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O1 Introduction & Business Problem

Problem Background

 Being able to express yourself to an audience is important for aspiring musicians. While uploading your tracks to web audience lets you gain publicity, it's just as important to perform live. It might be hard to do if you live in a small city or one without any live music clubs. Analysing foursquare data allows determining what city has the best distribution of music clubs.

Problem Description

- An up-and-coming indie music band is looking for a city
 to move. They decided they will choose one of major
 Polish cities: Cracow, Poznan, Warsaw or Wroclaw. It's
 important for them to live in a city where they will have
 opportunities to play their songs and listen to other
 fresh music groups.
- The city with most music venues and musics stores with best spatial distribution and ratings of facilities will

O1 Introduction & Business Problem

Target Audience

 Finding the best location for musicians will interest both artists and their audience.

Success Criteria

 The success criteria of this project is recommending the best of selected cities based on availability of music venues

O2 Data

- Geopy -city coordinates
- Foursquare finding venues and their details

geopy

```
geopy
In [3]: from geopy.geocoders import Nominatim #import the function
geolocator = Nominatim(user_agent="capstone") #define geola
location = geolocator.geocode('New York City') #look up the
location

Out[3]: Location(New York, United States of America, (40.7127281, -
74.0060152, 0.0))
In [4]: latitude = location.latitude
longitude = location.longitude
"{}, {}".format((latitude),(longitude))
Out[4]: '40.7127281, -74.0060152'
```

Foursquare

| | Name | Address | id | Lat | Lng |
|---|-------------------------|--------------------|--------------------------|-----------|-----------|
| 0 | Harris Piano Jazz | Rynek Główny 28 | 4bbf90a2b492d13a4fdfa260 | 50.061703 | 19.935660 |
| 1 | Jazz Rock Cafe | Sławkowska 12 | 4befe97724f19c747926f983 | 50.063866 | 19.937492 |

O2 Data

The main objective is to find the city with best music clubs and stores while considering their distribution. In first step information about music-related venues is fetched from FourSquare in each city. Then the venues were clustered by their location - the biggest cluster was considered a representation of a city - the distance within cluster as simplified distribution of the venues and their rating.

O3 Methodology

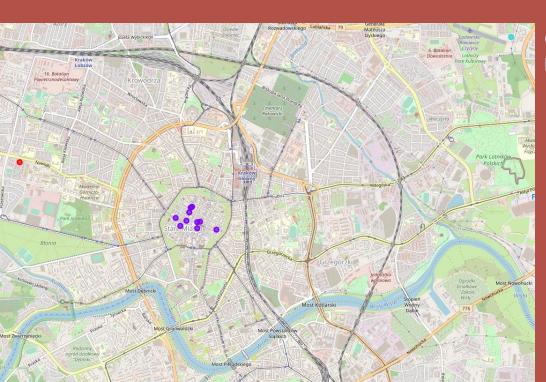
Cracow

O4 Results Cracow



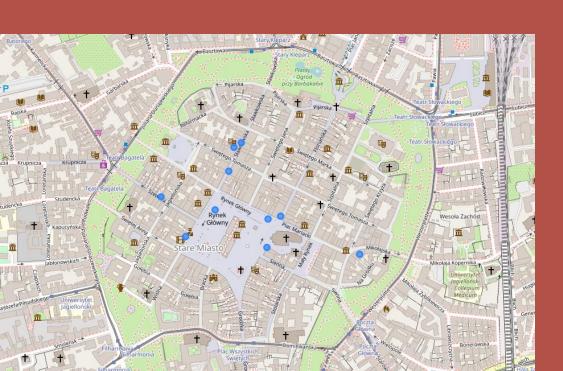
There are 15 music clubs and stores in Cracow. Most of them are concentrated old town. There are two single outliers - one far east and one east and a group of three venues Podgorze district.

O4 Cracow



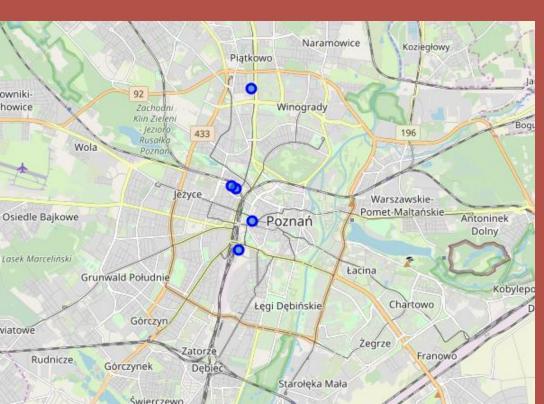
Cracow was divided into 4 clusters, with the most populated containing 10 venues.

O4 Cracow



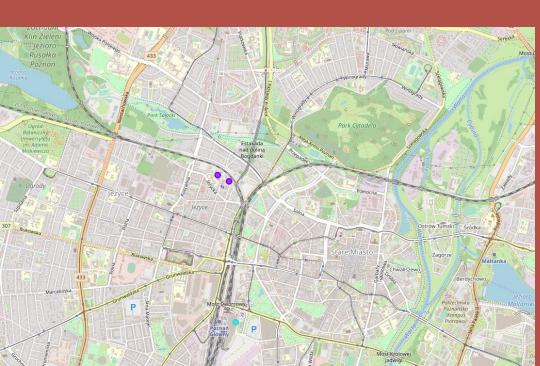
Poznan

O4 Results Poznan



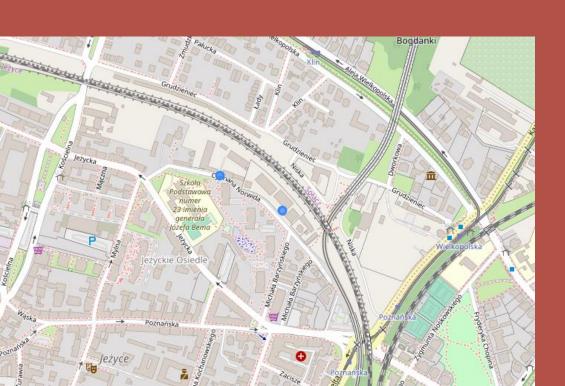
In Poznan there are 5 venues, distributed roughly around straight line.

O4 Results Poznan



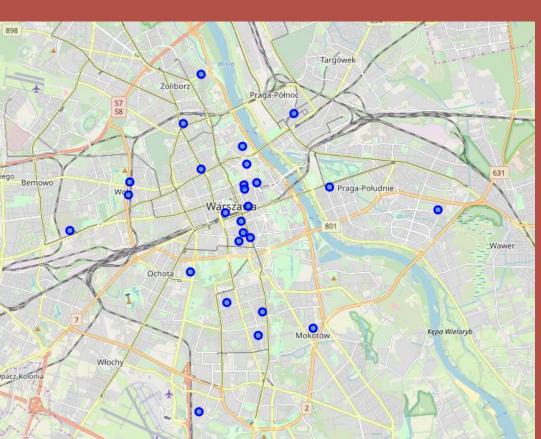
The winning cluster in Poznan has only 2 venues. At this point it's obvious that Poznan is the worst city for the objective of this project.

O4 Results Poznan



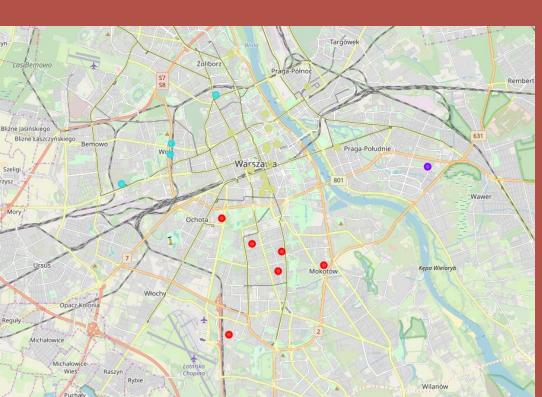
Warsaw

O4 Results Warsaw



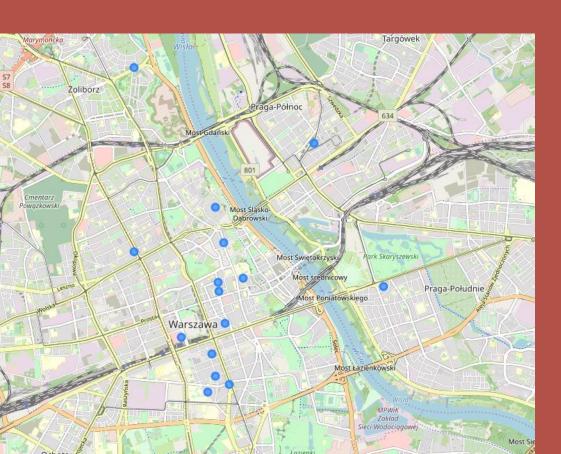
There are 26 venues in Warsaw, spread out all over the city in different districts, with majority of them in the city centre.

O4 Results Warsaw



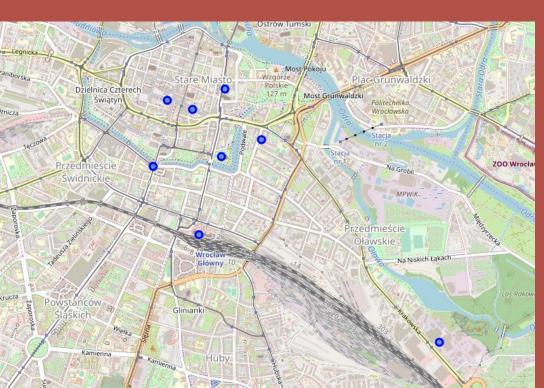
The biggest cluster in Warsaw is populated by 15 venues. Warsaw has both most venues overall and when considering the biggest cluster.

O4 Results Warsaw



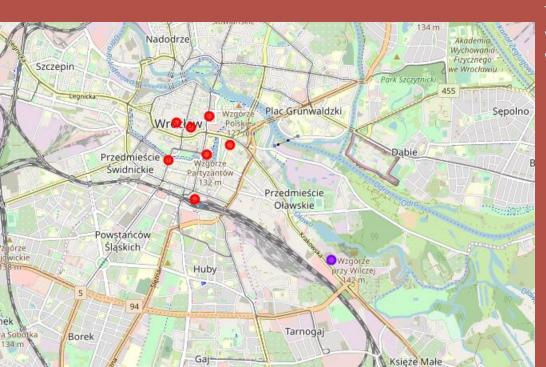
Wroclaw

O4 Results Wroclaw



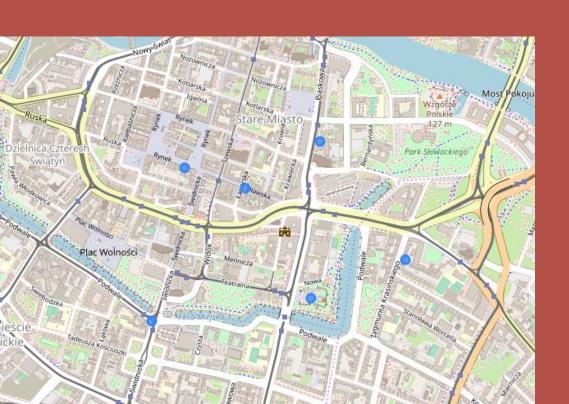
There are 26 venues in Warsaw, spread out all over the city in different districts, with majority of them in the city centre.

O4 Results Wroclaw



The biggest cluster in Warsaw is populated by 15 venues. Warsaw has both most venues overall and when considering the biggest cluster.

O4 Results Wroclaw



O4 Results Cluster analysis

Distance within clusters

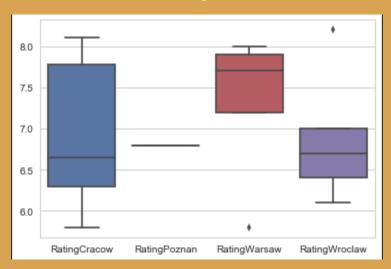
Venue rating in winning clusters

| City | Number of venues in biggest cluster | Mean distance |
|---------|--|------------------|
| Cracow | 10 | 0.024 |
| Poznan | 2 | 0.021 |
| Warsaw | 15 | 0.059 |
| Wroclaw | 7 | 0.018 |

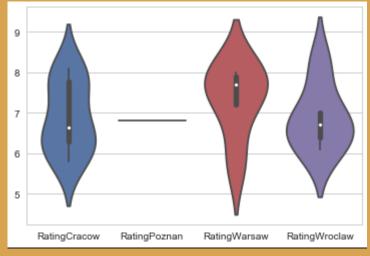
| | Cracow | Poznan | Warsaw | Wroclaw |
|-------|--------|--------|--------|---------|
| count | 10 | 1 | 5 | 5 |
| mean | 6.89 | 6.8 | 7.32 | 6.88 |
| std | 0.86 | NaN | 0.90 | 0.81 |
| min | 5.8 | 6.8 | 5.8 | 6.1 |
| 25% | 6.3 | 6.8 | 7.2 | 6.4 |
| 50% | 6.65 | 6.8 | 7.7 | 6.7 |
| 75% | 7.775 | 6.8 | 7.9 | 7.0 |
| max | 8.1 | 6.8 | 8.0 | 8.2 |

O4 Results Cluster analysis

Box plot



Violin plot



Poznan lacks music facilities. Cracow and Wroclaw are similar when considering venues' location and ratings.

- While the biggest cluster in Warsaw had 15 venues, only 5 of them were rated, which may indicate that Cracow is more popular among City Guide users. Further characterization of an average City Guide user is needed for more complex conclusions.
- Based on this analysis, Cracow is the best city for up-and-coming music band. There
 are many music venues both clubs and stores with good ratings. Secondary choice
 is Warsaw it's the biggest city in Poland with most venues, but due to limited
 information rating data is uncertain. While free Foursquare API access gives access
 to vast amounts of data, query limit can be an issue.

O5 Discussion

O6 Conclusions

- The best city for up-and-coming indie music band is Cracow - it has good ammount of quality music clubs and stores and is a popular tourist destination. Close second is Warsaw, thanks to being the biggest city in Poland it has the most venues overall, but not many of them popular among City Guide users.
- Wroclaw is a smaller city with less venues, but when considering city centre the results were similar to Cracow.
- Poznan is the worst choice it simply lacks venues.