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AN ADAPTIVE APPROACH FOR EXTRACTION OF DRAINAGE NETWORK FROM SHUTTLE RADAR TOPOGRAPHY MISSION AND SATELLITE IMAGERY DATA

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Abstract. *Many digital elevation models (DEMs) have difficulty replicating hydrological patterns in depressions and flat areas. Thus, methods of DEM hydrological correction must be used. The main objective of this paper is to extract drainage network through the combination of DEM and satellite imagery data. In this paper, an adaptive approach is proposed to use main drainage line which is extracted from satellite imagery as the known hydrology network and process depressions and flat areas in one procedure using heuristic information. It can be seen from the comparison and analysis of the drainage networks generated by the proposed approach and Agree, that the proposed approach, named adaptive approach for determinationing flow direction with heuristic information (AHI), can get a closer match result with the ground truth network than Agree.*
Keywords: Digital elevation model (DEM), Geographic information system (GIS), Drainage network, Heuristic information, Satellite imagery

1. **Introduction.** Information about topography reflects terrain composition and has an important role in many research fields of GIS (such as hydrologic analysis, environmental analysis, mineral deposition, land erosion and pollution diffusion analysis) [1-3]. Grid DEMs [4] consist of digital files storing terrain elevation values at the nodes of a regular square grid. They can be viewed as mono-channel two-dimensional images where the value of a node represents an elevation rather than a reflectance measurement. The use of DEMs for the purposes of automated watershed and drainage network delineation has increased dramatically in recent years.

Generating flow direction is the most important procedure for automated watershed and drainage network extraction. Almost all the computation of flow direction is based on the flow routing model. In such a model, the main task is to derive three matrices from the raw DEM, the depressionless elevation matrix, the flow direction matrix and the flow accumulation matrix. Therefore, most flow direction algorithms use DEM to determine the flow direction of a node according to the elevations in a 3×3 window around it [5].

The most convenient and widely used method is D8 algorithm [6,7]. The direction of each node is determined by one of its eight surrounding nodes with steepest descent.