

3D MODELLING OF ROCK FACES USING MICROSOFT PHOTOSYNTH AND MESHLAB SOFTWARES

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The main problem of the cartography is the presentation of the third dimension of the surface. Due to the digital improvement in the previous years lot of method was developed (for example anaglyph methods, VRML models). This paper presents a method which is suitable for the reconstruction of surfaces (for example rock faces) in digital format.

The Microsoft Photosynth (www.photosynth.net) is a very useful web-based application and the store of lot of panorama images and photosynths. The registered users can upload digital images which had been taken by digital cameras during the field-work. The client program which is running on our personal computer calculate the three dimensional shape of the rock face using the overlapping digital images. The application prepares a mosaic from the images at first and after that it calculates a three dimensional point cloud from the homologous pixels. We can watch the mosaic and the point cloud on the webpage from different point of view. Unfortunately there are more disadvantages of using Photosynth. We can upload only 300 images to the website and the generated point cloud will not be homogeneous. The images taken with higher resolution give more detailed point cloud but the modern digital compact cameras make pictures with higher noise rate on higher resolution which decreases the quality of the point cloud.

The three dimensional point clouds can be downloaded using some support programs in different formats, for example PLY or X3D. The original surface can be reconstructed from this point cloud in several programs which can manage three dimensional data. The open-source MeshLab software (www.meshlab.sourceforge.net) developed by the researchers of University of Pisa was used in this research. The software can compute a TIN (triangulated irregular network) surface using different functions (Voronoy triangulation or Poisson surface reconstruction). The reconstructed surface can be exported in different formats (for example VRML, 3DS, X3D). It is possible to generate photo-realistic texture for the surface using MeshLab. Up to the present the research focused just on the surface-reconstruction.

In the close future, the aim of the research is developing a simple, effective method for generate photo-realistic texture for the reconstructed surface and finding a format which can be useful for watching the digital models of rock faces on the Internet interactively. The main goal of this website can be the preservation of natural heritages.