

METHODS FOR CONSTRUCTING REGRESSION PRICING MODELS AND THEIR SOFTWARE IMPLEMENTATION

A.Kozhevnykov, B. Moroz
(Ukraine, Dnipro, National Mining University)

The object of the study of this work is the possibility of a program implementation of the monitoring fragment of the real estate market, which allows us to make an operational justified assessment of the real estate object and visualization of its location on a vector map on the basis of the method developed.

The proposed integrated method for constructing regression models of real estate valuation includes the following stages:

1. Processing and preliminary analysis of information about real estate objects with the help of relevant statistics, i.e. the finding of the mean, minimum, and maximum values, as well as variance and root-mean-square deviation for each quantitative factor.

2. Analysis of the matrix of paired correlation coefficients between all factors, with target detection the factors which the most influencing the value of real estate objects.

3. Detection and elimination of the problem of collinearity or multicollinearity factors. For eliminate the problem of collinearity or multicollinearity factors, the method of eliminating a number of correlated variables is used; in equation are remained factors with a minimum value of the coefficient of multiple determination.

4. The construction of correlation fields (dispersion diagrams) of a dependent variable and independent variables and on their basis the establishment the form of coupling variables.

5. Search and removal emissions. Emissions are atypical or rare values that digress significantly from the distribution of other selective data. These data can reflect the true properties of the phenomenon being studied (variable), or may be associated with measurement errors or abnormal phenomena, and therefore should not be included in the model.

Emissions have a significant effect on the incline angle of the regression line and, accordingly, on the correlation coefficient. To identify emissions, a regression model is constructed by all quantitative factors $x_1 \dots x_m$ selected as independent. According to the constructed model, the value of real estate objects is calculated and detection the value σ_{ocm} . If the remainder, i. the difference between the actual value of cost the real estate object y and the value $y(x_j)$ obtained with the help of the model go beyond the

limits of the value then the observation is classified as an ejection and removed from the selection.

6. Replacement of qualitative factors with dummy variables.
7. Construction using the step-by-step method of the regression equation, which includes only quantitative factors.
8. Inclusion in the model, built in phase 5, dummy variables using the stepping method
9. Analysis of the quality of the constructed model. To assess the quality of the regression model, the multiple determination index is calculated R^2 root-mean-square error, *t-statistics* for the regression coefficients and the Fisher *F-test*.

The functional diagram of the software developed is shown in fig. 1.

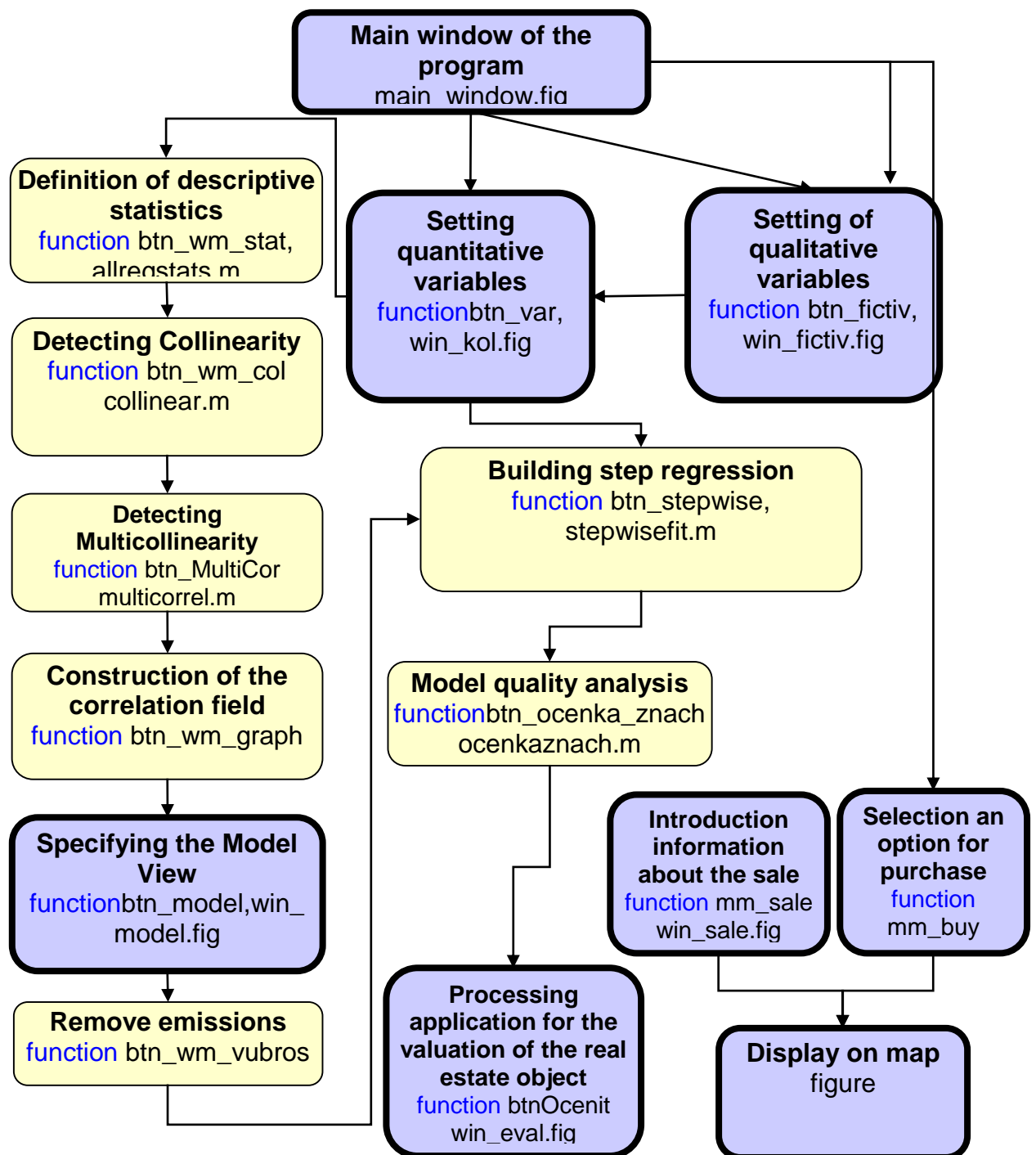


Fig.1. Functional diagram of the fragment of the information system for monitoring the real estate market

In the course of the work the following results were obtained :

1. An analytical review of the existing developments of regression models for the real estate valuation was carried out and their main shortcomings were revealed.
2. The review of existing methods of constructing regression models of pricing in the real estate market were conducted.

3. A complex method for constructing pricing models regression in the secondary real estate market has been developed, which allows us to take into account qualitative factors ensuring the detection and exception of collinear and multicollinear factors.

4. The analysis of existing software products that implement the methods of mathematical statistics and support the work with vector graphics data was carried out.

5. Software implementation for a monitoring fragment of the real estate market with automated support of an operative estimation of a real estate object on the basis of the offered complex method was developed.

6. As a result of testing the software developed, a comparative analysis of different types the regression models was carried out and, ultimately, a model was constructed that gives a high quality of the valuation the real estate market objects characteristic for the Dnipro city.

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