

Optimising visibility analyses using critical points in the terrain

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Abstract. Viewshed and intervisibility analyses are now an important part of many geographic information projects. The most common concerns in these analyses are the accuracy and efficiency of the visibility measurements. While, the uncertainties associated in the visibility measurements are perhaps well known, there is still no consensus on increasing the speed of visibility calculations. Researchers have attempted both hardware-based enhancements (Ware et. al., 1998) and algorithmic heuristics (Wang et. al. 1996, Stewart, 1998, O' Sullivan and Turner 2001, Kim and Clarke 2001) to increase the speed of visibility calculations. This work extends the observations and implements the proposals of Lee (1992) and O' Sullivan (2001) on the importance of the critical points such as peaks, passes, pits, channel points and ridge points as observers for finding out the visibility of targets. The results indicate, as expected, that the use of critical point observers not only improves the speed of visibility calculations significantly but there is also no significant loss in assessing the overall visibility of a point. Cited References Kim, Y-H, and Clarke, G., (2001). Exploring Optimal Visibility Site Selection Using Spatial Optimisation Techniques, In Proceedings GISRUUK' 2001, Glamorgan: UK, 141- 146. Lee, J., (1992). Visibility dominance and topographical features on digital elevation models, In Proceedings 5th International Symposium on Spatial Data Handling, Vancouver: Canada, 622 – 631. O'Sullivan, D, and Turner, A, (2001). Visibility graphs and landscape visibility analysis. International Journal of Geographical Information Science, 15(3), 221-237. Ware, J.A., Kidner, D.B., Rallings, P.J., (1998). Parallel Distributed Viewshed Analysis. Proceedings of the 6th international symposium on Advances in Geographic Information Systems, Washington DC: USA, 151-156. Wang, J., Robinson, G.J., and White, K., (1996). A fast solution to local viewshed computation using grid-based digital elevation models. Photogrammetric Engineering and Remote Sensing, 62(10), 1157-1164.