

The restoration of the playground or the construction of a shopping center

Background

In Shchelkovo, Moscow region, Russia, at 55.916471°N, 37.994031°E, a children's playground was closed and trees were cut down in preparation for the construction of a shopping center. The situation caused a public outcry and construction was stopped for a final decision.

Problem

The question being addressed in this analysis is: should a playground be restored at this location, or should the construction of a shopping center continue?

Interest

The stakeholder is the city administration, which manages the sustainable development of the city and decides on further construction. The city administration tries to avoid social discontent in society in the face of irritated mothers with children. On the other hand, it seeks to develop businesses that lead to the prosperity of the city, create new jobs and increase tax revenues to the budget, including increasing the welfare of townspeople's and the prestige of the city administration.

Data sources:

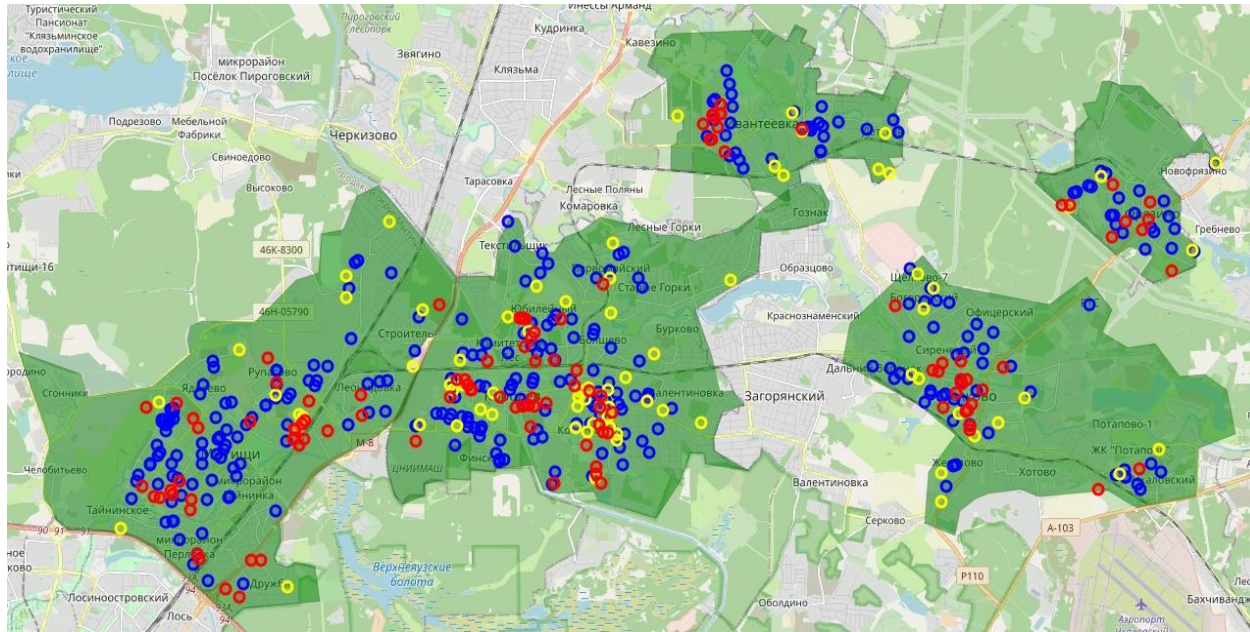
1. all-Russian statistics on the level of education, which shows the number of children in Russia aged 2 months to 7 years, and the number of kindergartens;
2. all-Russian statistics on the birth rate, which shows the total number of Russians;
3. the number of townspeople's in the study, for example, Shchelkovo;
4. normative document on the average number of children in kindergarten;
5. Python library for determining the geographical coordinates of the city under study;
6. Foursquare to search for research objects and determine geographical coordinates, for example, kindergartens in the city of Shchelkovo;
7. Yandex for in-depth search of research objects and determining geographical coordinates, for example, kindergartens in the city of Shchelkovo;
8. Geojson.io for plotting on a map the boundaries of the city in the format GeoJSON.

Analytical processing of city data frames

	Name	Townspeople	Children	Kinder garten	Playgro und	Shopping center	Children per kindergar ten	Children per playgrou nd	Townspe ople per shopping center
0	Shchelkovo	126109	6431	47	13	19	136	494	6637
1	Korolyov	225858	11518	101	39	40	114	295	5646
2	Mytishchi	235504	12010	92	14	35	130	857	6728
3	Fryazino	59535	3036	22	4	9	138	759	6615
4	Ivanteevka	81254	4143	31	8	13	133	517	6250

The number of kindergartens, playgrounds and shopping centers in Shchelkovo is not inferior to the average value for neighboring cities.

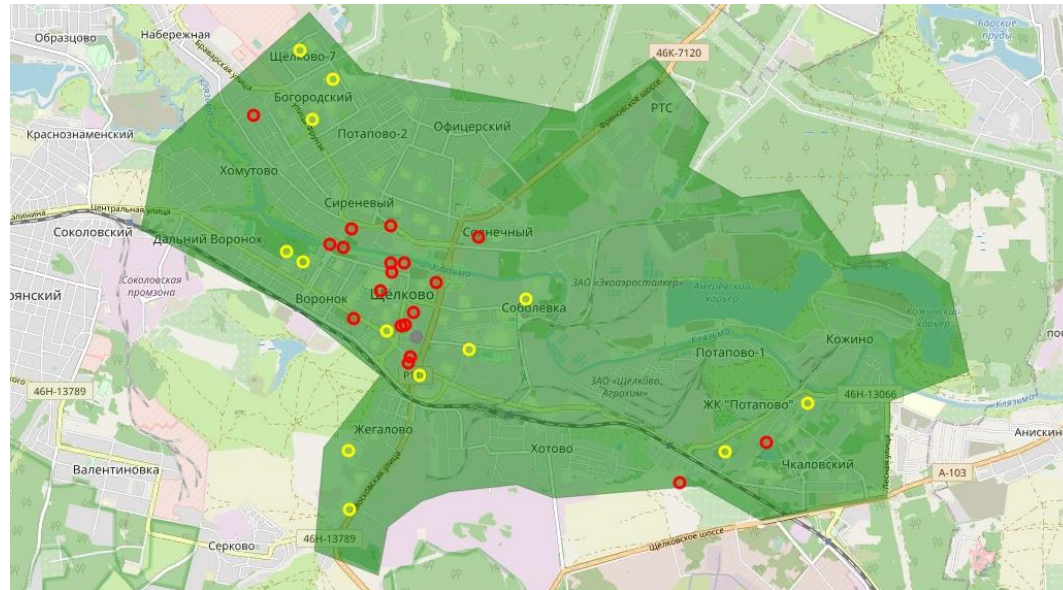
Visualization of found objects on the city map



kindergartens are highlighted in blue, shopping centers in red, playgrounds in yellow, and the city borders are highlighted in green

Kindergartens are located evenly, there are few playgrounds, they are mostly scattered, and shopping centers are concentrated in the regions or rarely located separately on the outskirts of the city. An urban area can be divided by a large object, such as an industrial development.

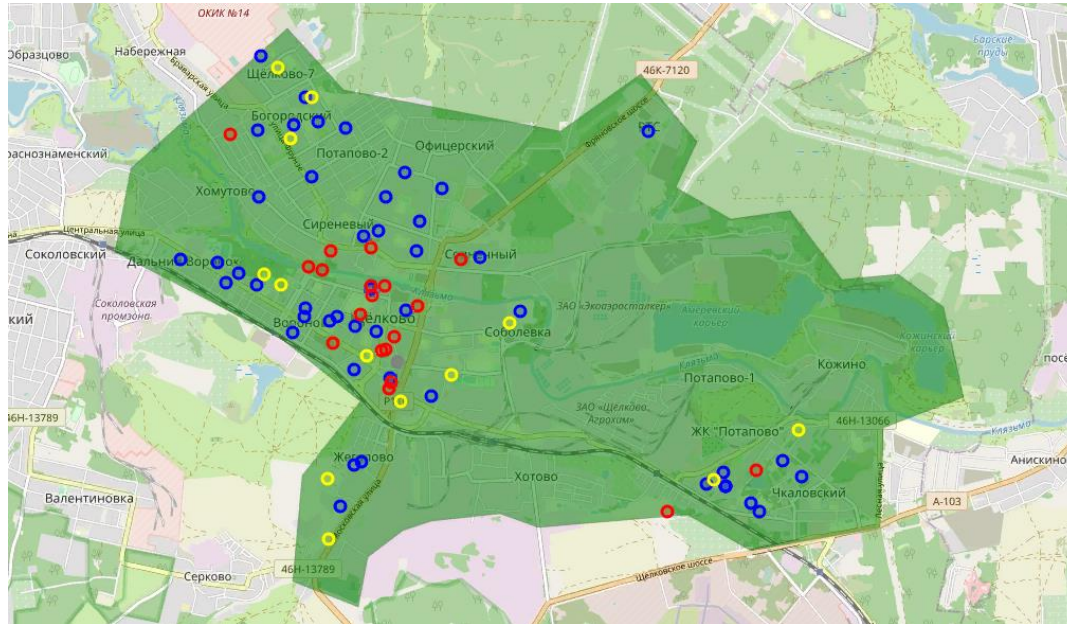
Data analysis using machine learning



Algorithm	Jaccard	F1-score	Class
KNN	1.00	1.00	shopping center
Decision Tree	0.00	0.00	playground
SVM	1.00	1.00	shopping center
Logistic Regression	1.00	1.00	shopping center

KNN model and most auxiliary models recommend the construction of a shopping center.

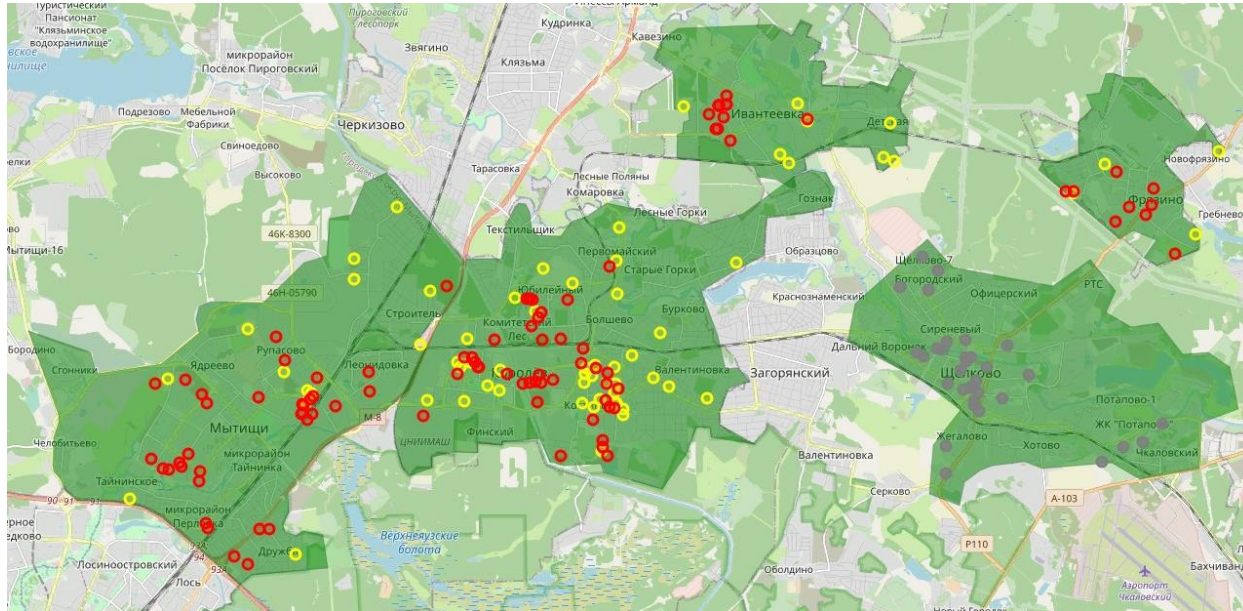
Data analysis using machine learning



Algorithm	Jaccard	F1-score	Class
KNN	1.00	1.00	shopping center
Decision Tree	0.00	0.00	kindergarten
SVM	0.00	0.00	kindergarten
Logistic Regression	0.00	0.00	kindergarten

The auxiliary model is recommended to build kindergartens. It is not possible to consider models "out of the box" you need to know what is "located under the hood«.

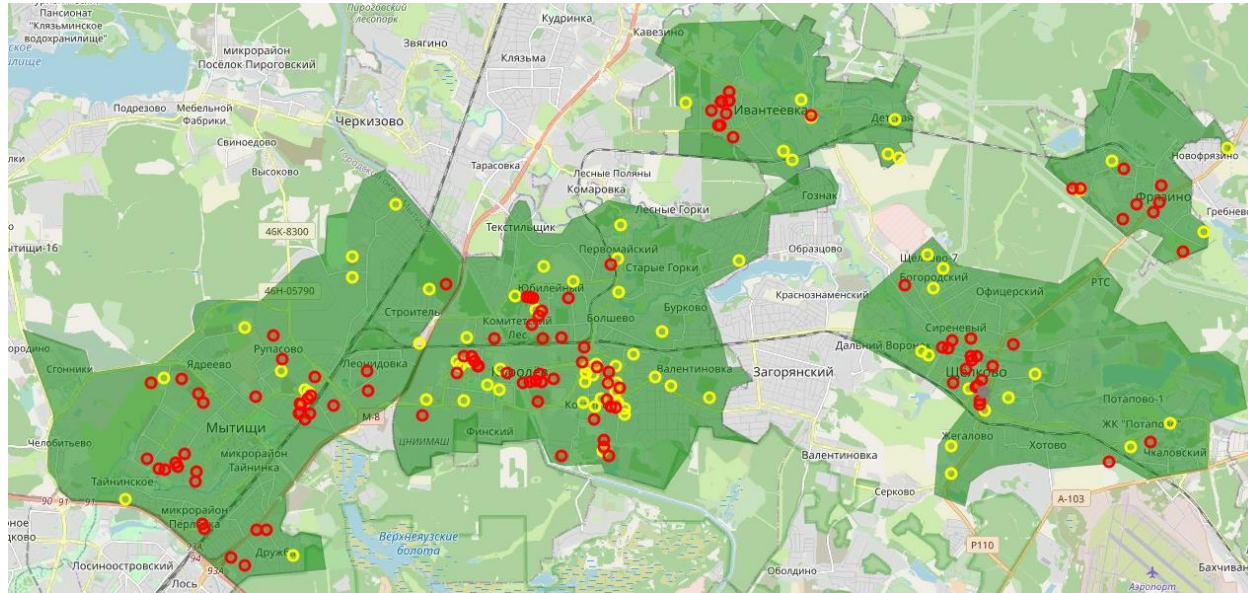
Data analysis using machine learning



Algorithm	Jaccard	F1-score	Class
KNN	0.52	0.52	-
Decision Tree	0.42	0.42	-
SVM	0.45	0.46	-
Logistic Regression	0.61	0.50	-

Using a classification method based on data from neighboring cities is not very applicable within the boundaries of the city under study.

Data analysis using machine learning



Algorithm	Jaccard	F1-score	Class
KNN	0.00	0.00	playground
Decision Tree	0.00	0.00	playground
SVM	1.00	1.00	shopping center
Logistic Regression	1.00	1.00	shopping center

KNN model assumes the restoration of a playground, in contrast to the previous recommendation for the construction of a shopping center. It is likely that an increase in the volume of data from other cities "noise" the model.

Conclusions

1. As a result of the research, it is recommended to continue construction of the shopping center at 55.916471°N, 37.994031°E.
2. By the number of children per kindergarten and playground and the number of townspeople per shopping center Shchelkovo is not inferior to the neighboring cities.
3. Playgrounds found in search queries are scattered and are mostly paid "amusement parks". Shopping centers are located mostly compactly.
4. Calculation models based on supervised learning classify the object under study as a shopping center.