# Optimum Warehouse Location

Using Foursquare API

# Business Problem

We have a lot  of  chain supermarkets “Perekrestok” we need to deliver on a regular basis

We will try to detect locations that allow us to optimize routes

**And minimize expenses**

We allocate optimization task within  South-Eastern and Southern Administrative Okrugs of Moscow, Russia.

# Data

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

- number and locations of delivery points (stores) in area
- number of warehouses we should set to supply stores effectively and reduce costs
- number of warehouses available for rent around optimum points.
- distance of a store to optimal warehouse

# Methodology

**Collect** the location of every supermarket within 5km from each district center.

**Separate** them in a few clusters (using k-means clustering) for more effective logistics.

**Define** warehouses available for rent within our districts using Yandex Realty service.

**Focus** on most promising warehouse locations according to how close they are to optimum cluster centers.

**Obtain Map**

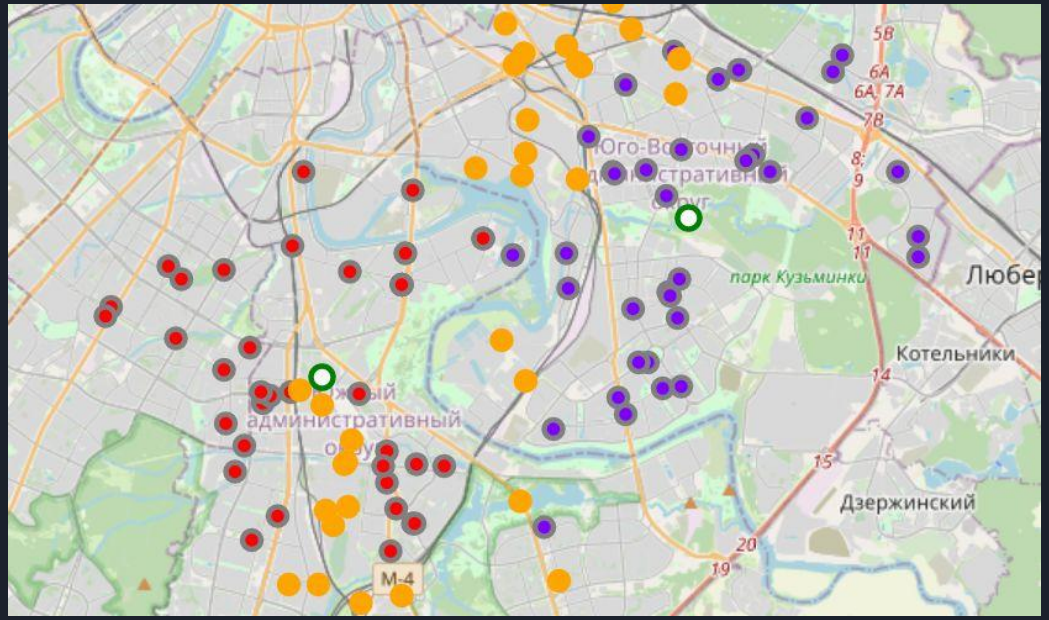
# Exploring Map

White = optimal cent.

Orange = Warehouses

Red = clust 1 Supermarkt

Grape=clust 2 Supermarkt



# And numbers

| | Address | Distance_C1 |
|---|---|---|
| 0 | Moskva, Kashirskij proezd, 17s1 | 616.917562 |
| 1 | Moskva, 2-j Kotljakovskij pereulok, 1s69 | 645.654343 |
| 2 | Moskva, 1-j Kotljakovskij pereulok, 13 | 1653.896744 |
| 3 | Moskva, 1-j Kotljakovskij pereulok, 12s2 | 2110.589138 |
| 4 | Moskva, Kantemirovskaja ulitsa, 65 | 2137.561909 |

| | Address | Distance_C2 |
|---|---|---|
| 0 | Moskva, Shossejnaja ul, d. 2A | 2823.710375 |
| 1 | Moskva, 2-j Vjazovskij proezd, 16 | 2978.868355 |
| 2 | Moskva, 1-j Vjazovskij proezd, 4k1 | 3832.524355 |
| 3 | Moskva, Juzhnoportovaja ulitsa, 40 | 4114.997046 |
| 4 | Moskva, Juzhnoportovaja ulitsa, 36s1 | 4182.554675 |

# Results

There are **80 supermarkets** divided optimally for two clusters in future logistic effectiveness.

**38 warehouse** candidates for the moment that met all formal basic conditions (fee, engineer systems, construction conditions).

Mapping and future calculations showed that candidates are spread irregularly.

Resulting with two good options for one cluster and far options (about 3000 m closest) to another.

Final decisions on warehouse rent will be made by management based on specific characteristics of facilities and locations closest to each optimum center.