

Authentic Measurements as a Basis for a Cadastral GIS

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SUMMARY

At present, as in many other countries, the cadastre in Israel is in a transition from a graphical product to a digital and analytical one. The essence of analytical cadastre is by digitally determining the old (historical) cadastral border marks to ensure as best as possible the authentic border's location. In most cases 'analytical cadastre' means to determine the coordinates of the cadastral parcels and blocks.

The best technique for validating the cadastral coordinates is by gathering and storing all the original cadastral measurements which led to defining and registering the cadastral entities, measurements that will be used as a basis for the analytical cadastral database.

Building such database which will be composed of the authentic measurements will enable, inter alia, the following accomplishments:

- The ability to draw the measurement plan (cadastral block or mutation plan) in an improved uniform, consistency and accuracy format.
- A more flexibility in the connection of neighboring plans.
- The ability to restore the registration act and then to accurately carry out the reparcellation.
- The ability to find contradictions in the registration process and help solving them.
- The ability to have fluent and updated information on the reliability of cadastral entities.
- Enlargement of the legacy and juridical validity of the GIS data.

The paper summarizes several years of a doctoral research at the Technion (Israel Institute of Technology) in the computer science (from a GIS viewpoint) and the analytical Cadastre domains.

The research has significant impacts on the theoretical-academic approach as well as on the practical-engineering approach toward cadastre in general and analytical cadastre in particular. From a theoretical standpoint, we developed several new algorithms which helped us creating a dynamic GIS while preserving the legal validity of the original observations, all which without any affect on the performance. From the practical-engineering standpoint, a tremendous enlargement in the GIS accuracy has been achieved – in terms of the relative accuracy between different attributes and objects in the system, as well as the external (absolute) accuracy when combining different cadastral projects measured in different coordinate grid systems.

The paper will describe the new tools for handling authentic cadastral data, measurements and observations. Rigorous and approximate adjustment processes will be presented, as well as a comparison between three different models of storing the authentic data (the scattered model; the centralization model; and the combined half-scattered model).

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