Partial Polygon Pruning for NHD Features Using Standards-Based Constraints

Alexander K. Stum[1], Barbara P. Buttenfield[1], Lawrence V. Stanislawski[2]

[1] Department of Geography, University of Colorado, Boulder Colorado USA
Email: {alexander.stum , babs} @colorado.edu

[2] Center for Excellence in Geospatial Information Science (CEGIS),
United States Geological Survey (USGS), Rolla, Missouri USA
Email: lstan@usgs.gov

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Following the generalization of hydrographic flowline and polygon features by way of enrichment, pruning, and simplification, additional processing is needed to render a National Hydrography Dataset (NHD) suitable for use at a generalized target scale. In this paper, post-simplification processing prunes portions of features that are too narrow for cartographic display at a target scale. The range of scales investigated in this paper extend from 1:24,000 (24K) to 1: 1 million (1M).

The removal of narrow portions of features follows NHD data production standards maintained by the USGS for various target scales (24K, 100K and 1M). Four categories of criteria apply: 1) short axis criteria, for which a feature must exceed a specified width along the shortest axis; 2) conditional criteria, for which portions of features must be greater than a specified width conditioned to the length; 3) relative criteria, for which the feature's retention depends on the geometry of another proximal or overlapping feature; 4) scale cutoff, or a specified scale threshold at which the feature is no longer included in the target scale version.

This paper addresses the first two categories and describes processing methods and results for exemplar NHD subbasins in different geographic conditions in the United States. Portions of polygonal rivers, streams, and canals are automatically characterized for width, length, and connectivity. The algorithm automatically distinguishes sections of polygons that are sufficiently wide, conditionally wide, or too narrow at the target scale. Sections are distinguished through a geoprocessing sequence that includes buffering, segmentation and numeric characterization. Topology is constrained by simple pattern recognition which retains conditionally wide segments that connect on both ends with sufficiently wide segments. Additionally, this algorithm amalgamates proximal islands and maintains features above a threshold size. As time and space permit, discussion will include algorithms for integrating polygonal features with simplified flowlines.