Capstone project
The Battle of Neighborhoods

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Introduction

In this project I will try to find an optimal location for a Chines restaurant in my country. Specifically, this report will be targeted to stakeholders interested in opening an **Chinese restaurant** in **Budapest**, Hungary.

Since there are lots of fast food restaurants in Budapest I will try to detect **locations that are not already crowded with restaurants**. We are also particularly interested in **areas with no Chinese restaurants in vicinity**. We would also prefer locations **as close to city center as possible**, assuming that first two conditions are met. Advantages of each area will then be clearly expressed so that best possible final location can be chosen by stakeholders.

Introduction

Chinese restaurant in Budapest

Data

Based on definition of our problem, factors that will influence our decission are:

number of existing restaurants in the neighborhood (any type of restaurant)

number of and distance to Chinese restaurants in the neighborhood, if any

distance of neighborhood from city center.

Budapest- Palota

6 km circle neighbourhood

- Now let's create a grid of area candidates, equaly spaced, centered around city center and within ~6km from Alexanderplatz. Our neighborhoods will be defined as circular areas with a radius of 300 meters, so our neighborhood centers will be 600 meters apart.

- To accurately calculate distances we need to create our grid of locations in Cartesian 2D coordinate system which allows us to calculate distances in meters (not in latitude/longitude degrees). Then we'll project those coordinates back to latitude/longitude degrees to be shown on Folium map. So let's create functions to convert between WGS84 spherical coordinate system (latitude/longitude degrees) and UTM Cartesian coordinate system (X/Y coordinates in meters).
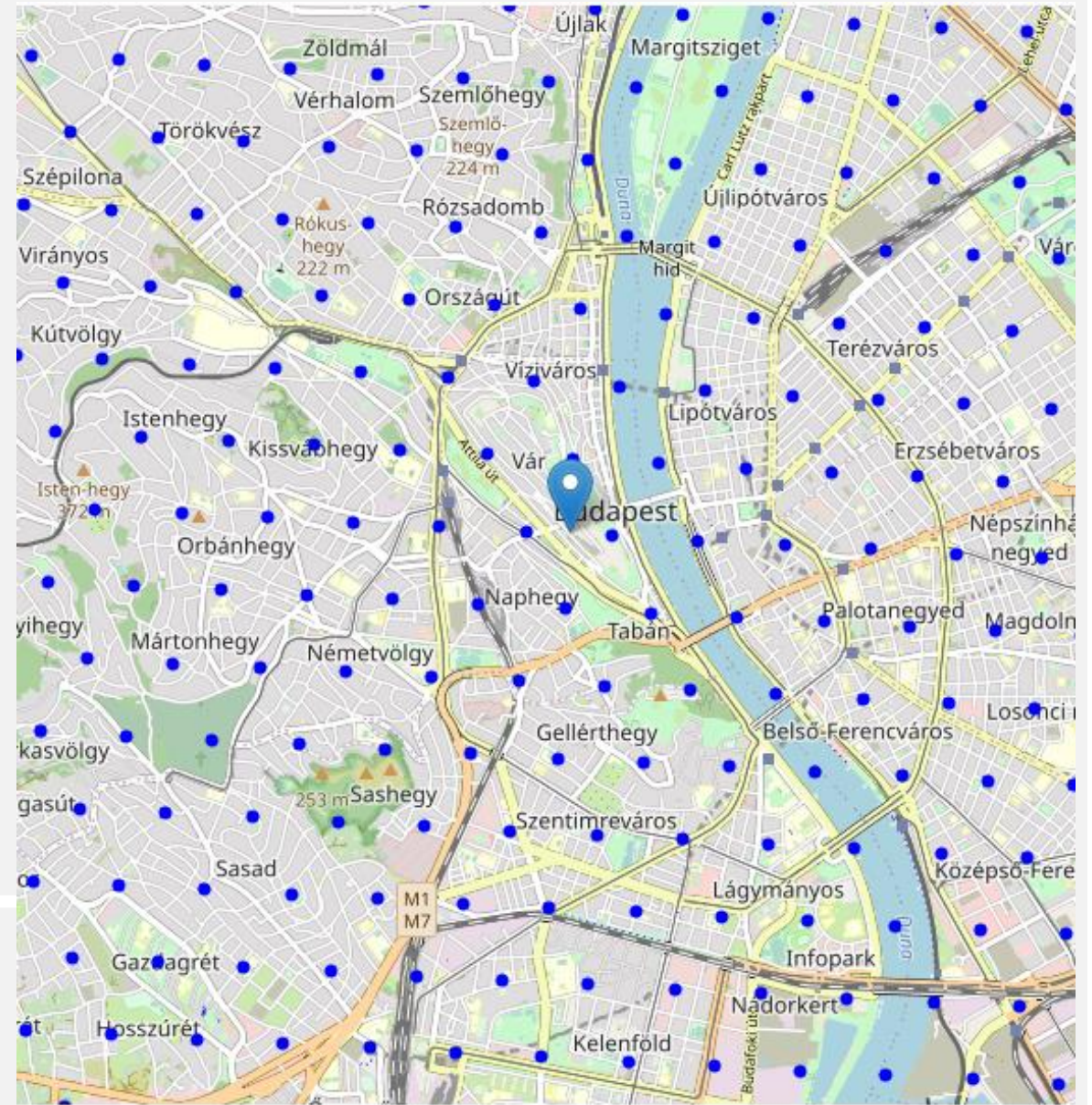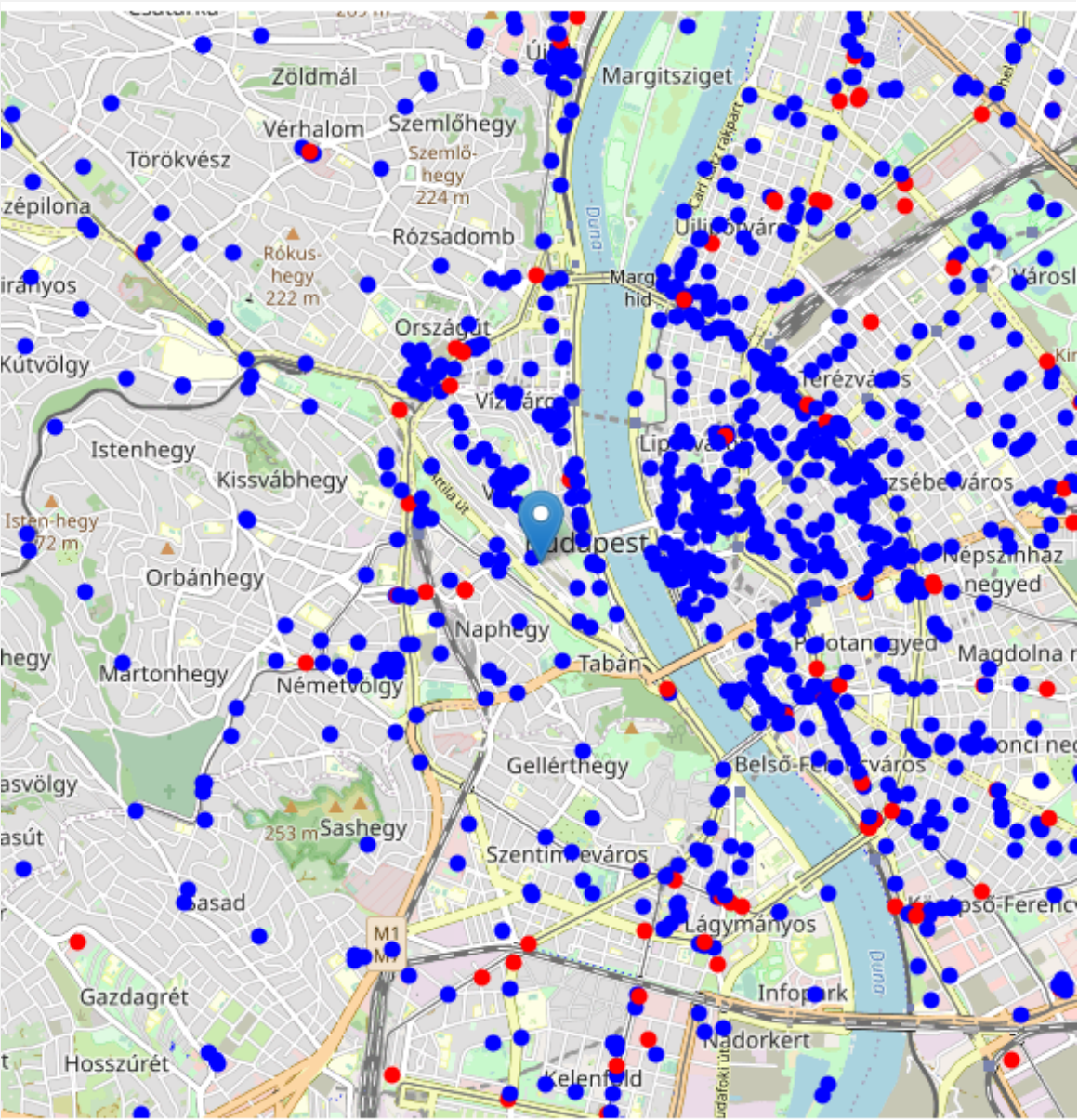
Budapest- Palota

6 km circle neighbourhood

- Total number of restaurants: 1195
- Total number of Chines restaurants: 107
- Percentage of Chines restaurants: 8.95%
- Average number of restaurants in neighborhood: 2.9148351648351647
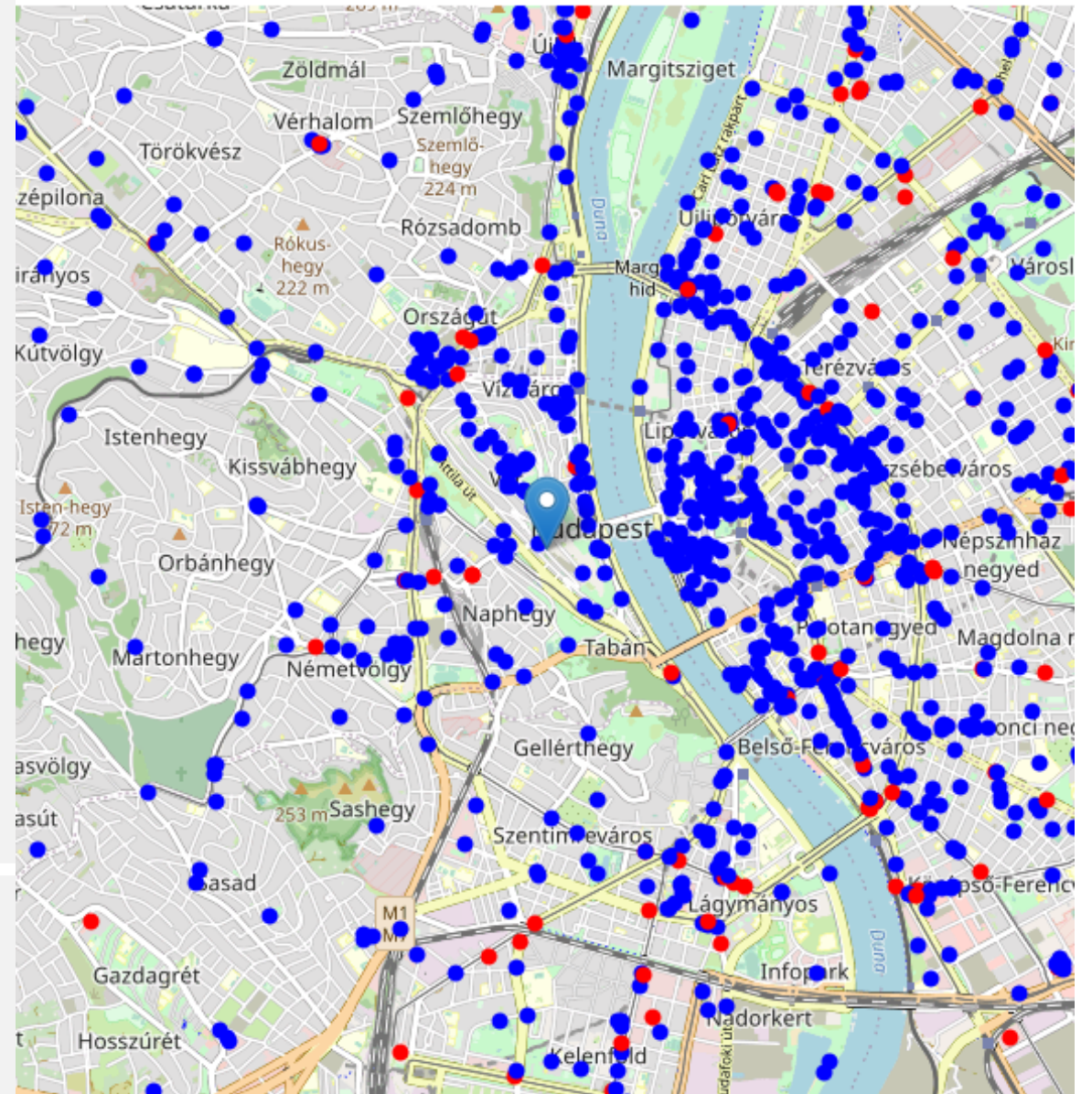
	Address	Latitude	Longitude	X	Y	Distance from center	Restaurants in area	
0	Budapest, Bedő u. 9, 1112 Hungary	47.446452	19.008445	802175.674296	5.262571e+06	5992.495307	1	
1	Budapest, Murányi u. 14, 1221 Hungary	47.446174	19.016384	802775.674296	5.262571e+06	5840.376700	0	
2	Budapest, Kubikos u. 3, 1116 Hungary	47.445895	19.024323	803375.674296	5.262571e+06	5747.173218	2	
3	Budapest, Verbéna u. 53, 1116 Hungary	47.445616	19.032262	803975.674296	5.262571e+06	5715.767665	0	
4	Budapest, Gyékényes u. 15, 1116 Hungary	47.445336	19.040200	804575.674296	5.262571e+06	5747.173218	0	
5	Budapest, Hunyadi János út 8, 1117 Hungary	47.445056	19.048139	805175.674296	5.262571e+06	5840.376700	0	
6	Budapest, Szikratávíró u. 12-14, 1211 Hungary	47.444774	19.056077	805775.674296	5.262571e+06	5992.495307	0	
7	Budapest, Egér út, 1112 Hungary	47.451533	18.996890	801275.674296	5.263091e+06	5855.766389	0	
8	Budapest, Repülőtéri út 6, 1112 Hungary	47.451255	19.004830	801875.674296	5.263091e+06	5604.462508	0	
9	Budapest, Ütköző sor 12, 1112 Hungary	47.450977	19.012770	802475.674296	5.263091e+06	5408.326913	0	

Budapest- Palota

Average distance to closest Chines restaurant from each area center: 906.6730769768445
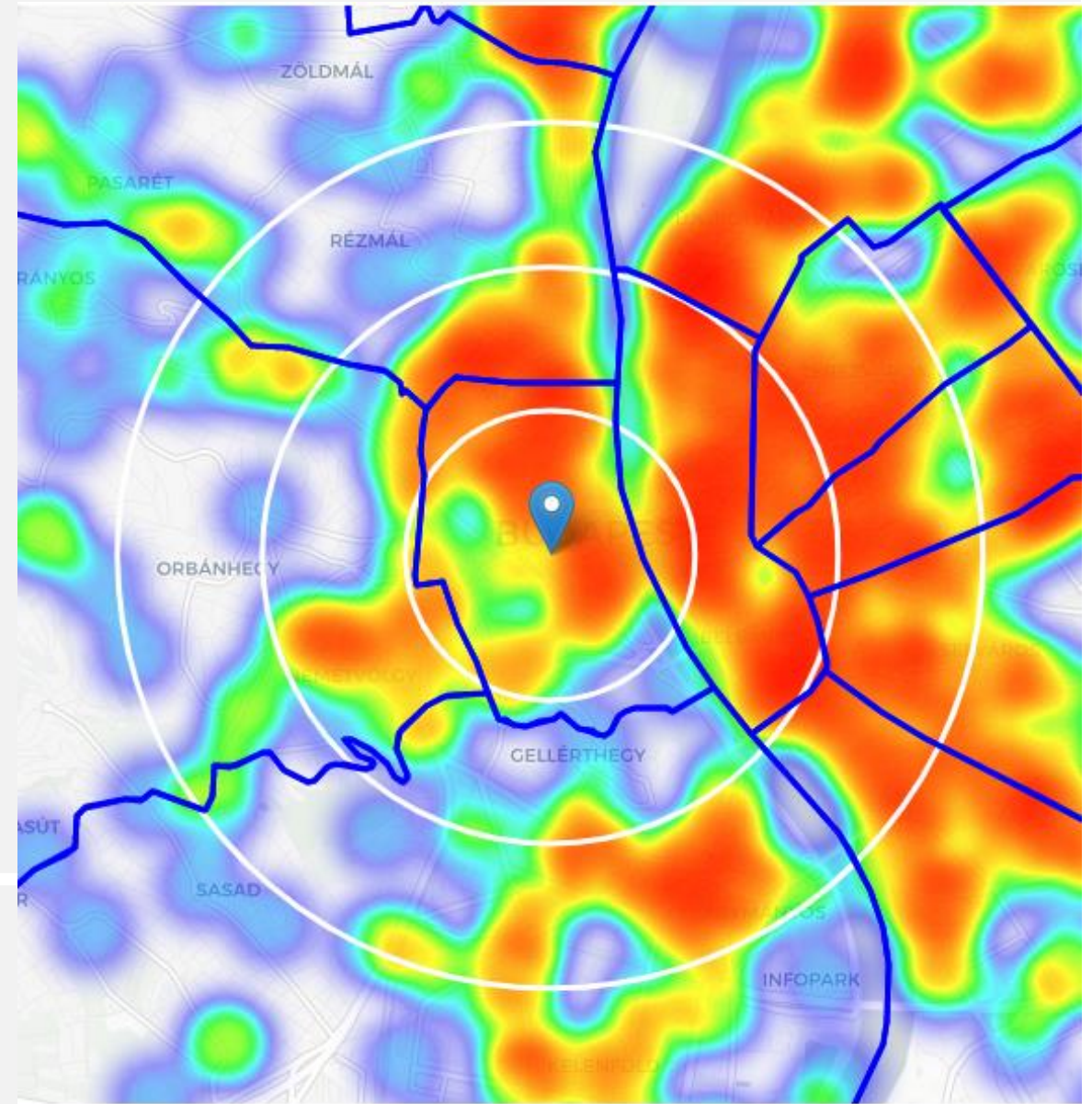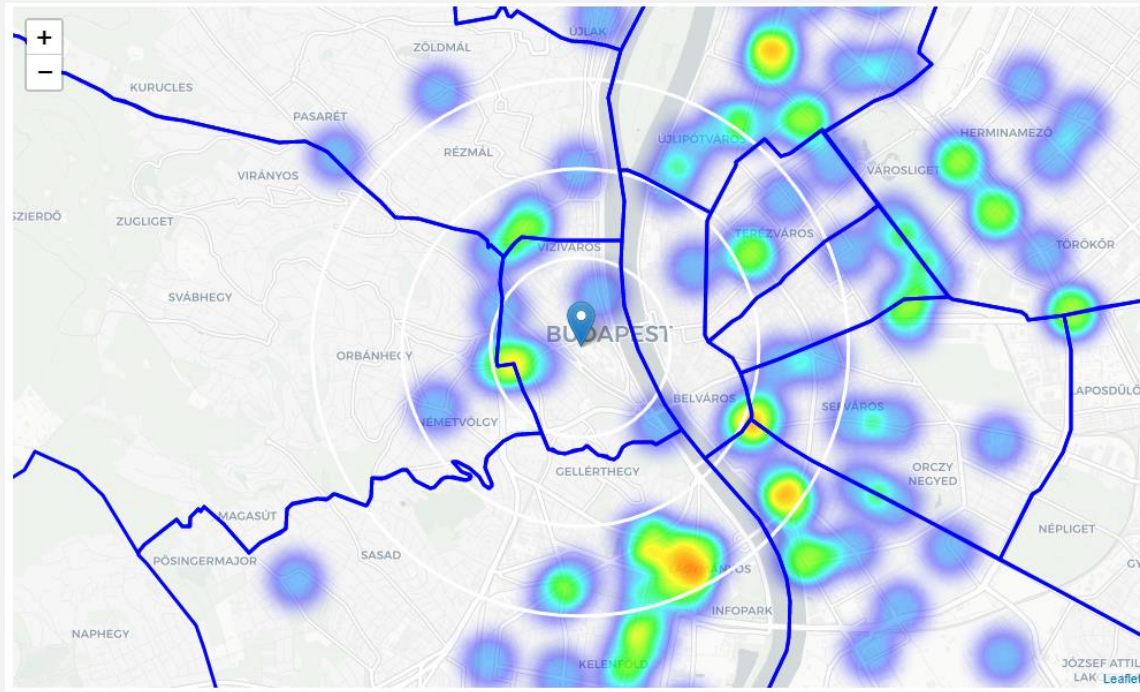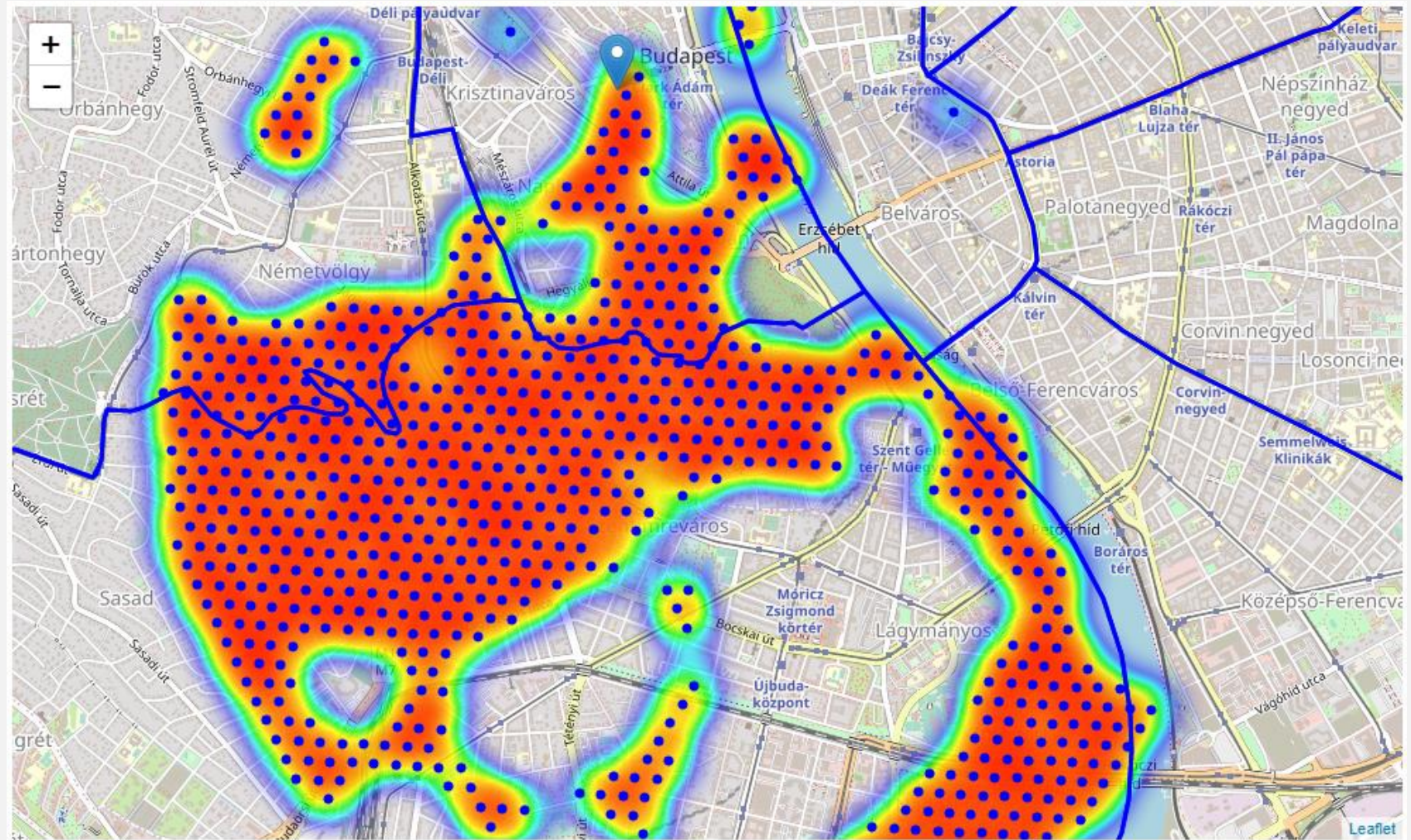
Budapest- Palota

- This map is not so 'hot' (Chines restaurants represent a subset of ~15% of all restaurants in Budapest) but it also indicates higher density of existing Chines restaurants directly north and west from Budapest Palota, with closest pockets of **low Chines restaurant density positioned east, south-east and south from city center**.

- Based on this we will now focus our analysis on areas *south-west, south, south-east and east from Budapest center* - we will move the center of our area of interest and reduce it's size to have a radius of **2.5km**.
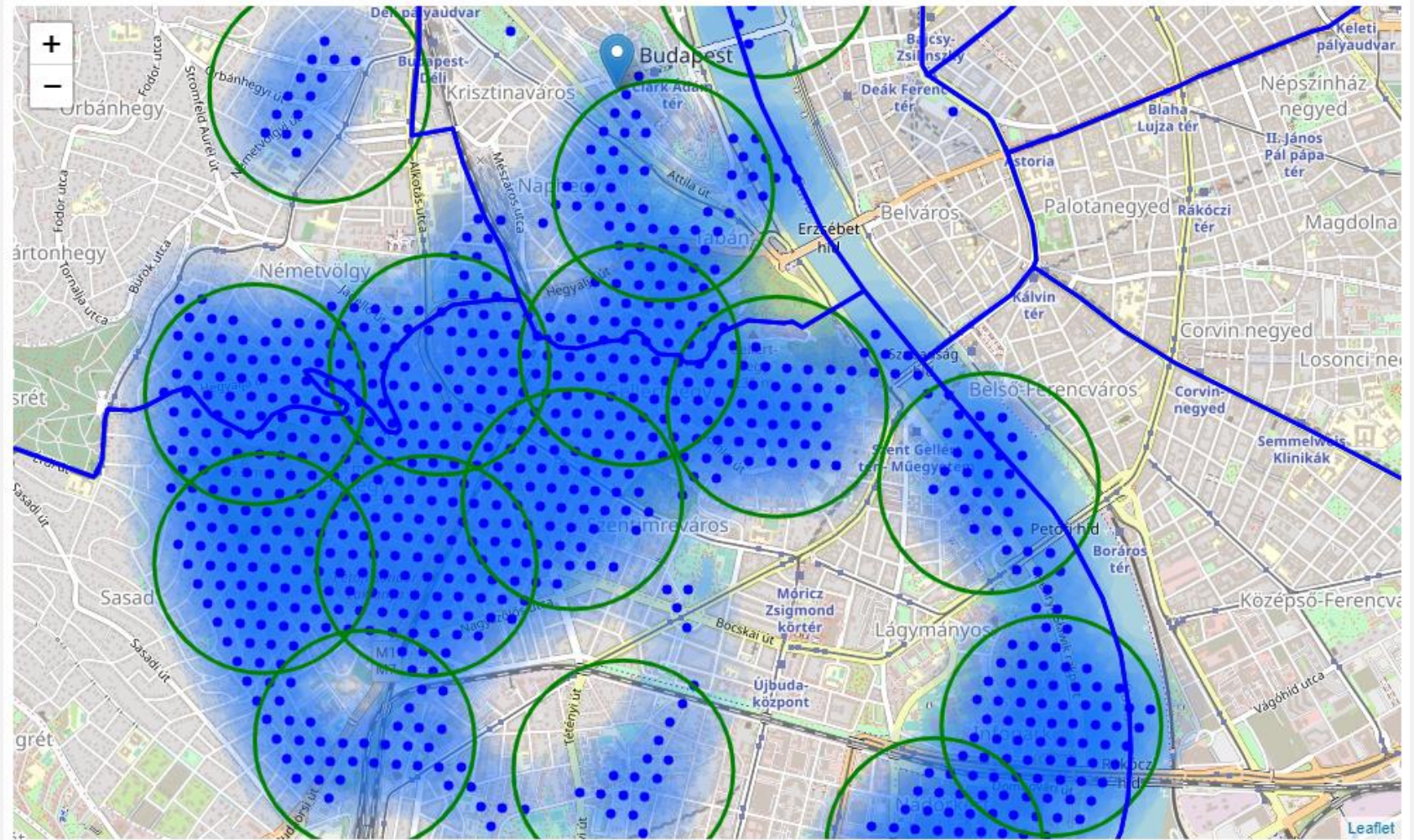
Budapest- Palota

- Looking good. What we have now is a clear indication of zones with low number of restaurants in vicinity, and *no* Chines restaurants at all nearby.

- Let us now **cluster** those locations to create **centers of zones containing good locations**. Those zones, their centers and addresses will be the final result of our analysis.

Budapest- Palota

- My clusters represent groupings of most of the candidate locations and cluster centers are placed nicely in the middle of the zones 'rich' with location candidates.

- Addresses of those cluster centers will be a good starting point for exploring the neighborhoods to find the best possible location based on neighborhood specifics.

- Let's see those zones on a city map without heatmap, using shaded areas to indicate our clusters:
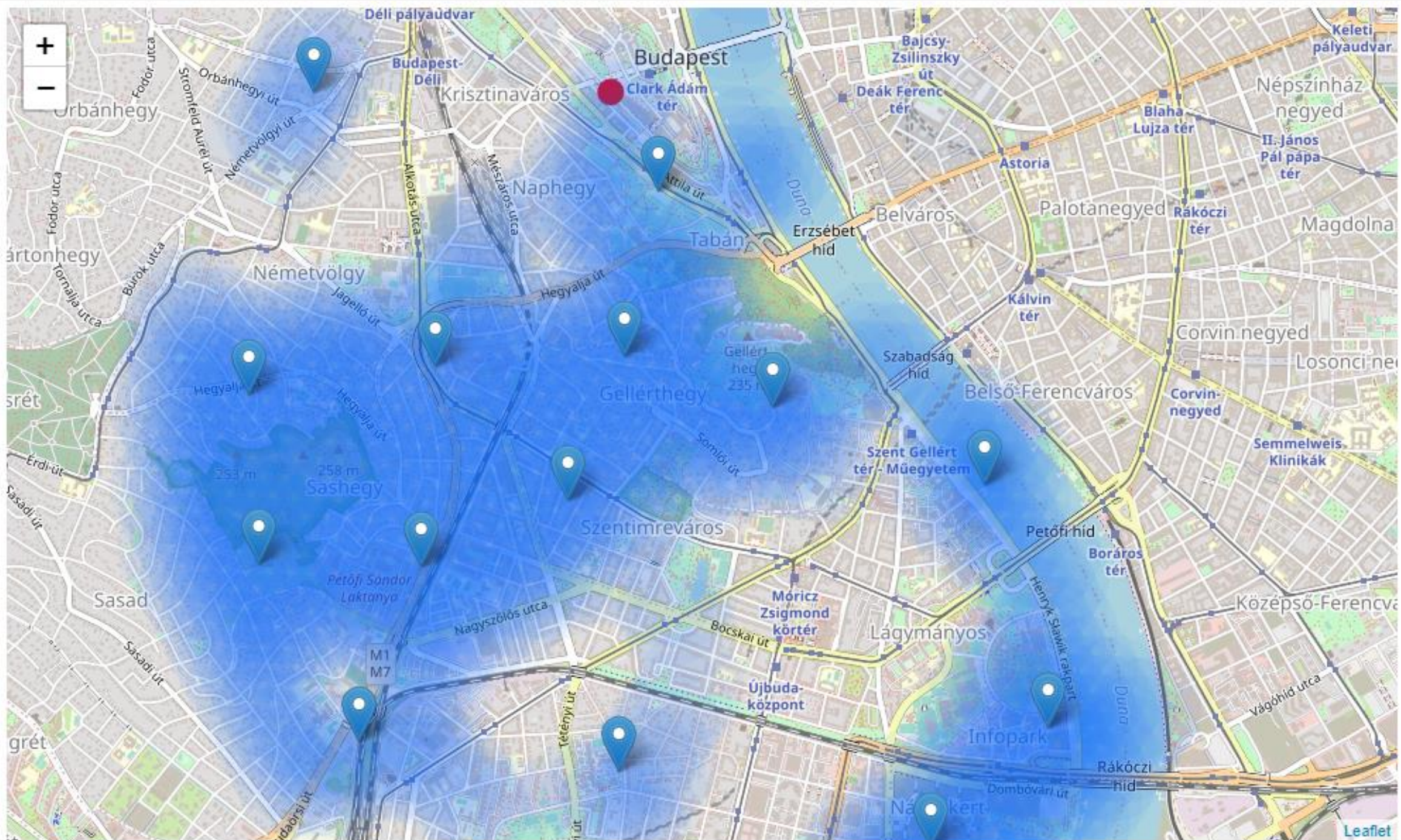
Result

- Our analysis shows that although there is a great number of restaurants in Budapest (~2000 in our initial area of interest which was 12x12km around Palota), there are pockets of low restaurant density fairly close to city center. Highest concentration of restaurants was detected north and west from Palota, so we focused our attention to areas south, south-east and east, corresponding to boroughs Vár, kastély and south-east corner of central Palace borough. Another borough was identified as potentially interesting (Kalrk Ádám square, north-east from Palota), but our attention was focused on Vár and Palota which offer a combination of popularity among tourists, closeness to city center, strong socio-economic dynamics *and* a number of pockets of low restaurant density.

- After directing our attention to this more narrow area of interest (covering approx. 5x5km south-east from Palota) we first created a dense grid of location candidates (spaced 100m appart); those locations were then filtered so that those with more than two restaurants in radius of 250m and those with an Chines restaurant closer than 400m were removed.

- Those location candidates were then clustered to create zones of interest which contain greatest number of location candidates. Addresses of centers of those zones were also generated using reverse geocoding to be used as markers/starting points for more detailed local analysis based on other factors.

- Result of all this is 15 zones containing largest number of potential new restaurant locations based on number of and distance to existing venues - both restaurants in general and Chines restaurants particularly. This, of course, does not imply that those zones are actually optimal locations for a new restaurant! Purpose of this analysis was to only provide info on areas close to Budapest center but not crowded with existing restaurants (particularly Chines) - it is entirely possible that there is a very good reason for small number of restaurants in any of those areas, reasons which would make them unsuitable for a new restaurant regardless of lack of competition in the area. Recommended zones should therefore be considered only as a starting point for more detailed analysis which could eventually result in location which has not only no nearby competition but also other factors taken into account and all other relevant conditions met.

Thank you!

👤 Dávid Kóczi