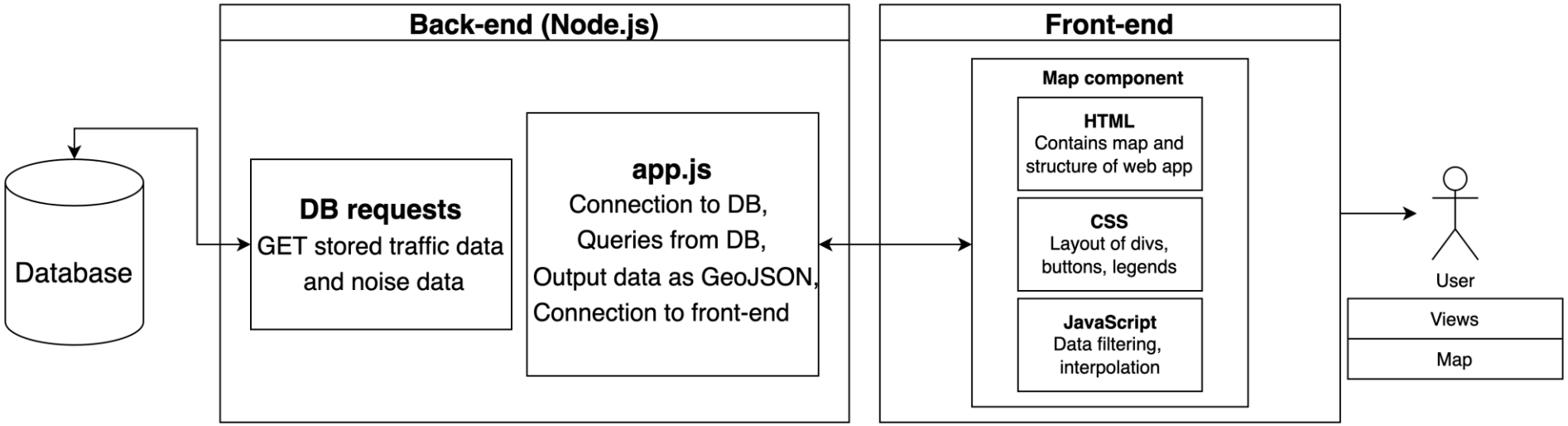
Implemented functionalities

- Start/stop simulation
- Access of information about a selected car
- Change in type of car and show noise only for a selected car
- Visualize by speed or by acceleration
- Selection of a cell size of noise grid
- Reduction to noise distribution of a selected car
- Selection of radius of noise influence of a selected car

Demonstration



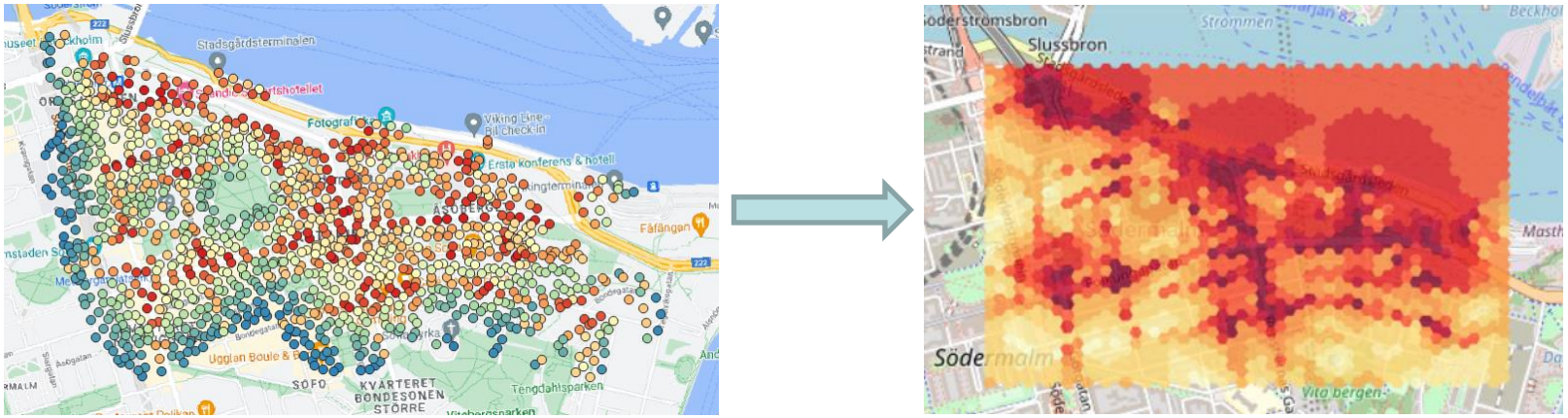
Architecture and components



Architecture and components

Transform the point noise data into a plane

```
var options = {gridType: 'hex', property: 'laeq', units: 'meters', weight: 3};
n1=turf.interpolate(n.toGeoJSON(), cellsize, options)
noice=L.geoJSON(n1, {style:style}).addTo(map);
```

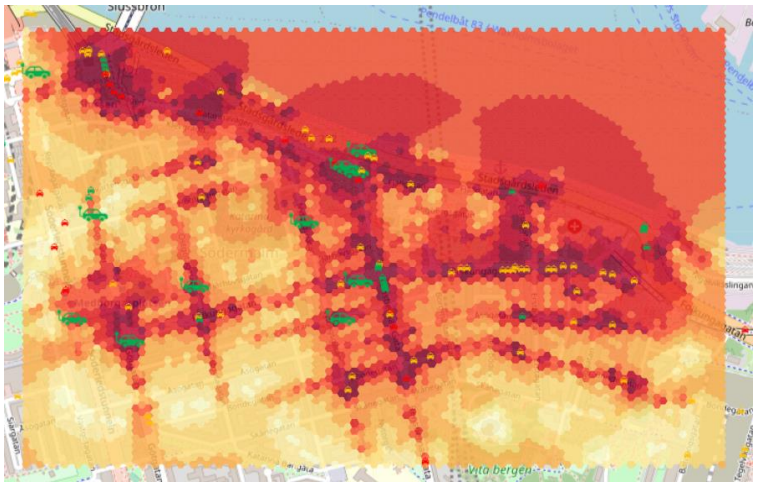


Learn more: https://turfjs.org/docs/#interpolate

Architecture and components

Display noise maps in different resolutions for different purposes

Cellsize is bigger ⇒ Loading faster, apply to dynamic maps
Cellsize is smaller ⇒ More precise, apply to static maps



Architecture and components

Selection of noise distribution of a selected car:

→ **Get all Noise Nodes which are in a buffer around the selected Car**

Variables: vehicle ID, buffer radius, time, reduction percentage


```sql
SELECT a.id, a.geom, a.laeq*reduction, ST_Distance(a.geom::geography,
(SELECT geom from ag2417_22_g1.data WHERE id= veh_id and time=t)::geography) as distance
from  (SELECT * from ag2417_22_g1.noise WHERE noise.timestep_t=t) as a
join (SELECT ST_Buffer(geom::geography,r, 'quad_segs=8')::geometry as geom
from ag2417_22_g1.data WHERE id=veh_id and time=t)as b
on st_within(a.geom, b.geom);
```

Problems encountered and improvements

- Template integration ⟶ Simple CSS design
- Time-lapse and time slider
- Querys faster with spatial indexing

Questions and comments

Thank you for

listening.

Any questions?