

RESEARCH ON GROUND OBJECT TYPES BASED ON UAV LIDAR POINT CLOUD

Bachelor's thesis

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ABSTRACT

The relevance of the research is that in the context of accelerating urbanization and technological progress, the study of urban land characteristic types has become a key issue in the fields of urban planning, resource management and environmental monitoring. The accuracy limitations of traditional cartographic methods and the high costs associated with the production of urban geographic information require innovative approaches to accurately capture urban topographic data.

The current research direction is to take advantage of the current trend to enhance data acquisition and analysis with cutting-edge technologies. Specifically, the focus is on the application of advanced unmanned aerial vehicle (UAV) Lidar technology to explore the urban spatial form and land characteristics of the Nanhu region. The study, which compares a variety of data classification methods, marks a shift in urban research toward more sophisticated analytical techniques.

The object of this study is to use high-resolution three-dimensional point cloud data derived from UAV LiDAR technology to deeply classify the ground objects of complex urban environment around Nanhu Lake. In doing so, it seeks to identify and evaluate the most effective data classification methods to improve the accuracy and efficiency of urban topographic data mapping.

The purpose of this qualification work is multifaceted:

1. Valuate and compare the performance of four different data classification methods (topographic elevation, image segmentation, image fusion, and random forest) by using confusion matrices and Kappa coefficients.

2. Determine which method provides the most reliable classification results, thereby addressing the gaps that exist in traditional mapping techniques.

Structure of the work. This paper consists of introduction, four chapters and conclusions. The reference list includes 50 positions. The thesis is laid out on 62 pages. Contains 10 figures and 9 tables.