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Bayesian Classification of Digital Images by Web Application

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Bayesian Classification of Digital Images by Web Application

Motivation

- **Decision-making processes usually require basic data, e. g. maps or georeferenced aerial photos** (Flood areas, areas affected by human activities or natural disasters, areas with the same vegetation, etc.)
- **The character of data and time aspect can lead to the need for automatic tools for area identification in raster images = classification of raster images**



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Problem formulation, result

- Determine areas with some characteristic properties
- Place (classify) these areas into several classes
- The goal of classification is to assign to each pixel in an image an appropriate class
- The result of classification is a new image showing (in colour) homogeneous areas belonging into the defined classes



Classification of raster images

- Unsupervised – no preliminary information about classes available (cluster analysis)
- Supervised – usually by definition of training sets,
 - We look for areas with similar colour composition as the training set
 - Important is the classification rule, a feature (colour) space is used:
 - Linear – separates clusters with planes,
 - Bayesian- probability approach.



Bayesian classification of raster images

Three methods are implemented:

- Relative frequencies (basic variant),
- Training sets extension,
- Nearest neighbour.



Practical solution of bayesian classification on-line

Web application WACLASS:

- The client (browser) handles all user operations – class creation, definition of training sets, etc.
- The classification is carried out on the server
- Data sources:
 - Individual image files
 - data provided via WMS
 - Different data sources can be combined
- Classification results are displayed as separate layers
- Analytical tools

<http://www.vugtk.cz/ingeocalc/igc/classification/>



Case studies

1. Comparison of strip-mine size



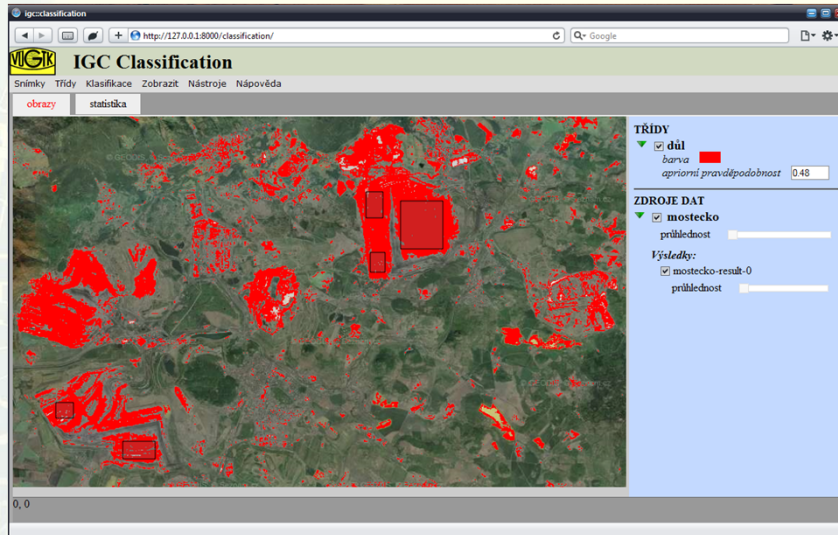
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The screenshot shows the 'statistika' tab of the IGC Classification web application. It displays a table for the layer 'layer-mostecko2001-result-0'.

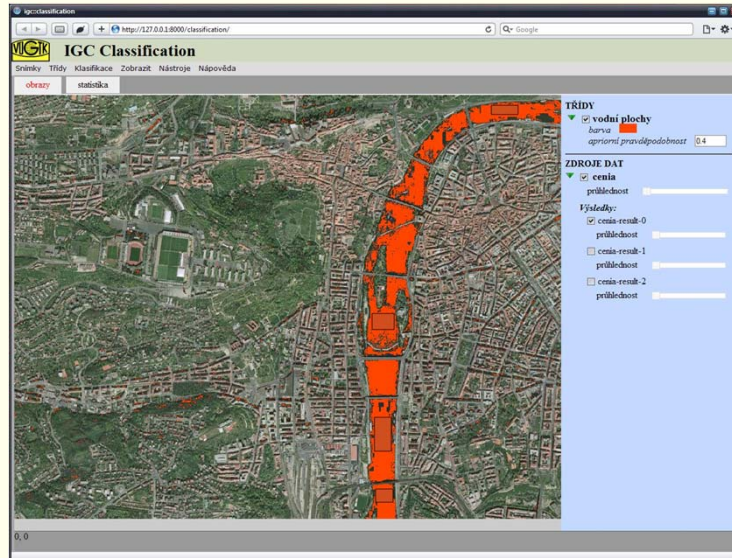
třída	množství pixelů	procenta	plocha [km ²]
neklasifikovano	390785	88.8	390.86
díl	49363	11.2	49.37

The screenshot shows the 'statistika' tab of the IGC Classification web application. It displays a table for the layer 'layer-mostecko-result-0'.

třída	množství pixelů	procenta	plocha [km ²]
neklasifikovano	377188	85.7	377.26
díl	62960	14.3	62.97

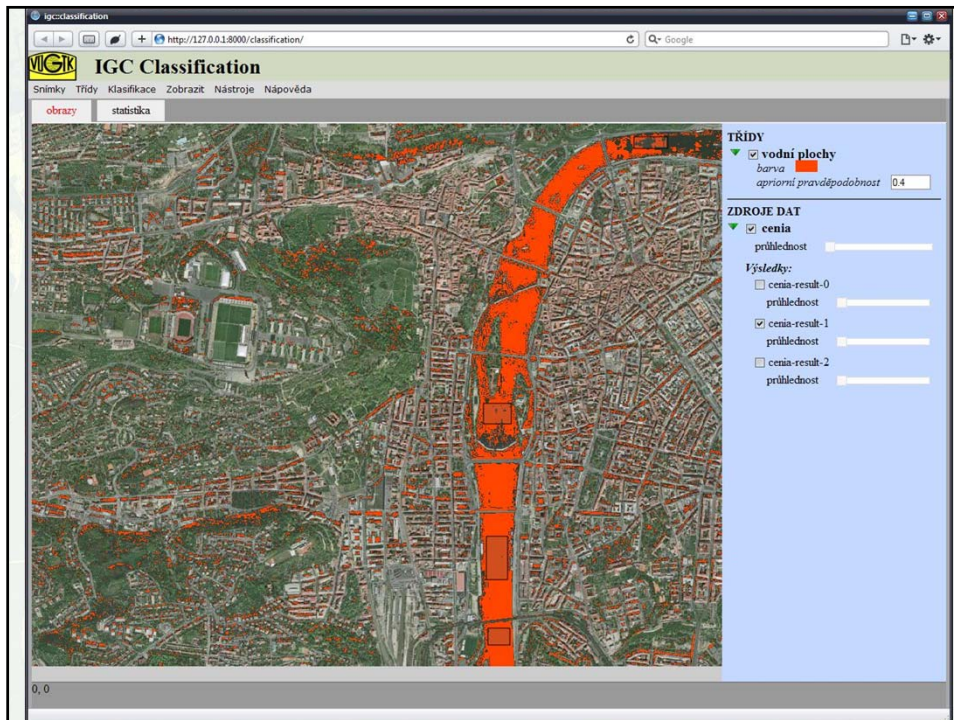


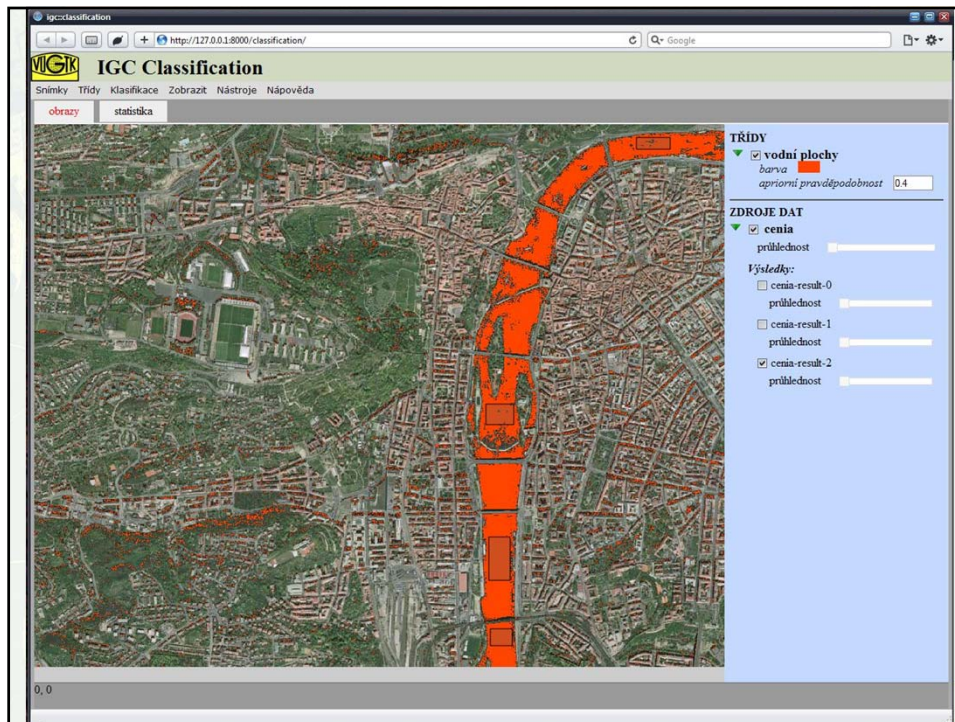
2. Water surfaces - detection and determination of area



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Conclusion

The objective of this report was

- Present the results of research on bayesian classification of raster images, carried out in VÚGTK within project InGeoCalc,
- Give a notice to the possibility of using web application WACLASS for on-line classification of raster images.

[Video example](#)



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Thank you for your attention

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