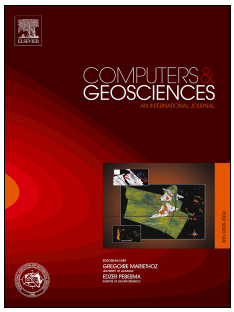
# Accepted Manuscript




A synthetic visual plane algorithm for visibility computation in consideration of accuracy and efficiency

Jieqing Yu, Lixin Wu, Qingsong Hu, Zhigang Yan, Shaoliang Zhang

PII: S0098-3004(17)30933-0

DOI: 10.1016/j.cageo.2017.09.004

Reference: CAGEO 4018

To appear in: *Computers and Geosciences*

Received Date: 29 August 2016

Revised Date: 2 June 2017

Accepted Date: 5 September 2017

Please cite this article as: Yu, J., Wu, L., Hu, Q., Yan, Z., Zhang, S., A synthetic visual plane algorithm for visibility computation in consideration of accuracy and efficiency, *Computers and Geosciences* (2017), doi: 10.1016/j.cageo.2017.09.004.

# A Synthetic Visual Plane Algorithm for Visibility Computation in Consideration of Accuracy and Efficiency

Visibility computation is of great interest to location optimization, environmental planning, ecology, and tourism. Many algorithms have been developed for visibility computation. In this paper, we propose a novel method of visibility computation, called synthetic visual plane (SVP), to achieve better performance with respect to efficiency, accuracy, or both. The method uses a global horizon, which is a synthesis of line-of-sight information of all nearer points, to determine the visibility of a point, which makes it an accurate visibility method. We used discretization of horizon to gain a good performance in efficiency. After discretization, the accuracy and efficiency of SVP depends on the scale of discretization (i.e., zone width). The method is more accurate at smaller zone widths, but this requires a longer operating time. Users must strike a balance between accuracy and efficiency at their discretion. According to our experiments, SVP is less accurate but more efficient than R2 if the zone width is set to one grid. However, SVP becomes more accurate than R2 when the zone width is set to $1/2^4$ grid, while it continues to perform as fast or faster than R2. Although SVP performs worse than reference plane and depth map with respect to efficiency, it is superior in accuracy to these other two algorithms.

**Keywords:** visibility; viewshed; synthetic visual plane, horizon; DEM;