Efficient longest flow path algorithm

Workspace

r.accumulate

\[\def\LFP{\overrightarrow{\text{LFP}}} \def\FP{\overrightarrow{\text{FP}}} \def\FL{\text{FL}} \def\DFL{\text{DFL}} \def\UFL{\text{UFL}} \def\LFL{\text{LFL}} \]

A flow path $\FP_i$ is the watercourse between a pair of two points i within the watershed and the longest flow path $\LFP$ is defined as

\[\LFP\in\left\{\FP_i\;:\;\left|\FP_i\right|\geq\left|\FP_j\right|\;\forall i\neq j\right\}. \]

The longest flow path plays an important role in hydrologic modeling, but its computation requires multi-step raster calculations for each watershed. This research project aims to improve the current process and efficiency of computing the longest flow path for a lot of watersheds.

Performance comparisons

Method	lfp.sh	lfp2.sh	r.lfp	r.accumulate
Elapsed time	3h 48m	9h 8m	6h 46m	**56s**

References

- Huidae Cho, July 2020 in Press. A recursive algorithm for calculating the longest flow path and its iterative implementation. Environmental Modelling & Software. 10.1016/j.envsoft.2020.104774. SCIE, 2018 Impact Factor 4.552, Author's Version.
- How to calculate the longest flow path in GRASS GIS

projects