

ABSTRACT

Relevance. The problem of finding the true pattern by analyzing to the results of experiments is universal. There is no one area of human activity which does not have this problem in one way or another. In economic, sociological and natural sciences, the problem of identifying factors that determine the level and dynamics of processes is often solved. Such problem is most often solved by methods of correlation, regression, factor and component analysis. The problem of regression analysis is to construct a model that allows the independent variables to obtain estimates of the values of the dependent variable. Different aspects of the solution of this problem are considered in such sciences as mathematical statistics, management theory, the theory of artificial intelligence. Within the probability theory, this problem is formulated as an estimation of the regression line by the results of statistical experiments and in practice is an area of applied regression analysis.

The problem of reconstruction of an unknown model is formulated as a classical problem of applied regression analysis: the reproduction of multidimensional polynomial regression over the redundant description and with an arbitrarily distributed error. According to the results of active experiments it is needed to find unknown coefficients, some of which are zero and unknown to the researcher. In contrast to the correlation analysis does not find out whether a significant connection and is engaged in the search for a model of this connection, expressed in the function of regression. Regression analysis is used if the relationship between the variables can be expressed quantitatively in the form of some combination of these variables. The resulting combination is used to predict the value that can be taken by the target (dependent) variable, which is calculated on

a given set of values of the input (independent) variables. In the simplest case, standard statistical methods such as linear regression are used for this. Unfortunately, most real models do not fit into linear regression. For example, sales volumes or stock prices are very difficult to predict, since they may depend on a set of interconnections of variable sets. Thus, comprehensive methods are needed to predict future values.

That is why the development of algorithms that would help solve this problem - the problem of regression of many variables - is very relevant in our time and will remain so for a long time. The task that we face is very complicated, since the general description of the situation described above does not show all the possible complexities of reproducing the real dependencies of complex processes. That is why there is still no algorithm that could find a very good solution for all the formulations of this task at a reasonable time. However, research has already been carried out and some possible algorithms for solving this problem have been developed, which for some variations give very good results. It is necessary to continue research and try to improve the results already obtained.

Purpose and objectives of the study. Increasing the efficiency of the tasks of several performers (devices) with different productivity by reducing the time spent planning their implementation.

To achieve the goal, you must accomplish the following **tasks**:

- carry out an overview of the known results of the problem;
- perform the formalization of the task of planning work taking into account different productivity of devices;
- develop approximate algorithms for solving a given problem;
- develop software implementation of algorithms and models;
- perform the analysis of the obtained results.

Object of study is the process of restoring complex economic or natural processes from experimental data.

The subject of study – recovery of complex economic or natural processes from active experiment data using multivariate regression analysis.

Scientific novelty of the results. Optimization of a fundamentally new approach to the recovery of complex natural and economic processes in the form of a multidimensional regression line.

Publications. Materials were published in the international journal “Naukoviy ohlyad”, №3, 2018 [1, 2, 3].

Connection of the thesis with scientific programs, plans, topics. The thesis was written at the branch of The Department of Department of Computer-aided management and data processing systems of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” under the topic “Theory of PDS-algorithms and creation of derived algorithms and methods of planning and decision making” To develop a mathematical apparatus focused on the creation of intelligent information technologies for solving combinatorial optimization and information security problems”(the topic’s index is HДP №2705-φ).

REGRESSION, MULTIVARIATE POLYNOMIAL REGRESSION,
EXPERIMENT, ACTIVE EXPERIMENT, FORTHYSES POLYNOMIAL,
REPEATED EXPERIMENTS, RECOVERY RELATIONS