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## Returning to geostatistical-based analysis of image/surface texture: from generalization to a basic one-click short-range surface roughness algorithm

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Despite the long record of applications and the well-known theoretical framework, geostatistical based image/surface texture tools have still not gained a wide diffusion in the context of geomorphometric analysis, even for the evaluation of surface roughness. Many geomorphometric studies dealing with various aspect of surface roughness use well-known approaches based on vector dispersion of normals to surface or even the popular Topographic Ruggedness Index. In many comparative studies on roughness metrics, geostatistical approaches are cited but not tested; in other studies, geostatistical approaches are tested using algorithms not adapted to the analysis of morphometric data. In remote sensing, geostatistical approaches are more popular, even if there is not a consensus on which are the most suited metrics for computing image texture indices. In metrology of manufactured surfaces, equipped by various industrial standards for surface texture measurements, approaches based on autocorrelation are widely adopted. However, “natural” surfaces and related morphogenetic factors are much more complex than manufactured surfaces and ad-hoc concepts and algorithms should be devised. This presentation is mainly focused on topographic surface analysis, but the considerations and results are applicable also in the context of image analysis. This presentation aims to clarify some aspects of the geostatistical methodologies, highlighting the effectiveness and flexibility in the context of multiscale and directional evaluation of surface texture. In doing this, the connections with other methodologies and concepts related to spatial data analysis are highlighted. Finally, it is introduced a simplified algorithm for computing surface roughness indices, which does not require the preliminary detrending of the input DEM.

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