Improving Shallow Water Nautical Charts Via Operational Automated Machine Learning-based Bathymetry Extraction from Airborne LiDAR Point Clouds

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A proof-of-concept clustering-based approach to automatically extracting shallow water bathymetric soundings from airborne LiDAR point clouds has been converted to software-engineered code and continues to evolve. This has brought enhancements including the conversion of extracted bathymetric soundings to area-based maps. The original testbed was 2016 500m-by-500m NOAA LiDAR tiles near Key West, Florida; currently being evaluated are 2022 tiles north of Miami Beach. Accuracy evaluation for the two data sets suggest the clustering approach is instrument-neutral, readily adaptable, and requires minimal human intervention. The analytical approach that couples a widely used approach used for sonar data (CHRT – "Cube with Hierarchical Resolution Techniques") with k-means clustering will be described as will the operational workflow. Performance metrics suggest that "CHRT-ML" (CHRT with Machine Learning) requires about 90 minutes of processing time per tile, and the carts that result have a root mean squared error (RMSE) of about 5 cm.