Detection and Delineation of Topographic Eminences

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Topographic eminence is a basic level category representing all convex shaped topographic landforms rising above their immediate surroundings. As opposed to everyday objects, the properties of an eminence are dependent on how it is conceptualized and where it is delineated. Research has shown that there are multiple conceptualizations of eminences (and other landforms) depending on cultural and linguistic backgrounds. However, the perception and registration of stimuli from our physical environment is not subject to cultural or linguistic bias. This research, therefore, exclusively depends on the morphological and perceptual elements of the natural landscape to propose universally applicable methods for detecting and delineating topographic eminences. First, an ontology is developed to specify the structural parts and spatial properties of eminences. Next, a hybrid system utilizing quantitative parameters such as elevation and slope, and qualitative features such as peaks and passes is used to detect the initial location of eminences in digital elevation models. Finally, alternative delineation algorithms are developed based on the proposed ontology and the hybrid system of terrain parameters and features. The practical utility and efficacy of these methods in identifying eminences is demonstrated for a study area surrounding the Presidential Range of the White Mountains.