SUPERVISED CLASSIFICATION OF MULTIDIMENSIONAL DATA SOFTWARE FOR THE EARTH SPACE MONITORING

Description
The system of supervised classification of multidimensional data on the base of Bayes decision rules, which was included in remote sensing data processing software, was developed. The system of supervised classification (classification with training) of the software consists of seven classifiers (one classifier is element by element and other six are object classifiers), based on the use of Bayes strategy of maximal likelihood, and two object classifiers, based on minimum of distance. All classifiers can be used in two modes – test mode and work mode. According to the results of classifiers work in test mode, the error matrix is formed under the vectors of training and control fields. We can control the quality of training by analyzing this matrix. The result of the work of classifiers in work mode is one canal (byte) image, which pixels values are the numbers of classes.

This image is colored into predetermined colors, which can be changed in interactive mode by users. Besides, one of two functions of post classification can be applied to this image to delete isolated pixels.

Technical appraisal and economic benefits
There are no limitations to processing data dimension in the system. In particular, it allows to process simultaneously all 36 channels by hyper spectral survey system MODIS (satellite “TERRA”). One from nine decisive rules implemented in the system is chosen depending on type of the neighborhood classified by data element. The system of unsupervised classification has the following characteristics: the number of training patterns – up to 9, the number of classes – up to 15, the number of training and control fields
in each class – up to 10, the size of each field – up to 50 × 50, the size of the object – from 1 × 1 up to 1 × 11.

The main advantage of the proposed system of classification is its capability to support an object classification. There is no such support in other existing systems.

**Application areas**
Thematic data processing of the Earth remote sensing for investigation of natural resources and environmental ecological monitoring.

**Development stage**
Now the software is applied in scientific and industrial centers of satellite data acquisition and processing: RCPOD (Novosibirsk) and SRC PLANET (Moscow).

**Patent situation**
No patents.

**Commercial offers**
Cooperation in developing the software of the Earth remote sensing data processing from space:
- Contract for supply of the software of the Earth remote sensing data processing developed in the Institute of Computational Mathematics and Mathematical Geophysics SB RAS;
- Agreement about cooperative R&D for further development of the software.

**Estimated cost**
The cost of the system “Supervised classification of multidimensional data software on the base of Bayes decisive rules” is about 1 500 $.

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