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TRANSFORMATION OF GRAPHIC INTO NUMERICAL
CADASTRE IN SLOVENIA /YUGOSLAVIA/

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ABSTRACT

Paper deals with the description of the process of the transformation the graphic cadastre into numerical form. For the estimation of existing cadastre the linear prediction was used. The results are encourages causing further extensive research in this field.

1. General

The land cadaster parcel is the smallest and the most accurately defined spatial unit. Socialistic republic of Slovenia is covered by approximately 5 millions parcels with an average area of 0,41 ha. In the concept of establishing of geodetic information system it is decided that the parcel /included in the land cadastre/ will be the basic unit of information system. Spatial location of territorial units should be realised by the positional coordinates of the points /centroids or contour of territorial unit/. This fact represents the imperative that besides existing graphical cadastre also numerical /coordinate/ cadastre should be build.

In this system also the parcel in the land cadastre should be accurately located. Due to the fact that the activities at the land-use planning use up dated cartographic material it is understandable that additional informations are given to the basic national map 1:5000. One of this additional informations is also general cadastral status e.g. cadastral parcel being the basic territorial unit and represents the carrier for different informations.

The transformation of graphical into numerical cadastre is heavy work caused mainly because of the non-sistematically deformed basic material.

This contribution has the intention to represent our approach to the solution of described problem.

2. Hystorical overview

The elaboration of graphical cadastre in scales of 1:2880 and 1:5760 has been carried out in Slovenia in the period of 1818-1822. Cadastral maps are relatively inaccurate /r.m.s. error 3,8m/ due to the fact that the cadastral measurement had graphically densified trigonometric net.

Estimation of existing production potentials showed that the classical geodetic remeasurement of land cadastre could not be completed even in relatively longer time period. Therefore it was decided to revise the possibilities of transformation the graphic into numerical cadaster using modern mathematical methods.

Out of the existing methods being revised the linear prediction /1,2/ has been chosen for preliminary estimation of coordinate residuals between cadastral map and real cadastral status.

3. Description of the transformation process.

An preliminary research of transforming the graphic into numerical cadaster has been carried out in the Research Institute of Geodetski Zavod SRS in the years 1978 and 1979. Cadastral map has been digitised; the obtained coordinates have been transformed by conformal transformation into photogrammetric obtained coordinates of the points, representing real cadastral status.

The entire research has been realised by stereoplotter /Wild A 10/ digitiser /D-MAC/ and digital computer PDP 11/45.

For 1/3 of identical points the residuals between real status and cadastral map have been taken. The covariances and covariance functions for X in Y coordinates were computed. On the base of computed covariance functions the residuals on the selected points were estimated by linear prediction.

The graphs of covariance functions differs from given in the literature. The computation of residuals with covariance functions, having the form of normal distribution gave considerably less sufficient results in comparison with covariance functions given in the graphs 1 and 2. This fact has been greatly influenced by the data of graphic land cadastre.

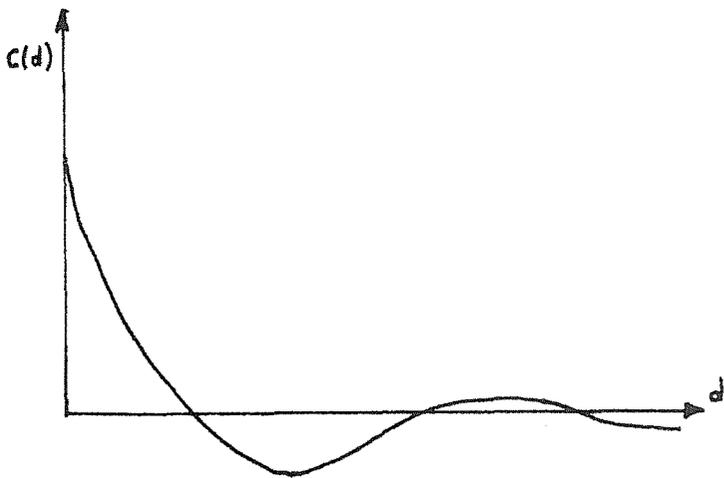


Figure 1: X coordinate

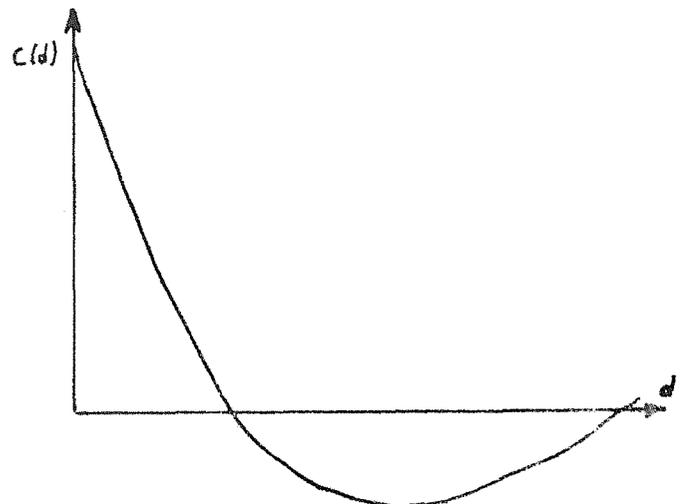


Figure 2: Y coordinate

Having been given real residuals also on the rest of the points the analysing of the research was made possible. The difference between estimated /computed/ values and real residuals were computed. 70% of the points differs less than 1 m from the real status. It was estimated, that the results, obtained in the research are sufficient considering the accuracy and quality of original materials and data.

4. Conclusion

After research being completed it was concluded that for the production work some more test examples should be elaborated. With the already planned extensive research the more accurate estimation of residuals will be probably reached; this will cause also greater accuracy of numerical cadastre using linear prediction.

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