



# What is the best place to be?

## Location optimization with R and Google Maps

Bartosz Czernecki <sup>[1][3]</sup> Jakub Nowosad <sup>[2][3]</sup>



- [1] Faculty of Geosciences  
Adam Mickiewicz University in Poznań, Poland  
[nwp@amu.edu.pl](mailto:nwp@amu.edu.pl)
- [2] Space Informatics Lab, Department of Geography  
University of Cincinnati, USA
- [3] [IQData.pl](http://IQData.pl)

# Motivation → (boring) decision making

---

The need to find a convenient place to stay before every conference or business meeting in a new city

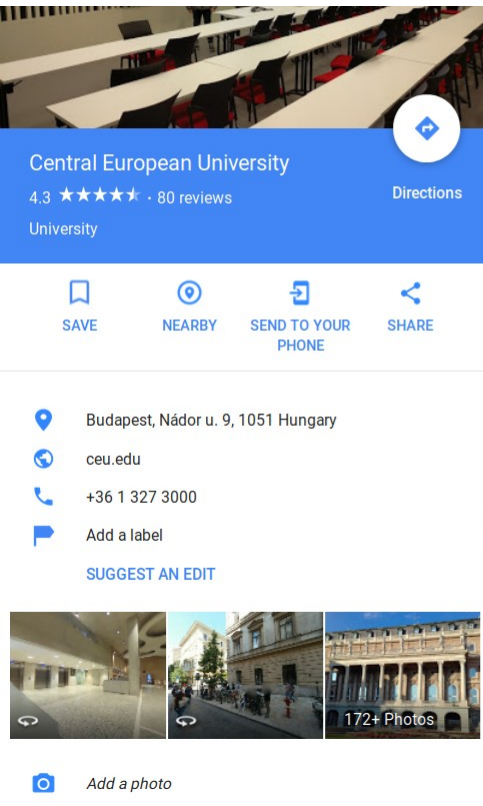
- **Nearby** the place of conference/business meeting
- With good public transportation facilities
- Affordable prices (or at least good quality/price ratio)
- Others: **close** to the downtown or any other attractive place to go in the evening, safe, etc..





# How does it look in practice?

## Finding a location of conference/meeting





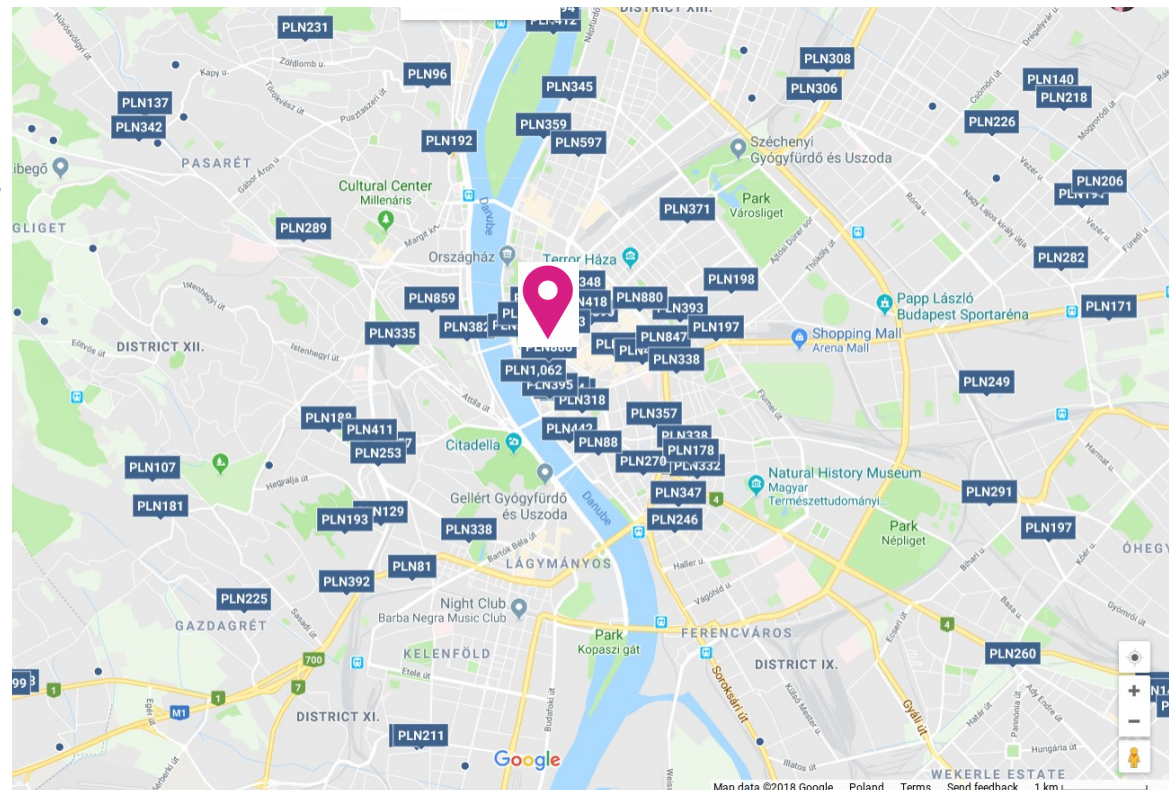


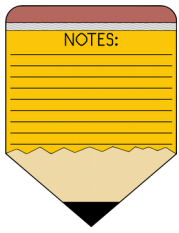
# How does it look in practice?

## Searching for hotels:

not too far away:

- a standard map with hotels (*booking.com, google maps, etc..*) giving *euclidean distance to the downtown or some historical places*
- Then filtering out ~70% (reason: price)
- Finding a set of hotels which gives us good distance/price ratio (+overall rating)





# How does it look in practice?

~**Top 10** destinations that need to be checked (in terms of traveling time)

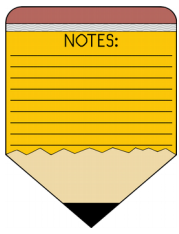
→ Hotel X1 → Walking 12 min., Public transport 10 min., Rating 6.6

Google Maps interface showing a route from Central European University to Gozsdu Court, Budapest. The route is highlighted in blue and includes a 10-minute public transport segment and a 12-minute walking segment.

Route details:

- 9:01 AM (Monday)–9:11 AM: 10 min (Public transport, 105)
- 9:07 AM from Deák Ferenc tér M: 9 min
- 9:01 AM (Monday)–9:12 AM: 11 min (Public transport, 16)
- via József Attila u.: 12 min (Walking, 1.0 km)





# How does it look in practice?

~**Top 10** destinations that need to be checked (in terms of traveling time)

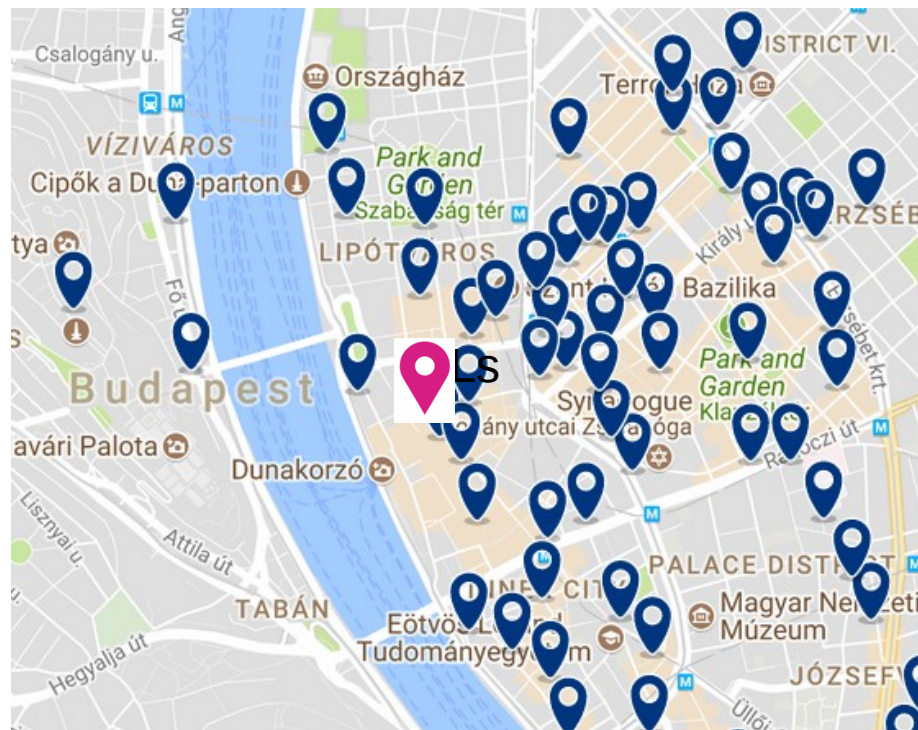
→ Hotel X2 → Walking 25 min., Public transport 16-17 min., Rating 7.2

The screenshot displays Google Maps with a route from Blaha Lujza tér to Continental Hotel Budapest. The sidebar on the left shows the following route options:

Route	Time
9:02 AM (Monday)–9:19 AM Walking > M2 > Walking 9:07 AM from Blaha Lujza tér Walking 14 min	17 min
9:05 AM (Monday)–9:22 AM Walking > M2 > Walking	17 min
9:09 AM (Monday)–9:25 AM Walking > M2 > Walking	16 min
9:01 AM (Monday)–9:23 AM Walking > 5 > 15 > Walking	22 min

The map view shows the route from Blaha Lujza tér (red dot) to Continental Hotel Budapest (blue dot). The route is highlighted in red and blue, with a 17 min label for the main route and a 16 min label for a shorter segment. The map includes various landmarks such as the Opera House, Central European University, and the Danube River.

# Time consuming process



**DISTANCE FROM A HOTEL TO THE VENUE  
DOES NOT ALWAYS EQUAL TO TIME OF TRAVEL**

**IS IT REALLY THE BEST AND FASTEST WAY OF PROCEEDING?**

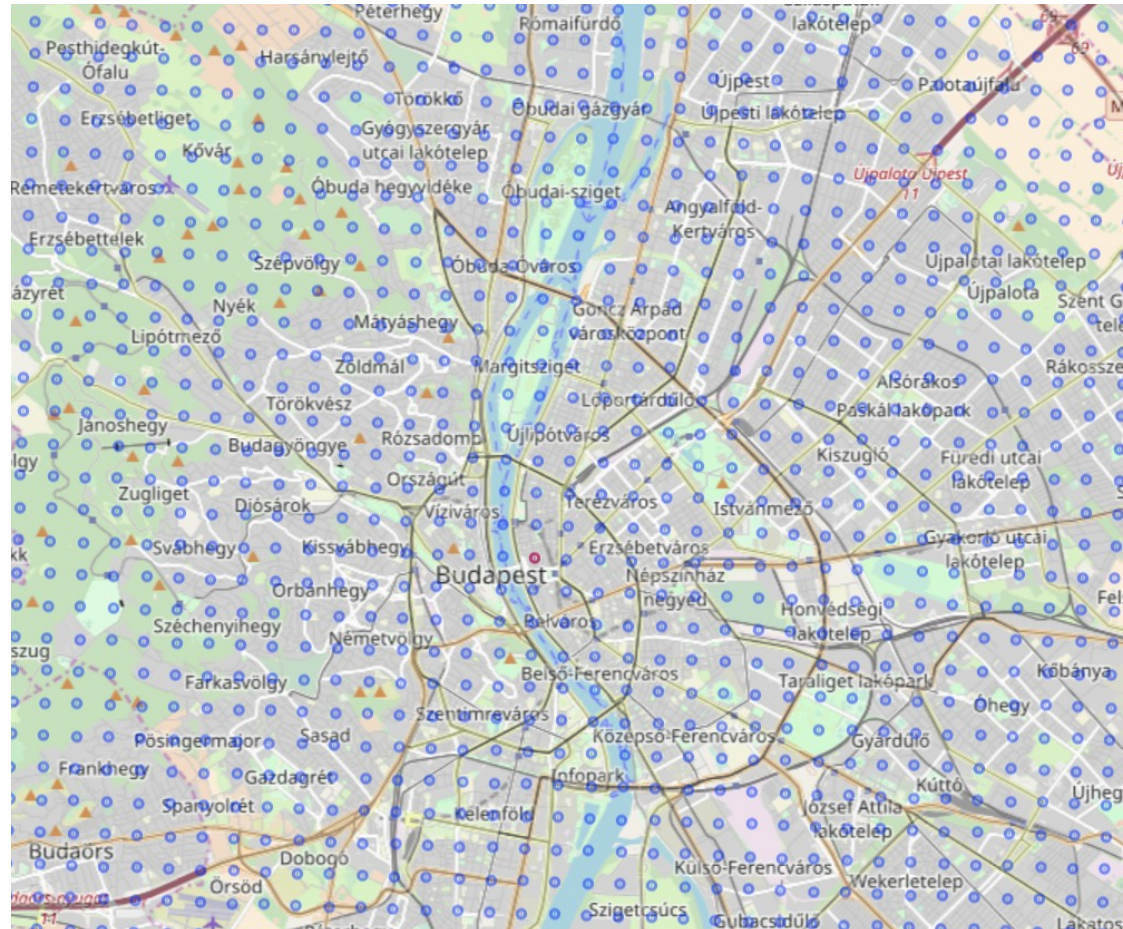




# How to make it automatic or at least semi-automatic with and GIS?

Create a regular mesh around the conference/meeting's location:

- E.g. 1 x 1 km in UTM coordinates for 10-15 km in each direction (not too dense)
- Convert coordinates to lon-lat grid usable by the google services



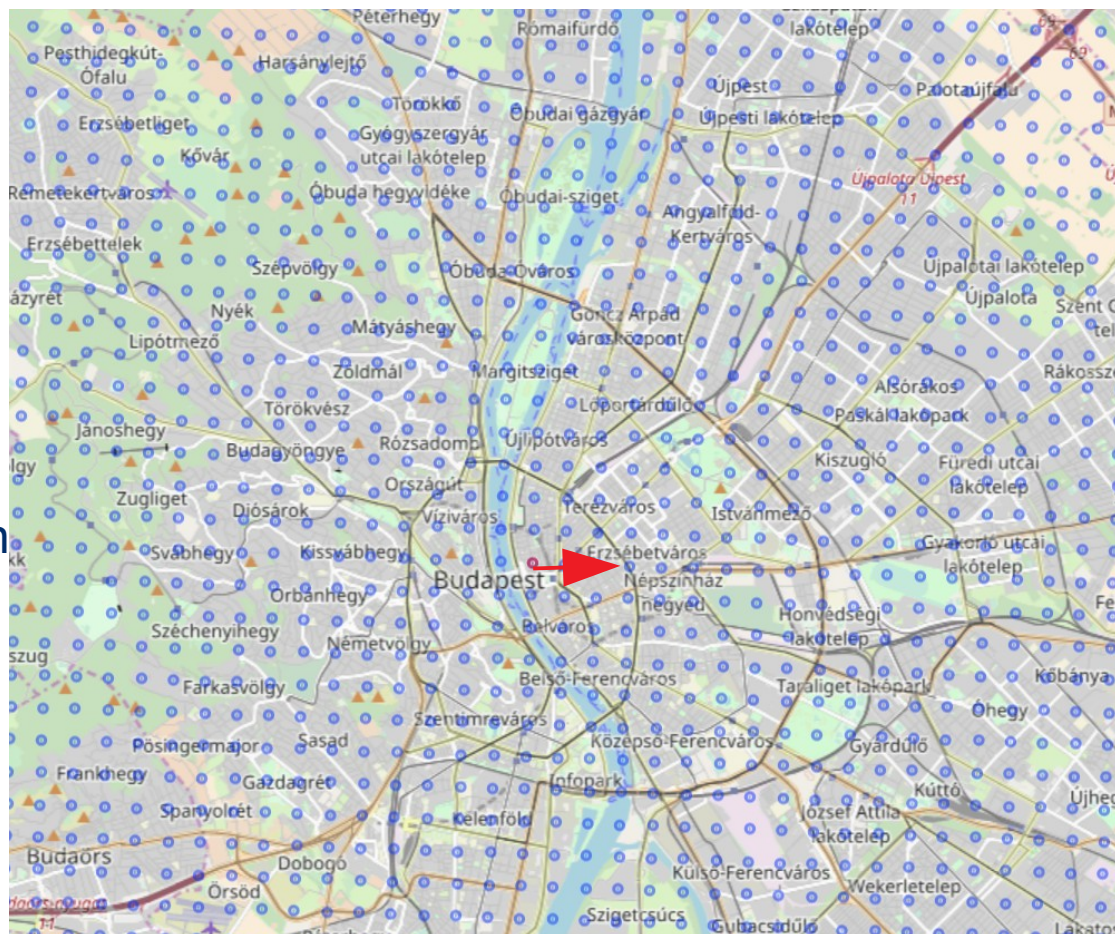




# How to make it automatic or at least semi-automatic with and GIS?

Create a regular mesh around the conference/meeting's location:

- E.g. 1 x 1 km in UTM coordinates for 10-15 km in each direction
- Convert coordinates to lon-lat grid usable by the google services
- Calculate distance and time for each grid point with Google Maps Distance Matrix API



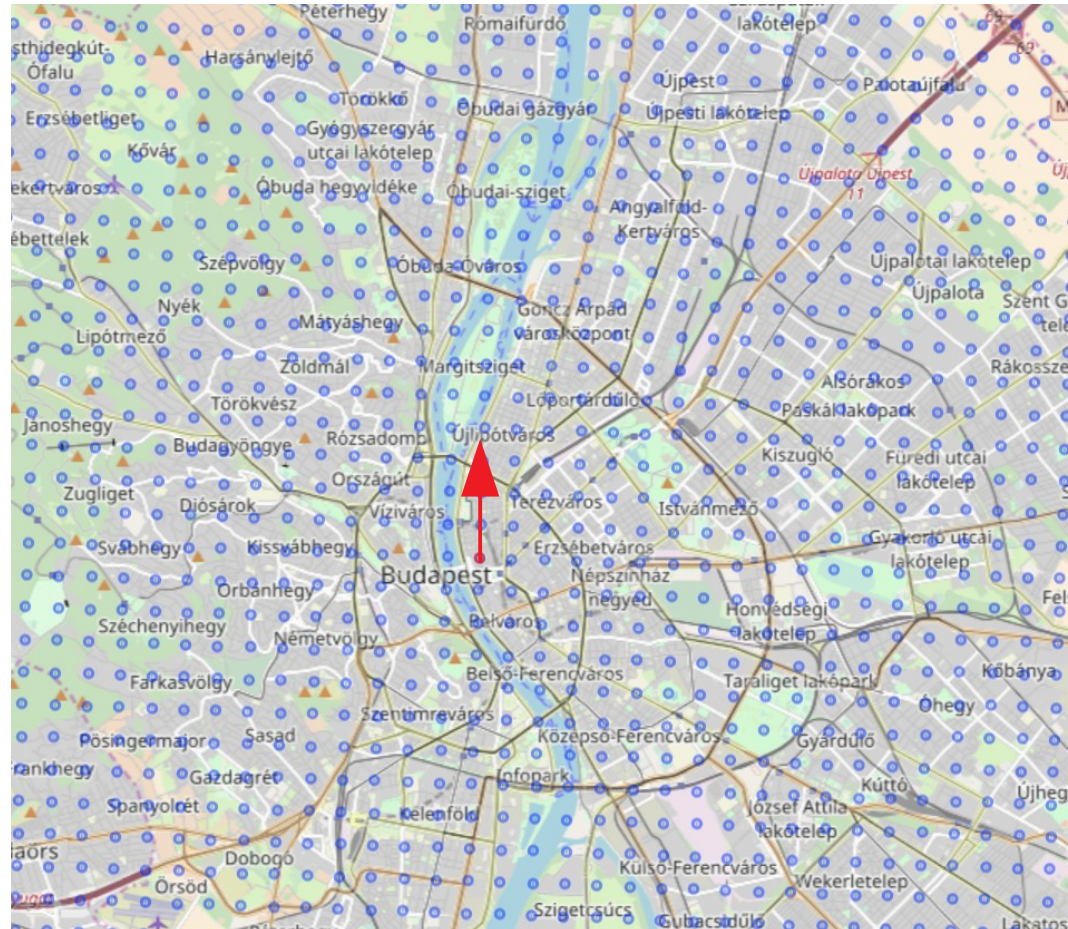




# How to make it automatic or at least semi-automatic with and GIS?

Create a regular mesh around the conference/meeting's location:

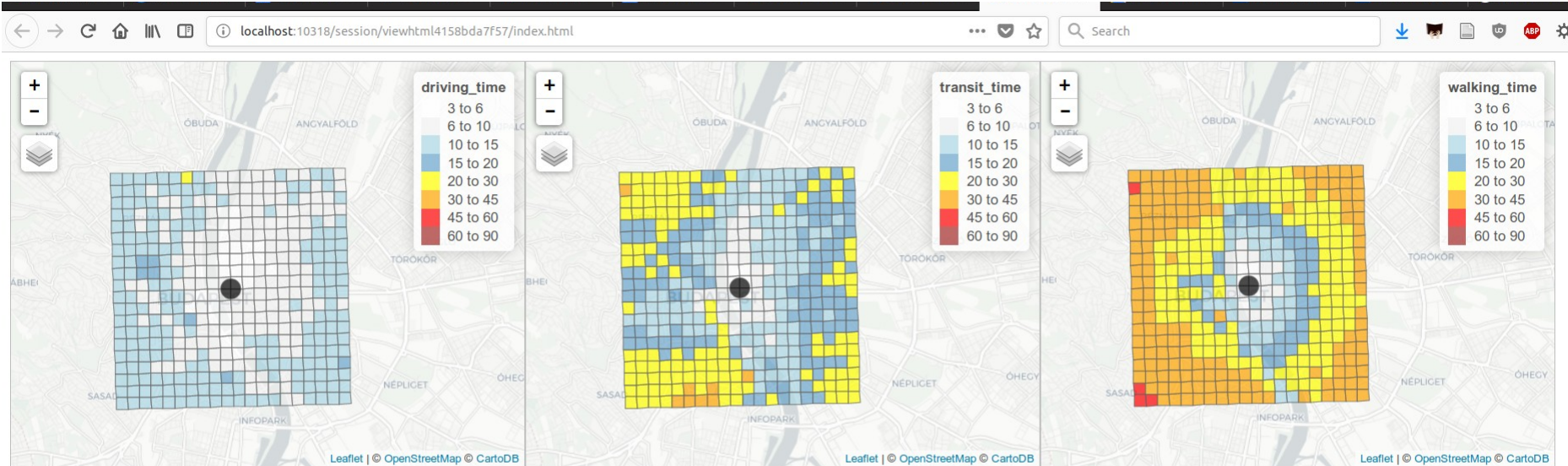
- E.g. 1 x 1 km in UTM coordinates for 10-15 km in each direction
- Convert coordinates to lon-lat grid usable by the google services
- Calculate distance and time for each grid point with Google Maps Distance Matrix API
- Repeat this step for **walking**, **driving**, bicycling, **public transport**







# How to make it automatic or at least semi-automatic with and GIS?



Taxi / Uber / etc...

Public transportation

Walking

## (2) Improving readability:

Creating new layers with hotels' location (over 300!) and transport barriers (e.g. rivers) → **library: osmdata**

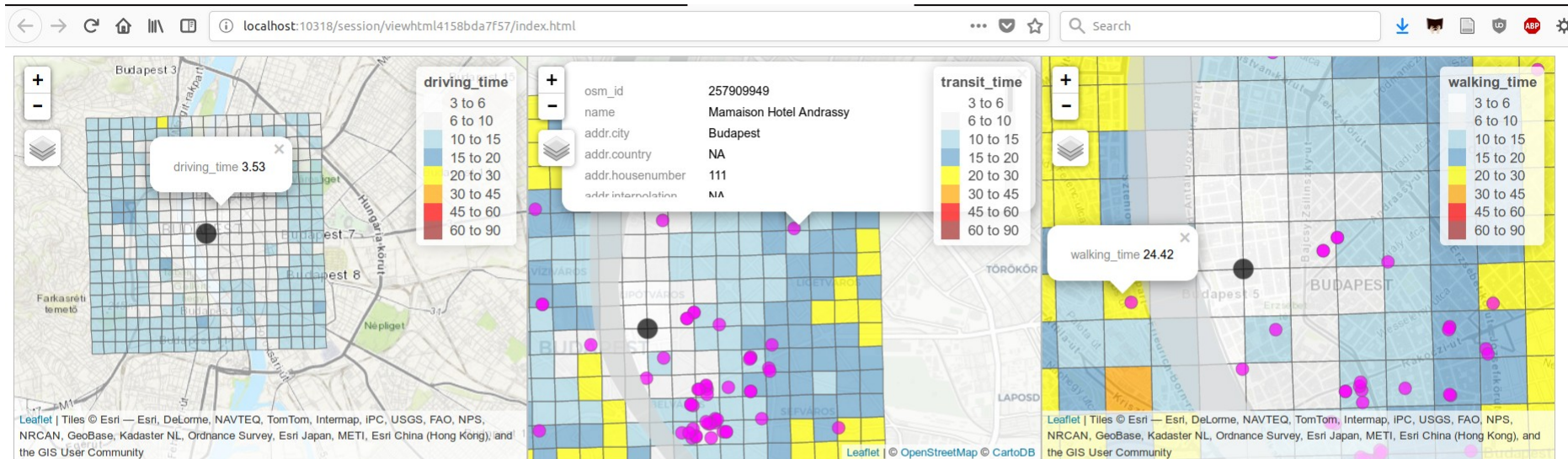
## (3) Webscrapping of prices and hotel rates with **RSelenium**



# How to make it automatic or at least semi-automatic with and GIS?

## (4) Interaction with `leaflet` clickable layers/features

→ strongly simplified version @rpubs: <http://rpubs.com/bczernecki/388489>



Taxi / Uber / etc...

Public transportation

Walking

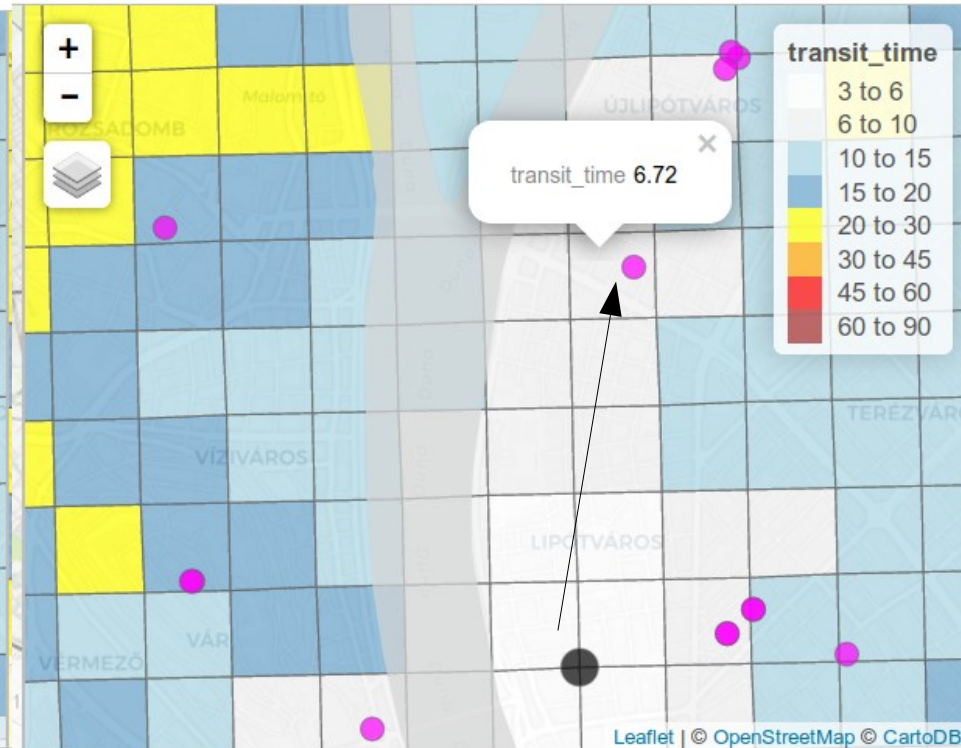
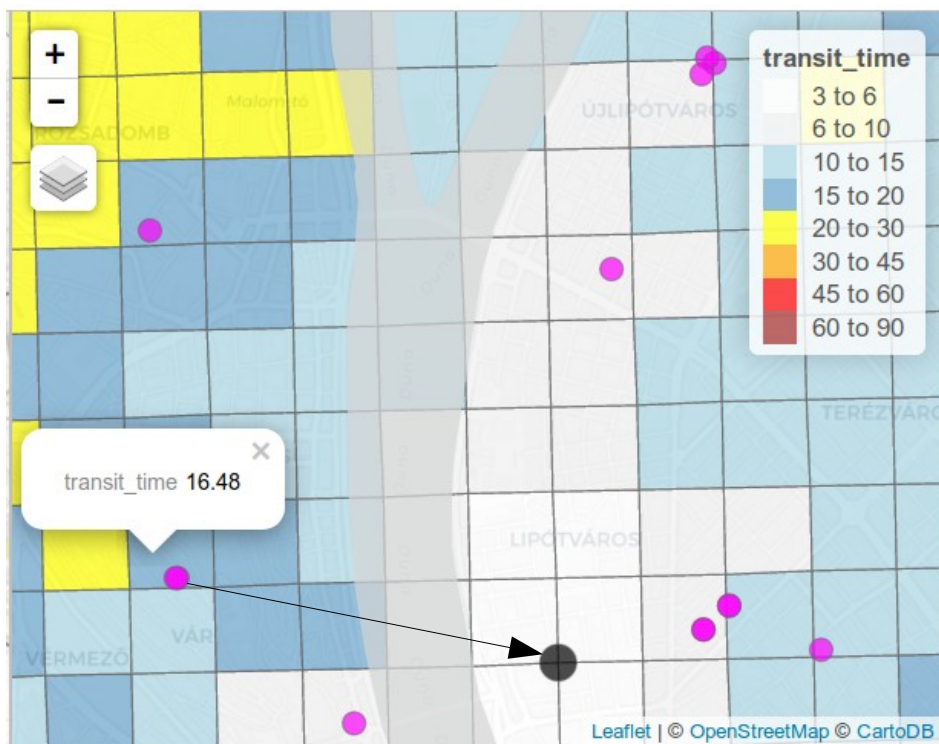




# How to make it automatic or at least semi-automatic with and GIS?

→ strongly simplified version @rpubs: <http://rpubs.com/bczernecki/388489>

**Confirmation: Distance != Time**





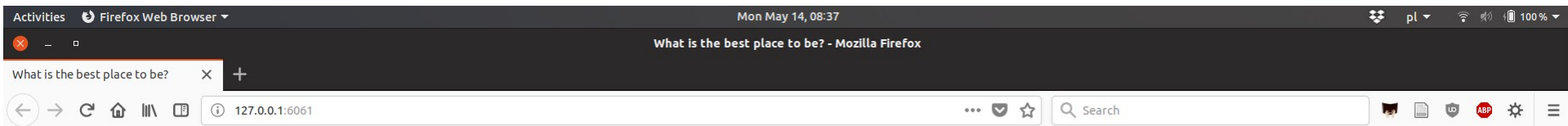
# How to make it automatic or at least semi-automatic with and GIS?



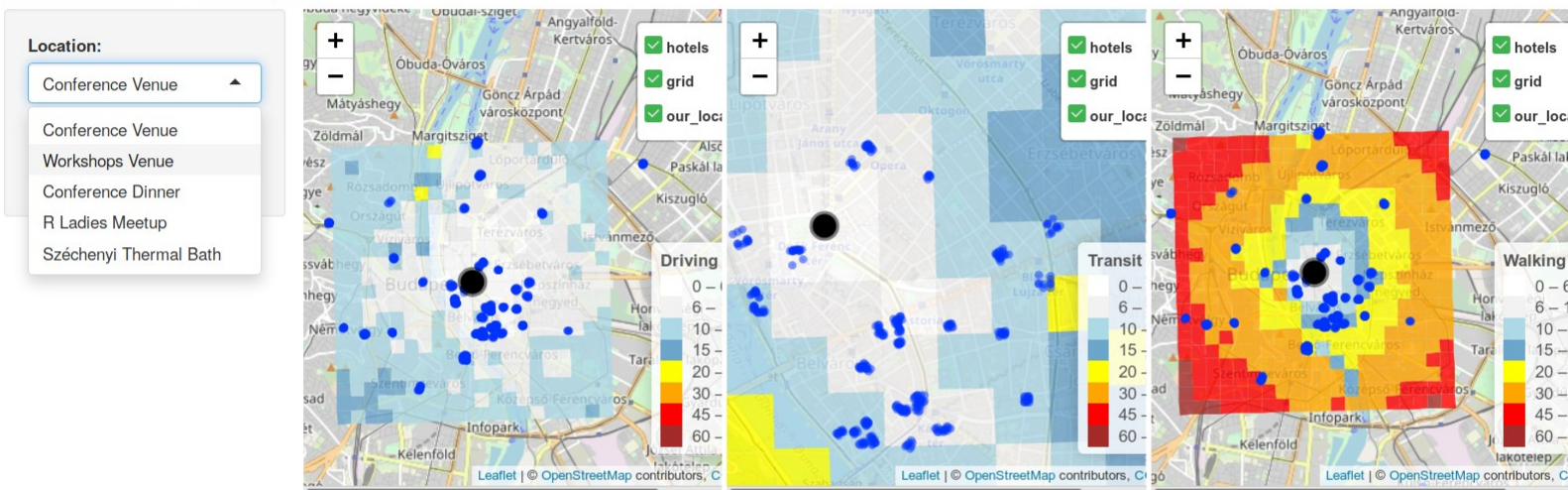
(5) Wrap up into

(for non-nerdy people) and

sum it up into table with sorted results (for data scientist)



What is the best place to be?







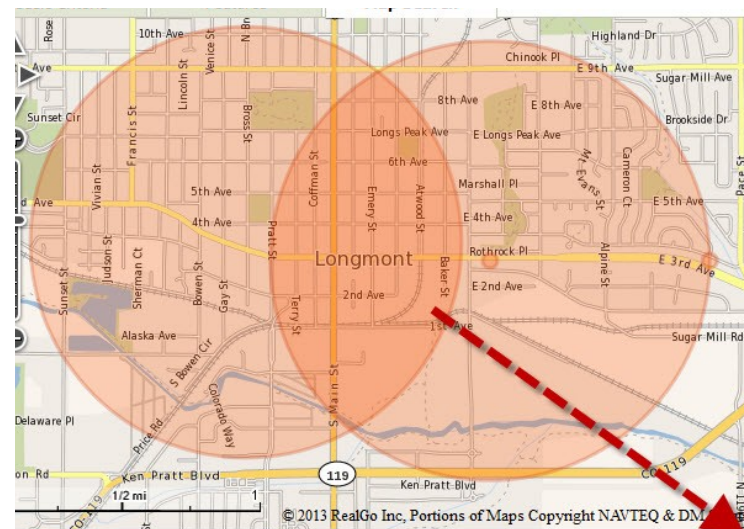
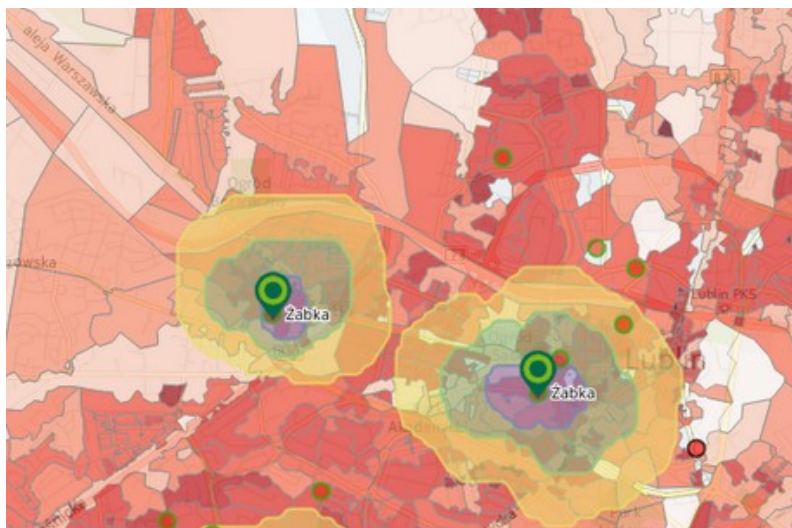
# PlaceR → application elsewhere

## Further ideas:

- Adding safety layer for districts
- Advanced filtering and broader statistics for particular locations
- Etc...

## Location intelligence (business) |

## Let's meet halfway



Thank you for  
your attention



ADAM MICKIEWICZ  
UNIVERSITY  
IN POZNAŃ

UNIVERSITY OF  
Cincinnati

iqdata.pl