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ENV 704 - Workshop on Remote Sensing and Photogrammetry with Drones

Final Project Report

December 20th, 2023

Urban Assessment of Marsh Hall and Greeley Lab using 3D Modeling and Thermal Imagery

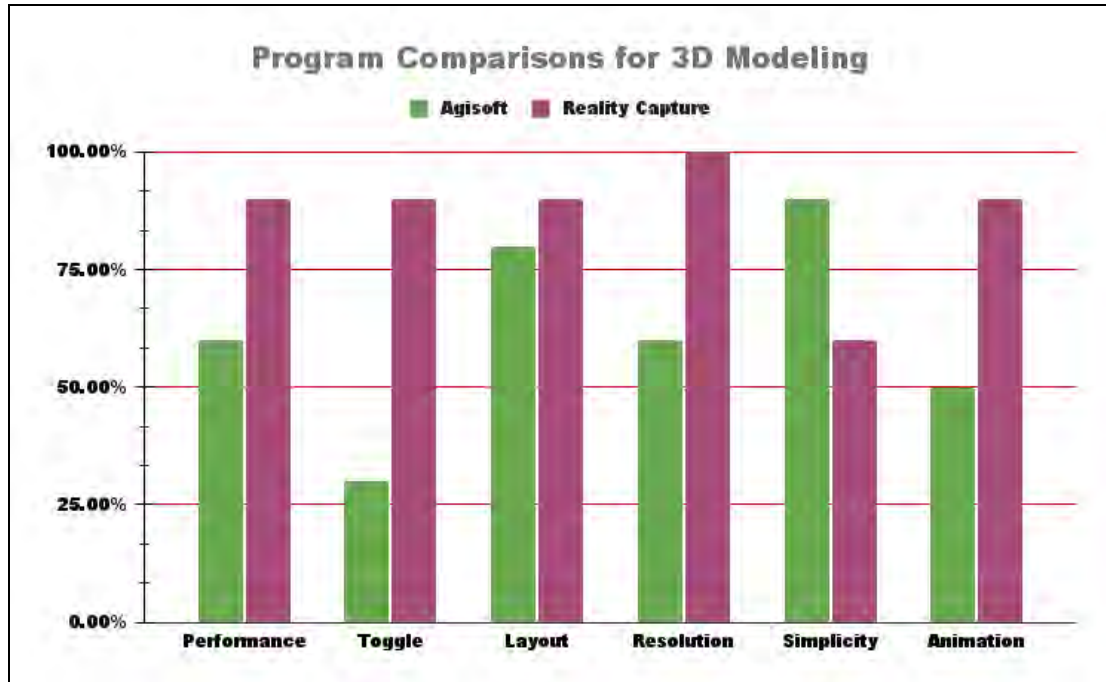
Abstract

The built environment is a main contributor to natural resource consumption and plays a crucial role in increasing temperatures. Designing and maintaining sustainable cities helps to mitigate the local and global impacts of climate change. Due to coarse resolution and temporal variability, there exists challenges capturing the negative effects of urban areas through satellite and aerial imagery. Through the use of unmanned aerial vehicles (UAVs), these effects can be captured and examined on a sub-meter scale. In this study, a UAV was employed in two flights to capture high resolution imagery of Marsh Hall and Greeley Lab to understand the advantages and disadvantages of 3D modeling programs— specifically, Agisoft and Reality Capture— and the effects of surface urban heat island (SUHI). The results indicate Reality Capture outperforms Agisoft for creating highly detailed and computationally efficient 3D models. In addition, the effects of SUHI were closely examined in the study area to determine both buildings and impervious surfaces emit higher radiation than the adjacent vegetation cover. This study underscores the importance of using UAVs for assessing the built environment and sustainable urban planning.

[Link to animated videos click here](#)



Raw orthomosaic of Marsh Hall and Greeley Lab.



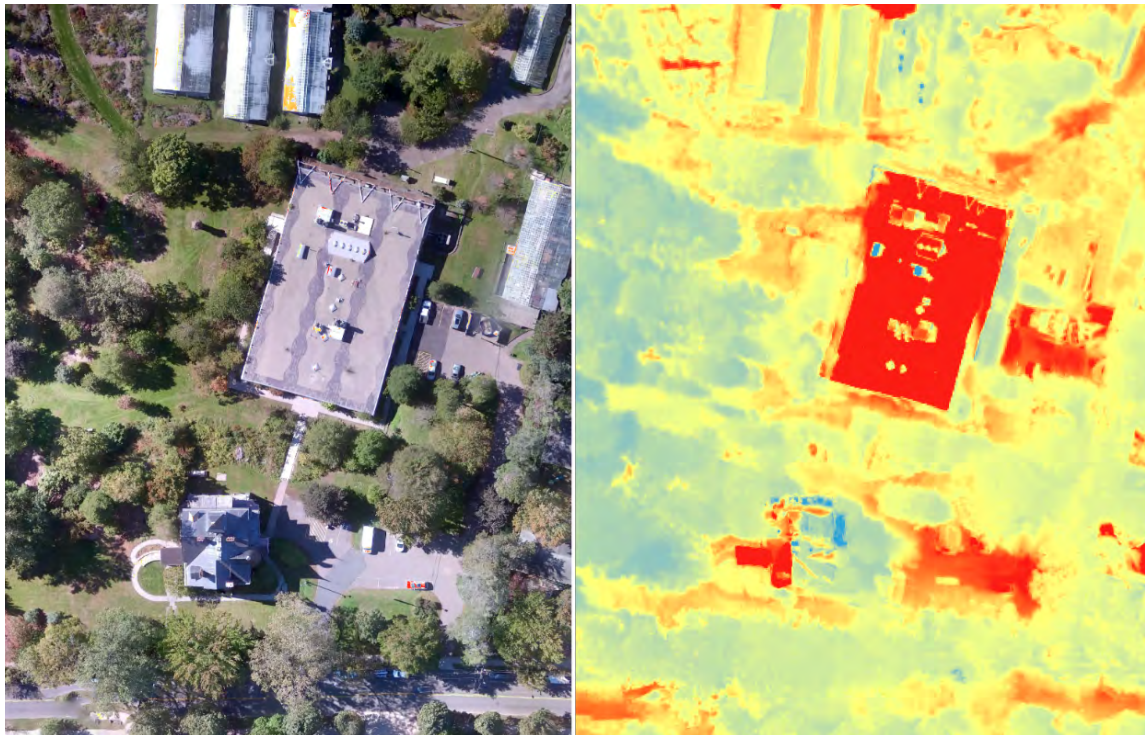
Criteria for comparing Agisoft and Reality Capture based on 3D model application.



Comparison between 3D models of Marsh Hall from Agisoft (left) and Reality Capture (right).



Comparison between 3D models of study area from Agisoft (left) and Reality Capture (right).



Orthomosaic (left) and thermal imagery (right) captured of study area.