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UPHOLDING OPEN SOURCE PRINCIPLES FOR EDUCATION: USE OF QUANTUM GIS FOR TEACHING GEOINFORMATICS

Requirements that students have to face up nowadays are tight enough to achieve a goal of the high level in IT and GIS skills, ability to work quickly and easily with any kind of information including geospatial data. Needless to say that modern system of education at universities in general and faculties of geography in particular should be prepared to answer the requests of time and society and to involve as many possible GIS teaching as possible. Recently, more and more IT courses including GIS is being taught at schools and universities. Using GIS becomes one of the most sought-after skills. Their use in the classrooms by students of geography departments is therefore essential and required. Nevertheless, the high commercial price of the software often becomes a serious problem. The aim of this short paper is to briefly demonstrate possibilities of the easy-to-use yet effective and multifunctional open source Quantum GIS which is effective and excellent replacement of the traditional expensive priority software.

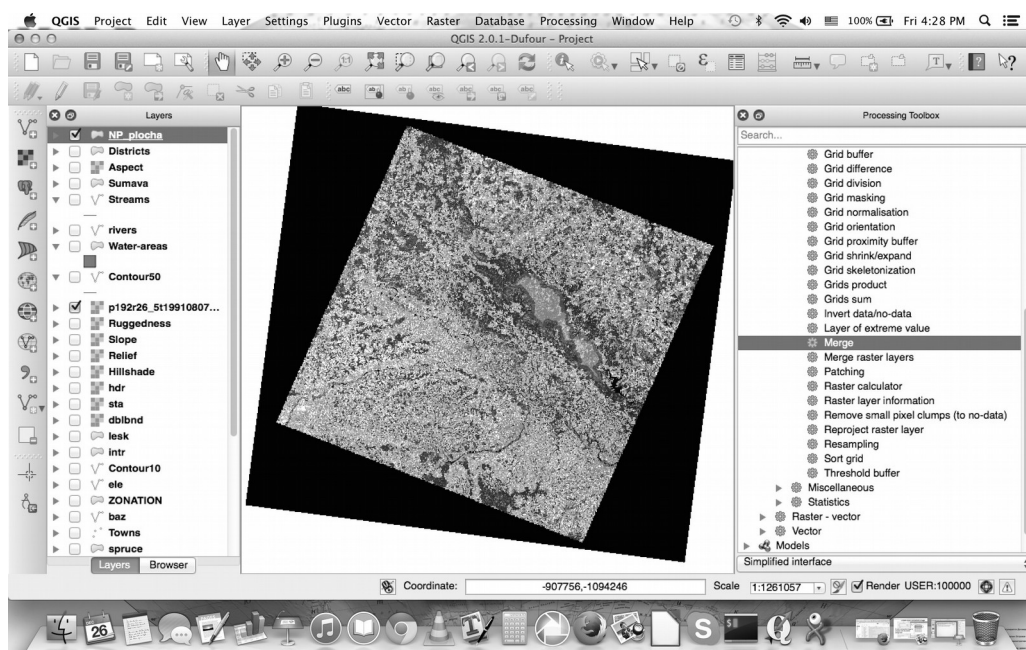


Fig.1. Organizing project in Quantum GIS: case of Czech National Park

The variety of data and information increases interest to the subject at students. The development of GIS skills is not only important in cartographic skills, but also for broader formal education in any branch of geosciences. Using GIS allows to visualize data and perform lectures at high standard as well as to integrate multi-disciplinary approach in lectures. Hence, students feel like active participants while

learning process rather than passive listeners. They can gain new skills, analyze and compare, look for data. Active, collaborative mode "teacher-student" in educational process enables student to discover and develop his creative potential [1].

However, the most sensitive question while using and choosing GIS is its price. Though it might not be a big problem for the corporations or big companies, it often becomes a serious challenge for students with restricted financial budget. The most popular GIS are represented by following software products: ArcGIS, MapInfo, Panorama, Neva, Erdas Imagine, GeoMedia and others. However, they are commercial software, not free of charge. In this work I am going to inform audience about the use of the GIS environment in the public domain: a QuantumGIS. The QuantumGIS is a GIS released under the license GNU (General Public License).

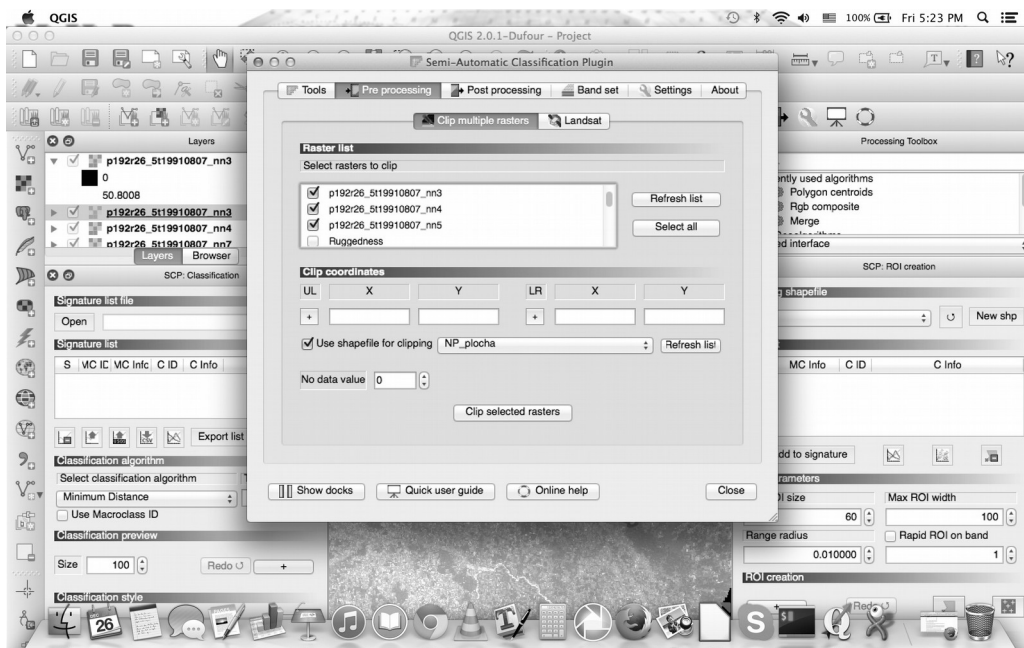


Fig. 2. Pre-processing raster data (Landsat TM image) using QuantumGIS

Use of Quantum GIS is free of charge, i.e. every student may install it on his laptop and enjoy its multi-functionality for the educational purposes. QuantumGIS allows student to create and analyze maps of countries, territories, regions, cities, to use both raster and vector data. Thematic layers can be displayed in various ways, including in the form of high-quality map layouts. QuantumGIS allows students to solve complex problems of geographical analysis based on the implementation of queries and creation of various thematic maps, to communicate with remote databases, to export geographical objects in other GIS, etc. Thematic maps created in QuantumGIS provide broad opportunities for data analysis and design possibilities: visualizing graphical objects using colors, hatchings, line types and symbols, etc.

Methodologically, starting project from scratch often (though not always) begins at georeferencing scanned paper maps and their vectorization in order to put them into e-form and to get new spatial information thereafter. To work with bitmap image in a QuantumGIS environment student has to open it as a raster file, find appropriate coordinates and refer to them. Then they should move on objects vectorization ('View', 'Toolbars', 'Digitizing'). By manual vectorization operator

student encircles each object by the mouse and save it using 'New Vector Layer' dialog in Quantum GIS that allows to define a new layer. Then student navigate and click on the menu entry Layer-New-New Shapefile Layer. The new vector layer now exists. To begin digitizing, student need to enter edit mode which is commonly required to prevent accidental deleting of important data. Edit mode is switched on or off individually for each layer by the student himself. Using such commands as 'Add Feature' for starting vectorizing, 'Move Feature' to move entire feature, 'Node Tool' to just only one part of a feature, enables student to play around with new objects.

While vectorizing contour lines it is usually enough to set up the starting point and the direction of the tracking lines. Later on, it will track the line for as long as it meets an uncertain situation (e.g. line break). Interactive vectorization is strongly related to the quality of raw data. Automatic vectorization involves direct transfer from raster-to-vector format using special software (Autotrace). However, editing is almost always necessary thereafter, as even the most sophisticated software incorrectly identifies objects, e.g. confuses symbols with groups of points, etc. There are special software specifically designed for certain types of automatic vectorization of raster images (such as maps, text information) that can be used as well. Quantum GIS vectorization is performed manually. In case if map registration is required, student has to register the image. Namely, he needs to specify coordinates with at least three points in the selected coordinate system. The Quantum GIS has a variety of tools for editing layers. Changes can be made by activating layer and choosing processing tools (vector or raster). The objects can be moved to a new location, changed in type, size, etc. [2]. Topologically, performing changes in shape is only possible for vector objects that are created by the polygon tool. Changing shapes can be done by moving, adding or removing nodes which are used not only to change the form, but also to align objects relative to each other. This process is called combining sites and is important for docking adjacent objects.

The value of GIS in our time does not require to be advertised. The GIS is used in almost all kinds of human activities: be it commercial analysis or education activities. Both involve variety of multiple special tasks and queries. These include assessment of overpopulation, air and water pollution, land cover changes, natural disasters, finding best route between points, planning sightseeing, tourism, selection of the optimal location of the new office, municipal tasks, etc. The use of GIS in educational environment, i.e. at workshops, seminar, colloquia, lectures, etc. enables applying multidisciplinary approach. Thus, teacher can use information from many sources and related disciplines (e.g., a priori knowledge, in situ data, soil or geomorphic schemes, climatic data, math calculations, statistics, etc.). The paper reported technical usage and some functionality of QuantumGIS for education.

LITERATURE

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