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Perspective

Working Principles of Digital Elevation Model and its Applications

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DESCRIPTION

The term Digital Elevation Model (DEM) is a standard description for digital imagery of elevation, topography and bathymetry. It is "digital" in the sense that DEMs most usually produced, distributed, and analyzed in soft-copy or digital format. Digital Elevation Model (DEM) is the 3D-representation of terrain surface in the discrete form and a standard device to observe the hydrological and research application associated with the terrain characterization, landscape and water resources management. It enables in identifying physical functions of a place, watershed delineation and stream network generation. It describes the "elevation" of the ground surface, exclusive of artificial structures, vegetation or any other objects above surface. A DEM is a pixel-based "modeled representation" of the earth's surface, where each pixel of a DEM represents an elevation value. Various applications of DEMs, the remote sensing techniques used to measure heights for creating a DEM, the necessary planning for generating a DEM ("project planning"), and quality elements of DEM creation and usage. The capacity of DEMs to derive actual ground height and height-above-ground has far-reaching applications with broad practical and analytical utility.

Significance of accurate DEM is important to pursue advanced hydrologic research. Evaluating the contrast with different size of pixels' scale in DEM to generate stream network analysis and hydrologic models. These streams facilitate the exact course of the channels and smooth calculation of the stream order. The accuracy of DEM is basically dependent upon the source of DEM generation; the space borne DEMs or specific methodologies which includes elevation data for the creation of DEM i.e. Triangulated Irregular Network (TIN), grid and contour. The important requirements of DEM accuracy are particularly affected by the strategies of data collection, density and spacing of the sample points, break line in the horizontal scale, spatial resolution, location and topographical surfaces. TIN modeling, dense feature matching and automated strip mosaicing are used for DEM technology through GCPs.

A water catchment, also known as a watershed or drainage basin, refers to the spatial extent of an area of land in which surface water (from rain, melting snow or ice) drains to a single outflow point at a lower elevation. Since the shape of the Earth governs water flow, a DEM is extremely useful for identifying flow channels, connecting these channels in the form of stream networks, and as a result, delineating catchment areas. Catchment maps, including permit water resource managers to designate management areas, map influence extents for pollution control, dam construction and other needs, and to calculate water resource quantities. DEMs are critical for characterizing the floodplain—the geographical extent of low-lying land regions that will be concern to flooding above certain thresholds. Having assessed flow channels and related them in stream networks to form a catchment or watershed based on ground morphology, DEMs can portray the related floodplains.

CONCLUSION

Storm water managers depend heavily on DEMs for tracking and modeling watersheds, streams, and different flow channels. DEMs can track hydrologic processes (which includes modeling the water's volume flow during peak rainfall events) and hydraulic processes (modeling where that water will flow and how storm water will have interaction with structures such as culverts and bridges). In concert with channel morphology modeled from DEMs and associated remote sensing, data on existing systems may be collected from municipal maps or from the DEMs' remote sensing sources.

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