ABSTRACT

The thesis is presented in 126 pages. It contains 3 appendixes and bibliography of 55 references. Sixteen figures and two table are giving in the thesis.

Topic relevance. There is the significant increase in billing primary (non-aggregated) information along with rising costs for mobile communications corporations. Actual topic is associated with the analysis and processing of such information in order to reduce such sufficiently large costs and which occupy the first paragraph of Article financial statements. Methods of analysis of information should allow for finding new ways to process such data, and when it relates to commerce, reduse costs of various corporate expenses. So, then he subject of money reducing is actual and important for mobile communications. Methods of data analysis can be divided into two types. The first one is methods wich are working with a set of data, which in fact is not systematic, it intended to structure them, identify patterns and characteristics in the information, which will be processing. The second one is methods are already working with structured data, intended to build mathematical models that will be able to categorize new information under previously existing classification. As practice shows billing information is non-structured, the actual problem is categorization this data and build mathematical models be able to classify new data, according to newly formed clusters for further use.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Applied Mathematics Department of the National Technical University of Ukraine "Kyiv Polytechnic Institute."

Research goal and objectives. The goal of this thesis is create a DSS (decision support system) as part of an existing system, to reduce corporate spending on mobile communications by analyzing billing information using machine learning techniques.

To accomplish this goal, the following objectives were reached:

- systematize existing clustering methods billing information;
- systematize existing methods of data classification;

– develop heuristic methods for clustering billing information and software to implement them;

– develop software integration method to integrate created software with the already existing system

– carry out experiments using primary data obtained through cooperation.

Object of research is machine learning techniques and methods to analyze billing data for reducing corporate spending on mobile communications.

Subject of research is applying of machine learning for reducing corporate expenditure on mobile communications.

Methods of research. To solve the task, the following methods were used: clustering methods (for building the classification of unstructured information bilingual); classification methods (to build a mathematical model based on clustering results to classify new data neahrehovanyh); optimization methods (for the development of methods for solving the problem of clustering and classification); methods of the theory of algorithms and programming (for software implementation of the developed algorithms and building the right architecture); methods of probability theory and mathematical statistics (for the experiments).

Scientific contribution consists of the following:

– for the first time the task to build a system to reduce costs not only within a company, which is usually done, and creating long-term DSS (decision support system) for many users;

– improved methods for clustering billing information, which, unlike existing, give greater assurance that it will be found the optimal solution relative to the primary assumptions;

– improved asynchronous software architecture according to the tasks. In this way we have opportunity to support the cloud computing and increase fault tolerance system.

Practical value of obtained results. Created the first version of decision support systems to reduce corporate costs as the part of existing commercial product. As a results it can be use after each accounting period of the carriers. The developed methods, mathematical and software give to employees, mobile managers, mobile coordinators and

mobile analysts opportunity to choose a more optimal plan for one one another corporate line if it possible.

Approbation of the thesis results. Basic ideas and results of the research were presented at the International scientific and technical conference SAIT 2016 (May 30 – 2 June, Kyiv, 2016), and at the VIII scientific conference of masters and postgraduate «Applied mathematics and computing» AMC 2016 (20 – 22 April, Kyiv, 2016).

Publications. Thesis results are published in 2 scientific works:

– in 2 papers in proceedings of international scientific conferences (all of them personally).

Keywords: machine learning, clustering, classification, neural networks, asynchronous model, asynchronous systems, cloud computing, billing, billing information, mobile communications.