How to overcome the traffic jam in Moscow: Simulation of the district's and satellite town's specialization.

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Abstract. It is well known that Moscow is overpopulated in terms of number of citizens per square meters of territory or living, or roads. It produced intensive traffic jam at working hours, over pollution of CO2 and many other inconveniences. Now the traffic jam is going to be main problem for the inhabitants. We simulate here one of the most cardinal ways to win traffic jam.

Keywords: agent-based model, traffic problems.

1. Introduction

There are a number of known ways how to overcome traffic problems, using the experience of the big cities like London, Tokyo, New York, Paris and others. The agent – based model's simulation is an effective and tool to compare all these ways using different criteria.

We simulate here one of the most cardinal ways to win traffic jam. Namely, building up of number satellite towns around Moscow and simultaneously, to realize complex of measures to make districts of Moscow more specialized.

The first direction is expected to weaken overpopulation of the city, and the second one focused on shortening time to be in transport because of closing work and living.

2. Simulations

On the first stage of the simulation we compare two states of the city; existing state and the virtual state, which has no traffic jam, keeping basic functions of the city the same. Next stage is devoting to the dynamic process how to move from one state to the other.

We use an agent – based model in the following way. The environment, where agents move, is a map of Moscow and nearest territory. On the map there are districts of the city, associated with municipal division (prefectures and "uprava"). Basic roads, which connect the districts and outside territory, drown as on geographical map and specify by the capacity for the traffic. The roads can be two types: car roads and metro.

There are six types of agents who play a role of groups of population's representative. Namely:

1. Professors, teachers, students, scientific workers.

2. Technical people, engineers, including involved to a high technology's sector.
3. People in public sector.
4. People in culture, entertainment, tourism.
5. People in industry.
6. Others.

An initial location of the agents across districts and satellite towns is given.

The agents use to move between districts and satellite towns if necessary.

The agents can work in one district (satellite town) and live in another. Then they should use roads between districts regularly.

The model simulates the movement of agents, taking into account a number of parameters like working or holiday's hours, capacity of roads, number of people in the districts and satellite towns, going to move and some others.

3. Model

We used the computer program AnyLogic 6.0 (see www.xjtek.com), which has convenient tools to represent the map of Moscow and put the moving agents into the environment. The program AnyLogic 6.0 is convenient especially to see a visual animation and changes dependent on various values of parameters and data.

On the picture 1 one can see the existing map of Moscow region.

Picture 1

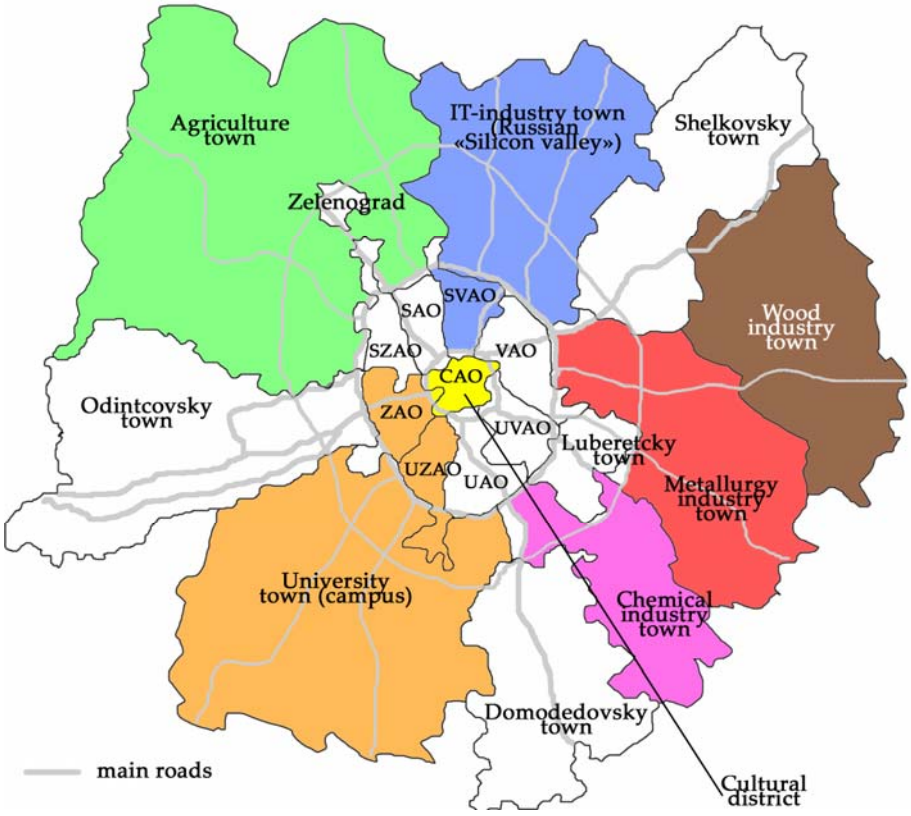
In the model we converted the map into more aggregated scheme not necessarily with exact administrative boundaries. The picture 2 shows the scheme.

Picture 2

The picture 3 shows the one of the variants, how the Moscow region may look 15 years from now. In the variant one can see specialization of Moscow districts and appearance of a number of new satellite towns, which have some specialization as well.

On the picture 3 one can see the specialization of the districts and satellite towns in such a way that people of near profession can move with shorter distance. For example, the university town practically merges with university district of Moscow.

First experimental simulations on the model show significant effect of the specialization. The congestion of the average traffic goes down in spite of essential increasing of a quantity of cars.



Picture 3

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