DEVELOPMENT OF IMAGE RECOGNITION SUBSYSTEM FOR CARTOGRAPHIC INFORMATION CORRECTION BASED ON MONITORED DATA OBTAINED WITH USE OF REMOTELY PILOTED AIRCRAFT

Dmitrijs Goreļikovs[*1], Margarita Urbaha[†1], Aleksandrs Urbahs[‡1]

[1]Institute of Aeronautics, Riga Technical University, Kalku str. 1, LV-1658 Riga, Latvia

Abstract

The introduction of the Electronic Chart Display and Information System (ECDIS) in maritime industry greatly facilitated the process of operations using navigation charts. In addition, this system allows to simplify and speed up the update and correction of electronic chart information, in comparison with paper ones, by using automatic correction methods. Operational correction of navigation information in a specified area is crucial for ensuring the effective operation of ECDIS system.

The creation of a Remotely Piloted Aircraft (RPA) complex with a system for obtaining cartographic information will significantly speed up the process of obtaining real navigation information and ensure the required accuracy of correction. The article presents the results of developing a monitoring object recognition subsystem and its implementation algorithm.

The aim of creating this subsystem is to recognize navigation objects (such as buoys, beacons, etc.) in a specified area for calculating information about the position and condition of observed objects. The recognition algorithm can be applied both for electronic chart images and for recognizing objects in photographs obtained after the RPA's flight in a specified monitoring area. After object recognition, the subsystem allows to calculate the position of each recognized object and make necessary adjustments in cartographic information.

The article proposes a theoretical solution for determining a binarization threshold, taking into account the overall colour gamut of the entire image under consideration. For image processing based on the shape of the objects being identified it is proposed to use morphological transformation.

The developed algorithm and the implementation of the subsystem of monitoring object image recognition and coordinate determination allow to automate the information updating procedure by using electronic charts in ECDIS. The application and implementation of this algorithm provide an opportunity to obtain visual and graphical information about new or removed navigation objects in a chosen area, as well as to obtain information about changes in the location of objects.

The algorithm and its software implementation can be used as important parts of the RPAS complex. Obtained information will be used to calculate an RPA flight plan for a specified area depending on the number and location of monitoring objects, as well as for determining the real coordinates of monitored objects.

---

[*] dmitrijs.gorelikovs@rtu.lv
[†] urbaha.margarita@gmail.com
[‡] aleksandrs.urbahs@rtu.lv