

Final Capstone Project - The Battle of Neighborhoods

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1) Introduction/Business Problem

My business partner and I want to open a student-oriented coffee shop near one of the universities in my hometown - Ekaterinburg, Russia. We had an argument about which university to choose, which area of our city can make most use of a new coffee shop and **which university does not have enough places in the vicinity to take a cup of coffee** to go or stay in and work.

In this project, I will try to find an **optimal location for a coffee shop in Ekaterinburg, Russia** targeted on college/university students and teachers. This report will help us choose the right location and help students and teachers have access to some good coffee during their day.

Since there are some places to grab coffee around local universities, I will try to detect one university that is **not already crowded with coffee shops**. If there will be multiple equal choices I would choose one **university that has more students**. I would also prefer locations **as close to city center as possible**, assuming that first two conditions are met.

I will generate a few most promising neighborhoods based on these criteria. Advantages of each area will then be clearly expressed so that best possible final location can be chosen.

2) Data

Based on definition of the problem, factors that will influence the decision are:

1. Number of existing coffee shops close to university (around 500 meters);
2. Number of students enrolled.
3. Distance of neighborhood from city center.

To extract/generate the required information I will need following data sources:

- a) Centers of candidate areas – universities located within 5500 meters from the city center, all of which will be obtained using Foursquare API.
- b) Number of coffee shops in the area will be obtained using Foursquare API.
- c) Number of students enrolled scraped from the Wikipedia page.

https://ru.wikipedia.org/wiki/%D0%A1%D0%BF%D0%B8%D1%81%D0%BE%D0%BA_%D0%B2%D1%8B%D1%81%D1%88%D0%B8%D1%85_%D1%83%D1%87%D0%B5%D0%B1%D0%BD%D1%8B%D1%85_%D0%B7%D0%B0%D0%B2%D0%B5%D0%B4%D0%B5%D0%BD%D0%B8%D0%B9_%D0%A1%D

[0%B2%D0%B5%D1%80%D0%B4%D0%BB%D0%BE%D0%B2%D1%81%D0%BA%D0%BE%D0%B9%D0%BE%D0%B1%D0%BB%D0%B0%D1%81%D1%82%D0%B8\).](#)

Exploratory Data Analysis: Area Candidates

I will create a dataset with latitude & longitude coordinates for local universities that are within 5500 radius of the City center.

Let us first find the latitude & longitude of Ekaterinburg city center, using specific, well-known address and Foursquare geocoding API:

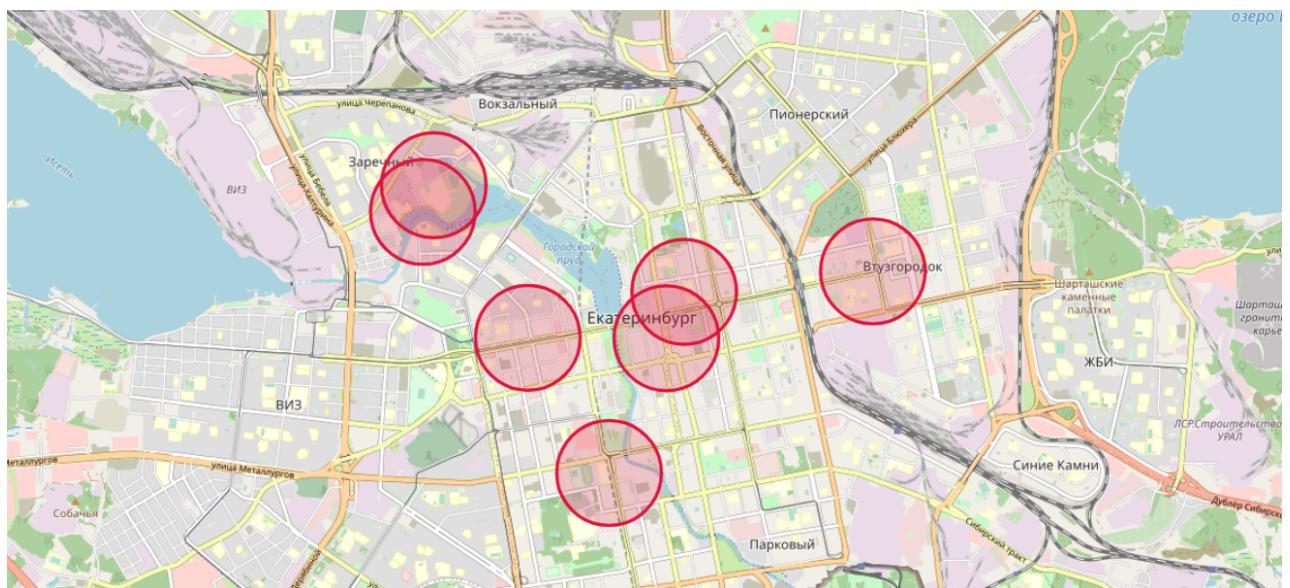
Ekaterinburg city center: 56.839104 60.60825

Now I will create a grid of area candidates, centered on universities. The neighborhoods will be defined as circular areas with a radius of 500 meters - 5-10 minutes walking distance.

After performing a search, I found seven universities that fit my criteria:

| | name | address | lat | lng | distance | id |
|---|---|--------------------|-----------|-----------|----------|--------------------------|
| 0 | Уральский федеральный университет имени перво... | просп. Ленина, 136 | 56.837324 | 60.590286 | 1111 | 51ae11d3498ee749a59e0898 |
| 1 | УрФУ им. Б.Н. Ельцина | просп. Ленина, 51 | 56.841270 | 60.614902 | 471 | 4c9fbb457c096dcb0e2de1d1 |
| 2 | Уральский Государственный Педагогический Униве... | Карла-Либнехта,9 | 56.837289 | 60.612107 | 309 | 4ca40d4a554b236a854f2c48 |
| 3 | УргЭУ / USUE | ул. 8 Марта, 62 | 56.825709 | 60.603077 | 1524 | 4d01c53037caa1cdfc9de047 |
| 4 | URAL STATE UNIVERSITY OF RAILWAY TRANSPORT | Kolmogorova 66 | 56.850434 | 60.575475 | 2360 | 564bf866498e686dd88f9b78 |
| 5 | Ural State Law University | Колмогорова 54 | 56.848147 | 60.573745 | 2329 | 55f8fc7f498e7f74a0b7653c |
| 6 | Ural State Technical University | Mira 21 | 56.817324 | 60.612173 | 2436 | 4cc83654de08199cf204ed5e |

I will now visualize my area candidates on the city map using Folium maps.



Exploratory Data Analysis: Foursquare

Now that we have our location candidates, let us use Foursquare API to get info on coffee shops in each neighborhood.

We are interested in venues in 'coffee shops' category, so we will include in our list only venues that fit these criteria. Results were as follows:

University #0

| | categories | name | lat | lng |
|----|-------------|--------------------------------|-----------|-----------|
| 0 | Coffee Shop | Simple Coffee | 56.836537 | 60.588000 |
| 1 | Coffee Shop | #CoffeeLovers | 56.836261 | 60.594912 |
| 2 | Coffee Shop | Engels | 56.833655 | 60.592192 |
| 3 | Coffee Shop | Double B Coffee & Tea (Даблби) | 56.835038 | 60.590711 |
| 4 | Coffee Shop | Starbucks | 56.836621 | 60.595589 |
| 5 | Coffee Shop | Coffee Project | 56.835851 | 60.595182 |
| 6 | Coffee Shop | Simple Coffee | 56.833446 | 60.592467 |
| 7 | Coffee Shop | Starcups coffee | 56.835810 | 60.594700 |
| 8 | Coffee Shop | Breakfast Unit | 56.835094 | 60.596972 |
| 9 | Coffee Shop | Surf Coffee | 56.835931 | 60.596389 |
| 10 | Coffee Shop | Good-coffee | 56.836649 | 60.594985 |
| 11 | Coffee Shop | Bow Jones Coffee | 56.839267 | 60.593730 |

University #1

| | categories | name | lat | lng |
|---|-------------|-------------------|-----------|-----------|
| 0 | Coffee Shop | Simple Coffee | 56.839292 | 60.615014 |
| 1 | Coffee Shop | Papa Carlo Coffee | 56.838019 | 60.609915 |
| 2 | Coffee Shop | Espresso Season | 56.836576 | 60.606505 |
| 3 | Coffee Shop | Engels | 56.839335 | 60.614723 |
| 4 | Coffee Shop | Скворечник | 56.839912 | 60.609209 |

University #2

| | categories | name | lat | lng |
|----|-------------|-------------------|-----------|-----------|
| 0 | Coffee Shop | Simple Coffee | 56.839292 | 60.615014 |
| 1 | Coffee Shop | Engels | 56.839335 | 60.614723 |
| 2 | Coffee Shop | Maybe Cup | 56.840515 | 60.610720 |
| 3 | Coffee Shop | Скворечник | 56.839912 | 60.609209 |
| 4 | Coffee Shop | New York Coffee | 56.842413 | 60.616523 |
| 5 | Coffee Shop | Starcups coffee | 56.839775 | 60.620480 |
| 6 | Coffee Shop | Papa Carlo Coffee | 56.838019 | 60.609915 |
| 7 | Coffee Shop | Коффис | 56.840889 | 60.611229 |
| 8 | Coffee Shop | Red Cup | 56.839017 | 60.610876 |
| 9 | Coffee Shop | Red Cup | 56.839822 | 60.619476 |
| 10 | Coffee Shop | D-cup | 56.845142 | 60.615932 |

University #3

| | categories | name | lat | lng |
|---|-------------|---------------|-----------|-----------|
| 0 | Coffee Shop | Sky18 | 56.823904 | 60.605148 |
| 1 | Coffee Shop | Simple Coffee | 56.823050 | 60.605402 |
| 2 | Coffee Shop | Кофеин | 56.823427 | 60.605746 |
| 3 | Coffee Shop | Viking Coffee | 56.829970 | 60.600605 |

University #4

No coffee shops in the area

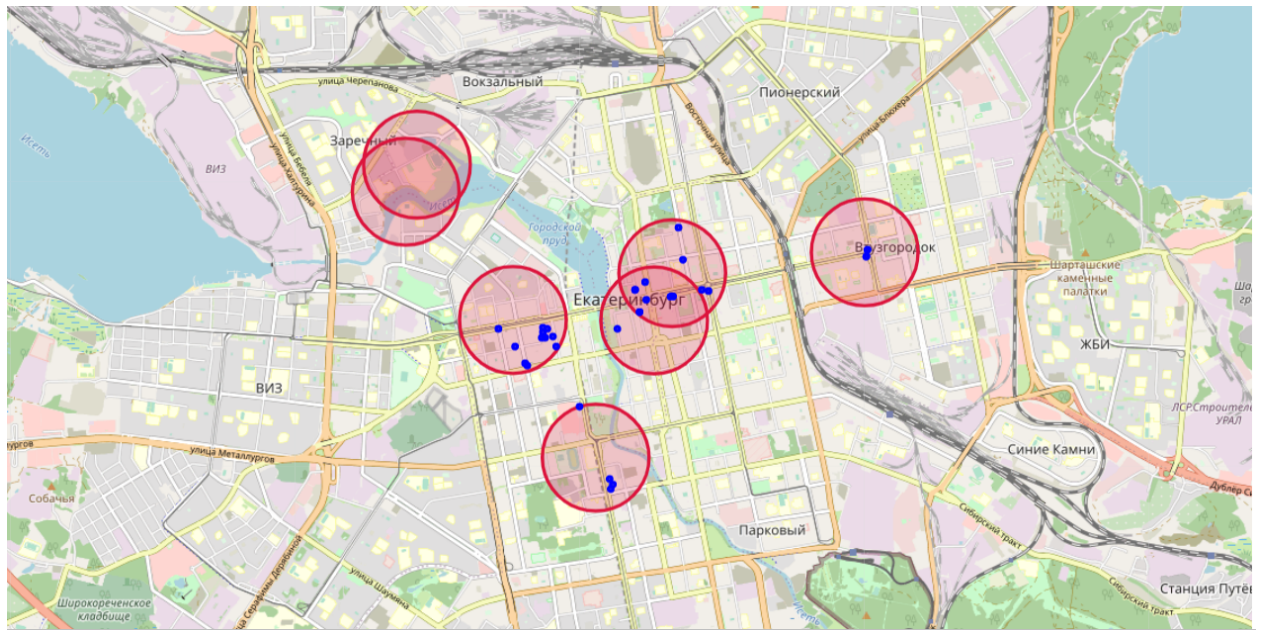
University #5

No coffee shops in the area

University #6

| | categories | name | lat | lng |
|---|-------------|----------------|-----------|-----------|
| 0 | Bakery | Поль Бейкери | 56.843214 | 60.645005 |
| 1 | Coffee Shop | Cup-cup Coffee | 56.842725 | 60.644823 |

Results are already interesting and I think I can see some winners. I will now visualize the results by putting them on my initial map.



Now I can clearly define that students of Universities #4 and #5 are living a sad sleepy life with NO coffee shops in the vicinity! While students of central universities are exposed to a whole bunch of great coffee shops.

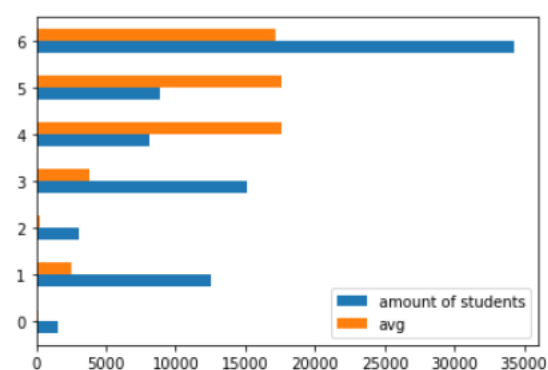
However, maybe there are not enough students and University #6 may make more use out of a good coffee shop? I will compare the numbers of students in these three universities and make a conclusion.

| | name | lat | lng | No of coffee shops | amount of students | avg |
|---|---|-----------|-----------|--------------------|--------------------|---------|
| 0 | Уральский федеральный университет имени первог... | 56.837324 | 60.590286 | 11 | 1523 | 138.0 |
| 1 | Уральский Государственный Педагогический Униве... | 56.837289 | 60.612107 | 5 | 12586 | 2517.0 |
| 2 | УрФУ им. Б.Н. Ельцина | 56.841270 | 60.614902 | 10 | 3070 | 307.0 |
| 3 | УрГЭУ / USUE | 56.825709 | 60.603077 | 4 | 15151 | 3788.0 |
| 4 | URAL STATE UNIVERSITY OF RAILWAY TRANSPORT | 56.850434 | 60.575475 | 0 | 8141 | 17602.0 |
| 5 | Ural State Law University | 56.848147 | 60.573745 | 0 | 8921 | 17602.0 |
| 6 | Ural State Technical University | 56.843034 | 60.644628 | 2 | 34326 | 17163.0 |

I have added three columns showing:

- a) the number of coffee shops in each university area;
- b) the number of students currently enrolled in each university (Wikipedia page) and
- c) divided the number of students by the number of coffee shops to see the average density of students per each coffee shop.

Now I want to visualize this result so that it is clearly defined.



As we see, the amount of students is high for the university with index 6 but the average amount of students per coffee shop there is a bit lower than the ones for universities #4 and #5 because they have no coffee shops at all while university

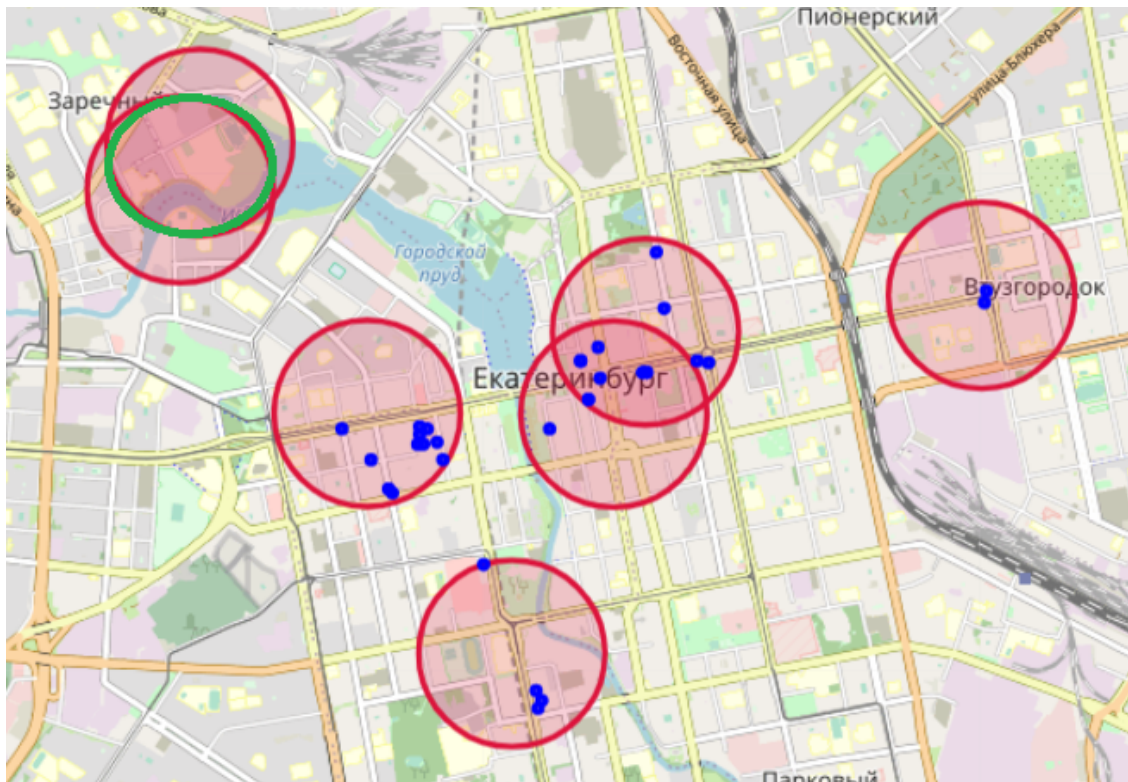
#6 has two. I will go deeper and compare the amount of students that will potentially

3) Methodology

For this report, I used a few different maps that could help me and my partner to decide the best area to open a student-oriented coffee shop in Ekaterinburg based on the density of students per coffee shop. In order to do that I have used Foursquare data about coffee shops in selected areas and combined with information about the number of students enrolled in each university from the web to visually display the area with more students per existing coffee shops.

4) Results

Looking at the result, we can notice the majority of the coffee shops is grouped in the areas closer to the City center, while some universities have no walking access to any coffee shops. Therefore, we decided to choose the area between universities #4 and #5 as shown in green on the picture below:



Therefore, if we would open a coffee shop in the green location there will be near 17000 students (from both university #4 and #5 per this one coffee shop. Although University #6 has more students than these, two combined, the average number of students for our coffee shop will be a little bit higher and we will have no competition while someone else had not decided to open another coffee place in the area.

5) Discussion

When I first decided to create this study, I was expecting to find an area near one of the universities that will benefit most from our coffee shop. I suspected that universities closer to the center of the city may have a bigger choice of places to grab a coffee to go and figured that that is the place where there are more students. However, I never knew that almost half of the universities in our town have no coffee shops in the vicinity at all so if the students wanted to grab a coffee they will need to go all the way to the city center – where students from central universities already crowd it. Potentially I have found two great areas for opening a coffee shop, so if we will want to open a second one in the future or if any stakeholder may ask for the advice – I can clearly define areas most beneficial for a new student oriented coffee shop in Ekaterinburg.

6) Conclusion

This report is helpful for someone planning to open a student-oriented coffee shop in Ekaterinburg. We compared the current offers and area profiles, however it may not cover all variables such as possible proximity to business centers, local restaurants and other categories of food places that may serve coffee in the mornings, so it shall not be used as a single decision making tool. As my friend and I are already aquatinted with all the researched areas, results of this report are very useful for our further business planning.