Construction of Regular Grid DEMs from Digitized Contour Lines: A Comparative Study of Three Interpolators

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Abstract

Regular grid DEMs were constructed from digitized contour lines using weighted averaging (WA), minimum curvature (MC), and kriging for three terrain units. The accuracy of the DEMs was assessed against 200 randomly selected checkpoints. Other factors related to the accuracy, such as grid size, number of elevations in the input sample, number of nearest neighbouring elevations, distance decay power, and the impact of missing observations, were also comparatively studied. It was found that DEMs constructed using WA are the least accurate, and those using the other two methods have a similar accuracy at 10 m. At a larger grid size all DEMs are comparable in their accuracy regardless of the interpolator used. The accuracy is not severely subject to change in the size of sampled elevation unless it is extremely small. If constructed using MC, the accuracy of the DEMs is the most sensitive to increment in the grid size. The accuracy is hardly affected by the number of nearest neighbouring elevations for kriging, but is adversely affected if the WA interpolator is used. Distance decay power improves the performance of WA only when it changes from 1 to 2. Of the three interpolators examined, MC handles topographic uncertainty caused by missing elevations in the input dataset better than WA and kriging.