

# **Detection of drainage channel networks on digital satellite images**

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## **Abstract**

We present a technique for automatic detection of drainage channel networks on single digital images acquired by conventional remote sensing satellites such as Landsat and SPOT. Since these satellites are Sun-synchronous, the approximate local Sun angle at time of image acquisition is always known. Consequently, the spatial behaviour of shading with respect to channels and other topo-morphological features is known. This knowledge has been used to advantage in this work.

We use a multi-level knowledge-based approach for this detection process. The first and lowest level deals with image processing: radiometric and edge enhancement, edge detection and consolidation, and skeletonization; resulting in a complex network of lines. The second (intermediate) level of knowledge for network extraction performs a categorization of line segments in order of resemblance to channel elements based on the strength and local disposition of shading. The highest level of knowledge that has been applied, reconstructs the channel network from the selection of these line segments based on structural considerations, including connectivity and streamflow direction. This last stage of network extraction conforms naturally to a global view of a network. The extracted networks are smooth and relatively well connected and seem to be quite encouraging for developing this approach further into practical uses.