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A local update and refine method of the global terrain nature grid

Wang Hongbin CNNC Beijing Research Institute of Uranium Geology, China

A s an important data model for the exploration and interpretation of large range natural phenomena such as hydrological analysis, climatic analysis, simulation of sea level rise, global terrain nature grid (GTNG) partitions the earth surface into nature cells based on Morse complex, directly revealing the required global terrain morphological information at different scales. Recently, with the development of data acquisition technology, high temporal/spatial resolution terrain data sets are being collected. However, there is no top-down operation for GTNG to achieve almost infinite continuous refinement, since it is very important to the representation of Morse features dealing with the ever-growing global massive terrain data. On the other hand, due to the updating of local terrain data, GTNG needs a corresponding local model reconstruction method to suit the present situation. To this aim, an accurate and efficient method to update and refine GTNG locally is presented. In this approach, local terrain is updated firstly through constraint Delaunay triangulation. Then, the local cells of GTNG are located and updated according to the topological relation between the terrain triangles and the Morse cells. Although the exterior triangles associated with the vertexes on the constraint boundary are extracted and added into the computation of new critical points and cells, the other parts of GTNG don't need to be updated. By this method, local cells of GTNG can not only be updated, but also be refined almost infinitely using terrain data with higher and higher resolution. In the end, an experiment is done to validate the correctness and feasibility of this method.

Biography

Wang Hongbin has completed his PhD from China University of Mining and Technology (Beijing). He is a Senior Engineer working in CNNC Beijing Research Institute of Uranium Geology. He has been engaged in Terrain Morphology Modeling and Geo-Spatial Data Management Research for seven years and has published some papers in reputed journals.

whbcumtb@163.com