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# Detection of fertile soils based on satellite imagery processing

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The paper proposes a method for detecting fertile soils based on the processing of satellite images. As a result of its application, a map of the location of fertile and infertile soils for a given region of the earth's surface is formed and the corresponding areas are calculated. Currently, data from most satellites are in the public domain and, as a rule, are multispectral images of the earth's surface. Access to this data is carried out through one or another service of access hub. The paper proposes a method for automatically obtaining the necessary data for the region of interest for specified periods of time.

The method for detecting fertile soils is based on the fact that fertile soil includes areas covered with vegetation in the spring-summer period. Therefore, by measuring the spectral characteristics of these areas in the late autumn period, when there is no vegetation on them, it is possible to obtain objective parameters of fertile soils. For detection, a number of classifiers are being built that recognize two classes - fertile soil and sand, which is especially important when monitoring areas prone to desertification. The feature vector used for classification is a set of indices similar to the well-known NDVI index. This set of indices is calculated for each pixel of the image by its values in different spectral channels. Classifiers are implemented using CUDA parallel computing technology on a GPU. Based on the results of the experimental study, a classifier is selected that has shown the best characteristics of the recognition quality.

## Summary

We propose a method for detecting fertile soils in specified regions based on processing multispectral satellite images. Satellite data is stored in a specialized remote database. The data required for detection is requested during interaction with the hub service for accessing this database. In addition to spectral images, we also use the results of their preprocessing, which are also requested from this database. The feature vector used for classification is a set of indices similar to the well-known NDVI index. The paper presents experimental estimates of the recognition quality for the classifiers under study, which are used to detect fertile soils. Based on the analysis of the estimates obtained, the choice of the type of classifier for the detection of fertile soils is made.

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