

UNIVERSITI TEKNOLOGI MARA

**RELIABILITY STUDY OF L1-NORM
ADJUSTMENT IN EXAMINING THE
INCONSISTENCIES OF CADASTRAL RECORD**

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**BACHELORS IN SURVEYING SCIENCE AND
GEOMATICS (HONOURS) - AP220**

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Thesis submitted in fulfilment
of the requirements for the degree of
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College of Built Environment, CBE.

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under - Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Least square estimation (LSE) is a well-known adjustment approach that has been utilised by the geomatic practitioners to systematically distribute random errors in the cadastral datasets. Taking into account the sources of cadastral records, which are established from multi-class and quality of observations, the augmentation of outliers in the datasets is inevitable. The dependence on mean value in deriving adjusted parameters has constrained the LSE solutions, making the algorithm prone to blunders. In contrast, L1-norm adjustment that exploits the median in yielding the parameters has robust solutions even in the presence of outliers. Thus, this study aims to investigate the reliability of L1-norm to quantify the uncertainties in the cadastral records between adjacent certified plans. To measure the ability of L1-norm to detect outliers, the traverse network has been augmented with artificial errors in the distance and bearing measurement. Both adjustment approaches were employed to fairly evaluate the performance of L1-norm and LSE in identifying the synthetic blunders. Later, actual cadastral records were used to assess the best adjustment method to detect information discrepancies in adjacent certified plans (CPs). To ensure that experimentation is thoroughly performed, three combinations of adjacent CPs were utilised: i. Both are first-class CPs; ii. First and second classes CPs; and iii. Both are second-class CPs. Through the synthetic errors experiment, the study found that redundancy is the main criteria for L1-Norm to detect the existence of blunders. Otherwise, variant of LSE outliers' detection demonstrates better performance compared to L1-Norm. The findings have been strengthened by the later experiment that indicated that L1-Norm is applicable for detecting discrepancies between the adjacent CPs. However, LSE also managed to perform similar result to the L1-Norm. In consideration of the mathematics mechanism employed by the adjustment approaches, it is advisable to proceed with LSE's outliers' detection variant in quantifying outliers.

Keywords: L1-Norm Adjustment, Least Square Adjustment, Cadastral Record, Outliers Detection

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