Comparative Analysis Of UAV-Based And Ground Survey Methods For Digital Elevation Modeling: A Case Study Of Federal Polytechnic Nekede, Nigeria

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SUMMARY

This study compares UAV-based and ground-based survey methods for creating Digital Elevation Models (DEMs) at Federal Polytechnic Nekede in Owerri, Imo State, Nigeria. DEMs are important geospatial products used in urban planning, environmental monitoring, and infrastructure development. Traditional ground-based surveys using Total Stations and GPS offer high accuracy, but they can be labor-intensive, time-consuming, and limited in large or hard-to-reach areas. In contrast, UAVs provide quick data collection, cover larger areas, and improve efficiency. The research aims to assess and compare the performance of these methods regarding accuracy, efficiency, and cost. The methodology includes setting up Ground Control Points (GCPs), conducting detailed flight missions with drones that have high-resolution cameras, performing ground-based surveys with Total Station and GPS, and processing all collected data using Agisoft Metashape and Civil 3D. Statistical analysis, including Root Mean Square Error (RMSE), will compare the results. Expected outcomes include a thorough evaluation of each technique under various terrain conditions on campus. The study will provide practical recommendations for choosing the right DEM generation methods based on the survey scope, terrain features, data needs, and budget. By integrating UAV workflows and verifying them against traditional methods, this research advances geospatial data collection practices in Nigeria. It also helps build capacity for academic institutions and surveying professionals by highlighting the advantages and drawbacks of each method. The findings aim to inform future uses of modern geospatial technologies in education and infrastructure planning.

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