

Semi-automated rock depiction methods for large scale topographic maps

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In mountainous areas rock depiction in large scale topographic maps is indispensable for navigational purposes. It can be seen as part of the topographic relief representation that supports the user when utilizing maps in an outdoor environment. Furthermore it is a characteristic attribute of high mountain maps and contributes essentially to the overall acceptance of maps in relation to design as well as esthetic impression. In the past, rock depictions in maps were typically hand drawn. Today these traditional methods are rarely utilized due to high costs, time restrictions and the lack of talented personnel. Therefore many attempts towards automated rock depiction are being undertaken in the last years, however with modest not to mention unsatisfactory outcome.

The described method in this paper shows a new approach towards semi-automated rock depiction. The data that is used is derived from digital elevation models (DEM). Formalization for the automation process is preprocessed and is based upon the concept of analyzing manual rock depiction methods and principles such as the “Swiss manner“, or the traditional methods of the Austrian Alpine Association (“Alpenverein”).

The process of automating rock depiction consists of three areas: data generation, cartographic design and graphic revision. Horizontal and vertical lines are generated from the DEM. The information of slope and aspect is also derived and allocated to vector data. Relevant terrain edges and rock boundaries are manually constructed and added to the model.

The cartographic depiction is based on the principles of the Swiss style shadow hachuring method and the replacement of horizontal by vertical hachures in case of steep faces. Depending on slope and aspect, the derived horizontal and vertical lines are drawn as hachures. Assuming a light source from a north-west direction, hachures in shadowed areas are drawn stronger and denser (principle of shadow hachures). In contrary lines in sunlit areas are drawn more lightly with larger intervals. To avoid overlapping hachures, horizontal lines are replaced by vertical lines at a defined slope threshold value (principle of “Scharrungsersatz”). The last step of the automated process is the graphic revision. To illustrate the roughness of the terrain and the characteristics of the rock, the lines are drawn in a crumpled style.

The generated “hachure styled” rock depiction is based on known manually drawn rock depiction methods, but doesn't intend to reproduce or copy them. A simple Web-interface enables the user to create different kinds of representations, as well as editing and improving existing illustrations.