

Quality of Quantity: L₁ Norm Residuals in Geodetic Networks

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ABSTRACT

The task of ‘cleaning’ a large network of archived Global Navigation Satellite System (GNSS) vectors such that the confidence of truth can be assured is complicated by the nature of traditional methods of outlier detection. Least squares techniques that test the hypothesis of the presence of a single outlier in a minimally constrained model are known to sometimes fail in the presence of several outliers, in particular the obfuscation of gross error ‘localisation’ to a single measurement. An alternative to least squares is the minimisation of absolute residuals (L₁ norm residuals), which assesses measurement quality against a ‘best candidate’ minimum set of measurements. One aspect of an L₁ adjustment is the improved ability to identify measurements that do not fit the geodetic network model. The successful application of a fast linear programming technique to minimise L₁ residuals enables this technique to be used as a pre-processing step before a least squares adjustment and also allowed the evaluation of a comparison between least squares and L₁ residuals on large geodetic networks with incomplete metadata.

KEYWORDS: *Least squares, L₁, residuals, outliers, data cleaning.*