# Better completion of fragmentary river networks with the induced terrain approach using potentially conflicting clues

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**Abstract:** We extend the induced terrain approach for reconnecting river segments by maximizing information from multiple potentially conflicting clues. The reconnection problem is important because in aerial photography, canopies and clouds cover parts of rivers. However, a complete and hydrologically consistent river network is necessary for transportation, land use planning and flood plain control. With the advancement of surveying techniques, it is easy to collect numerous layers of data, each of which corresponds to a terrain attribute in concern. However, their accuracies could vary in different regions and at different time, leading to conflicting conclusions when using each of these layers to make river reconnection decisions. This paper is particularly devoted to balancing between partial height samples and terrain shapes implied from segment geometry, and suggesting a few possible considerations when we design which layer to trust. First, we propose the use of terrain (and hence river network) type. We find that while a partial height density of 0.01 is sufficient for our induced terrain approach to reconnect a reasonably good dendritic network, the requirement to reconnect a parallel network is much higher. Better reconnection rates are achieved with segment geometry clue. Second, as partial height data density should affect the precision of the terrain being interpolated from the height samples, we investigate a typical partial data density at which partial height samples are more reliable than segment geometry. Finally, we present how we decide which of the two clues should be used for best possible reconnection results. We expect our technique may also be used with other combinations of conflicting clues to improve reconnection results of river networks and other networks.

**Keywords:** River segments, River network completion, Height awareness, segment geometry, Hydrology