OPTIMIZATION METHODS REGARDING THE BUILDING TRANSFER IN LIMA SOFTWARE

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ABSTRACT – Noise is a major source of dissatisfaction in residential areas. There are many noise sources in the urban areas, but only some of them can be taken into consideration for noise mapping. The pre-processing phase includes the activities for preparing LimA input data: the layers of GIS map (streets, terrain model, buildings, and other obstacles) and noise sources data: traffic volumes, vehicles speed, flow type, road surface and gradient.

In this research paper the focus was uppon the buildings transfer from GIS (.DXF) to LimA (.BNA) format and the same time problems which appierd along it and how can they be solved.

INTRODUCTION

Noise is a major source of dissatisfaction in residential areas. There are many noise sources in the urban areas, but only some of them can be taken into consideration for noise mapping and noise reduction action planning. These are: road traffic, railway traffic, airports and industry. In order to know the effect of these noise sources on the population and buildings, we have to know as much as possible about the sources and propagation. The analysis can be done using specialized software. The result is a noise map – a map representing the noise levels as surfaces or contour lines. The input data for the simulation software are a base map and specific properties of the sources (road segments, railway segments, industrial sources and others). The preprocessing phase includes the activities for preparing LimA input data: the layers of GIS map (streets, terrain model, buildings, and other obstacles) and noise sources data: traffic volumes, vehicles speed, flow type, road surface and gradient. All that data are stored in an Access database; this is imported in LimA over the base map. Our team challenge was to realize the noise map for the city of Tg. Mureş, a city with about 150,000 inhabitants. There are more than 30,000 buildings and about 300km of streets, from which about 60km are considered main roads, with significant vehicle traffic. The road traffic is the main noise source in Tg. Mureş, like for almost urban areas

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MODELLING OF BUILDINGS

As mentioned before, the input data for the simulation software are stored in access tables, which are connected to the AutoCAD drawings using the entities handle. The base map layers are imported in LimA through dxf files. For the buildings, the height information is sent as color property (the conversion between thickness and color was done previously on the AutoCAD drawing) as you can see in Figure 1.

After importing the geometry some checks should be done in LimA: closing polygons to ensure the correct modeling, especially for buildings; recognizing and preventing multiple existences of objects; linking objects to prevent gaps in the model; smoothing polygons to reduce the number of vectors and speed up calculations.

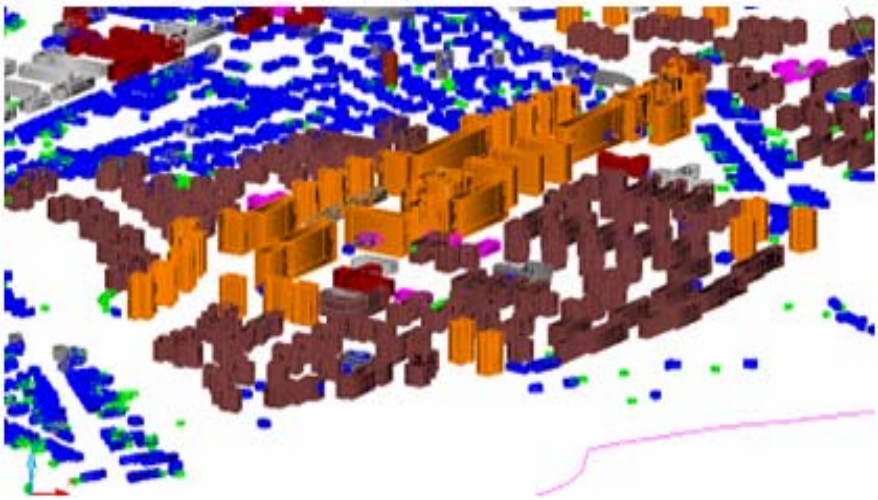

Figure 1. *Buildings prepared for LimA in 3D view*

The whole city was split in 97 tiles, each tile containing up to 10,200 grid points, the distance between points being 10 meters. The calculus is very complex and time consuming; for a single run it taken almost 48 hours (only the running time, not including the data preparation and visualization of the result. On the other hand, there was a limitation found when trying to plot the resulted map on a large format (ISO A0) – the user control is quite poor and it was not possible to configure LimA for plotting on that format. Taken these facts into consideration, it was chosen to do the post processing outside the simulation software, using custom software developed by the team members. The development platform was again AutoCAD/AutoLISP[1],[5].

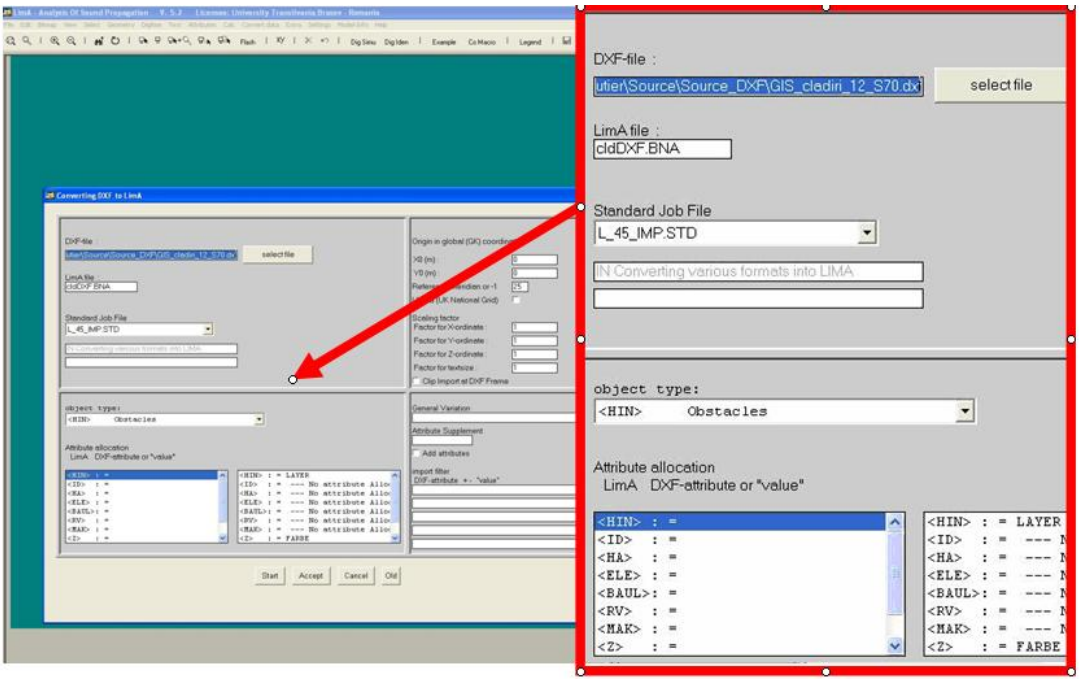

Figure 2. *Converting the .DXF to .BNA for buildings [7]*

OPTIMISATION OF LIMA SOFTWARE

When taking the height of buildings problems were caused if macro-type commands were used (which are basically a sequence of commands), which exempt the user to manually launch a lot of commands to achieve the desired result.

In Figure 3 you can see two files,in the original and modified, may also be noted that in the latter two have fewer orders.

The original version

Modified version

Figure 3. *The original and modified data files [7]*

In the first case, when the program reaches this step, it searches buildings having an area less than 151 square meters and will allocate them to 8 m height, and those buildings which have an area exceeding 151 sq m will allocate it to 12 m. Of course this is not desirable because it would download data from GIS database using automated methods to shorten working time.

It was therefore necessary to enter into the program database and find the optimal solution, which materialized in the second option, where any building should be looked for from the amount of the buildings and in stead of prior conditionalities the attribute Z (height) is chosen to behave as a variable ($) and can retrieve values from the GIS, as they have been assigned to each building separately. The last command is SASM and this one applies the above mentioned orders to all buildings in the map[7].

CONCLUSION

As a final conclusion can be mentioned that the buildings transfer from GIS (.DXF) to LimA (.BNA) format is not an easy process, but maybe is the same in other noise mapping softs.
As it was described in the paper the whole city was split in 97 tiles, each tile containing up to 10,200 grid points, the distance between points being 10 meters. There are more than 30,000 buildings with different shapes so this must be simplified because of the calculation limits.
An important conclusion that can be drawn from the researches is that a noise modeling program as complex as could be appears special circumstances that were not taken into account by those who conceived the program. Thus, optimizations made in the program that deals with such studies should be sent to one that distributes the program to improve modeling.

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