ABSTRACT

Master’s dissertation consists of 83 pages, 28 images, 19 tables, 1 appendix, 27 referring sources.

Topicality. An important task in the management of agriculture such as cultivation of various agro-cultures is the timeliness of the identification of various harmful factors which provoke decreasing of productivity and even complete destruction of crops.

In our time, the usage of unmanned aerial vehicles is a relatively new direction, but it has already made it very famous. The existing methods of obtaining and analyzing aerial photographs of the fields are quite expensive and have many disadvantages. In addition, these methods should be easy for usage and servicing. Modern tasks set pretty high requirements for the quality of received images and the speed and quality of their processing.

Aerial photos taken with special cameras have high resolution and contain a large amount of additional information. There is a problem with the speed of processing and analysis of images, because much more time and resources are needed.

Thus, the problems of orthophotomap formation and multispectral analysis of aerial photos of crops are quite new and demanded in agricultural development context.

Relationship with scientific programs, plans, themes. This work was performed at the Department of Automated Systems for Information Processing and Management of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" within the framework of the initiative theme" Monitoring system of crops".

Aim of the research – increase the efficiency of agricultural management by simplifying the process of monitoring the state of crops and improving the quality of their analysis.

Tasks of the research:

- to review the existing methods and tools of analyzing the state of crops;
- to design a subsystem of multispectral analysis of aerial photos;
- to analyze existing algorithms for cluster analysis;
- to develop an algorithm for building an orthophotomon;
- to develop an algorithm for multispectral analysis of aerial photos;

- to create a program implementation of the functional parts of the subsystems, including the developed algorithms;

Object of the research – the process of multispectral analysis of aerial photographs obtained by the UAV.

Subject of the research – subsystem of multispectral analysis of aerial photos.

Aprovation of results of thesis is the usage and adaptation of clustering algorithms, such as DBSCAN and OPTICS for images with calculated normalized relative vegetation index, comparison of the results of their work with other clustering algorithms, usage of parallel programming for processing high resolution images.

Publications. The materials of the work are published in the theses of the scientific-practical conference "Information systems and management technologies" (ISMT-2018).

AERIAL PHOTOGRAPHY, ORPOPHOTOPLAN, NORMALIZED DIFFERENCE VEGETATION INDEX, CLUSTER ANALYSIS, DBSCAN, OPTICS, INTELLIGENT DATA ANALYSIS, PARALLEL PROGRAMMING