Comparison of Watershed Delineation Methods for the Los Angeles River

A PROJECT BY,
DANIEL LYVERS & ALEX MCMANUS

4/593 DIGITAL TERRAIN ANALYSIS

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L.A. River

- Until 1913, L.A. River was the source of public drinking water.
- Seasonal flooding led to deaths and property damage
- 1938-1959: US Army Corp of Engineers channelized river.

Highly urbanized Area.

The beginning of channelized River

Area of interest

Mouth of the river

Watershed Delineation

Automated Watershed Delineation Methods

- Un-enhanced method
- Stream burning
- Natural Excavation
- AGREE (surface reconditioning)

Watershed Delineation

Un-enhanced method: using DEM to create watershed boundary.

Data: DEM and a vector stream file

Tools:

- Flow Direction
- Sinks
- Fill
- Flow Accumulation
- Watershed

Watershed Delineation

Stream Burning: “burn” stream at a uniform depth into the DEM.

Data: DEM and rasterized stream network

Tools:

- Same as un-enhanced +
- Conditional statement to create burned raster
- Stream links (segmentation)
- Snap pour points (cells with highest accumulation)

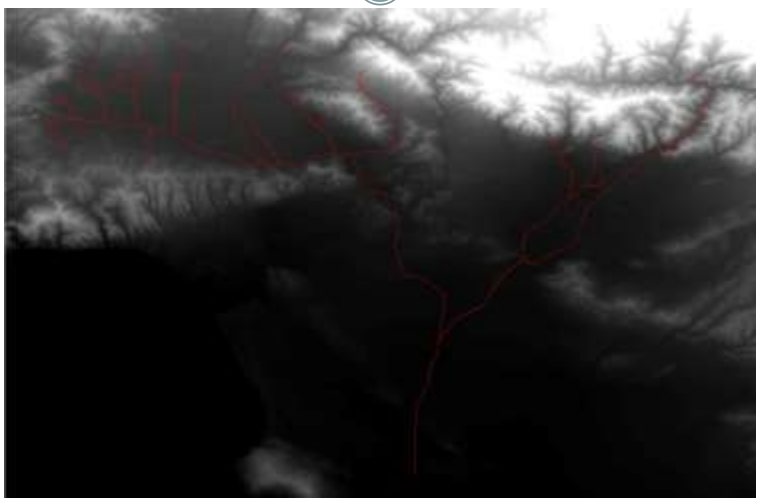
Our Data

- USGS 30x30 Meter DEM
- USGS Stream Network Vector Data
- Manually Digitized Polyline features from Google Earth (Kml to Shapefile)

Our Data

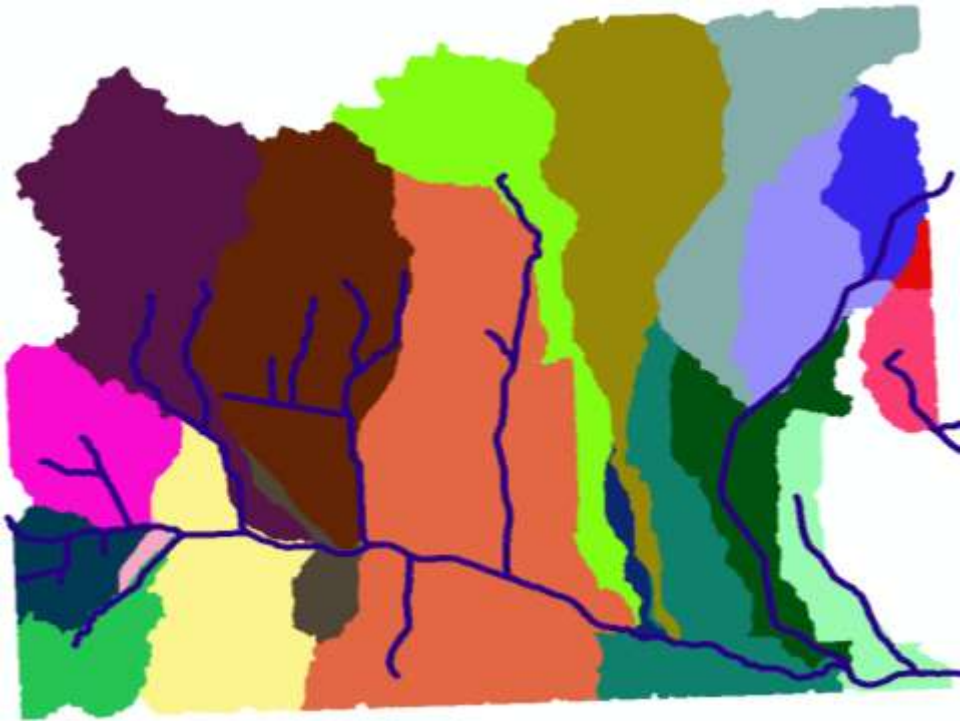
Challenge of identifying and digitizing a channelized river network in a dense urban setting.

Our Data



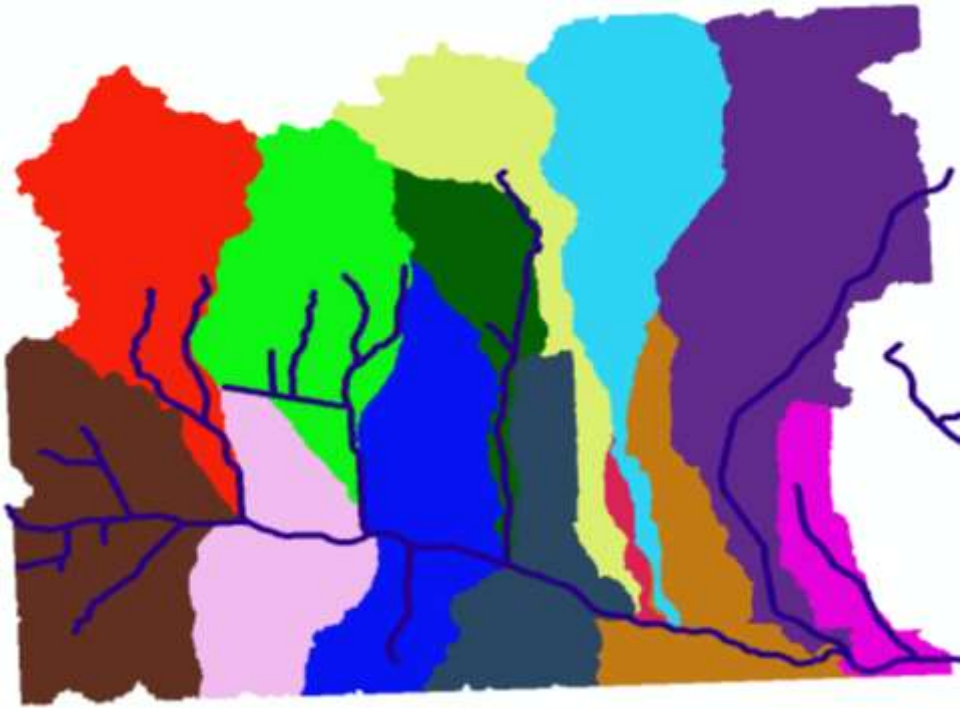
Methods

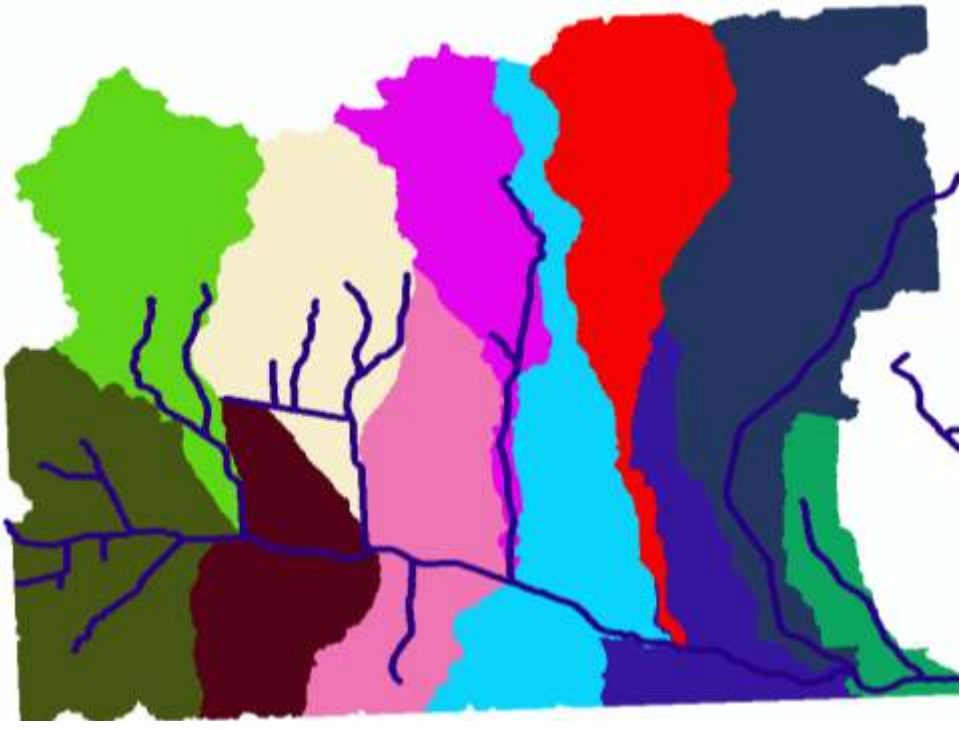
- Preprocessing
- Unenhanced Watershed Delineation
  - Flow Direction
  - Sink
  - Fill
  - Flow Direction
  - Flow Accumulation
  - Stream Link
  - Watershed

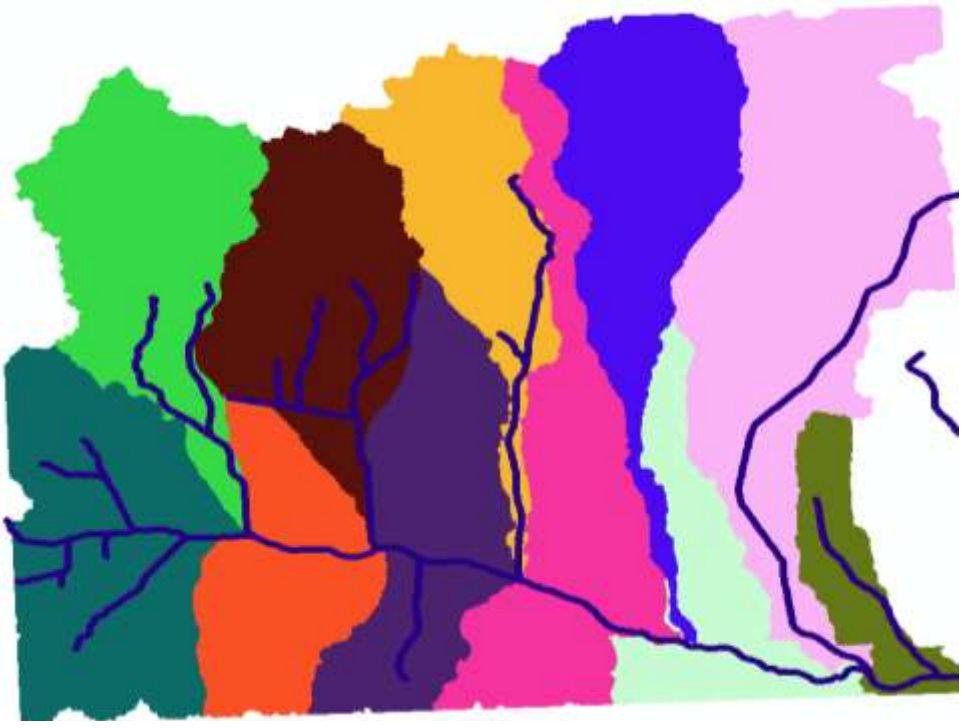


Methods Cont'd

- Enhanced Stream Burning Watershed Delineation
  - Rasterize stream layer
  - Isnull function: con(isnull([river_raster]), 0, 1)
  - Stream Burn: con([Calculation2] == 1, [mosaic_clip] - X, [mosaic_clip])
    - 2
    - 10
    - 20







Discussion

- All methods were fairly accurate
- Stream burning slightly more accurate

- Future research should include:
  - Other enhanced methods (normalized excavation, AGREE)
  - Other highly urbanized areas with channelized and non-channelized rivers