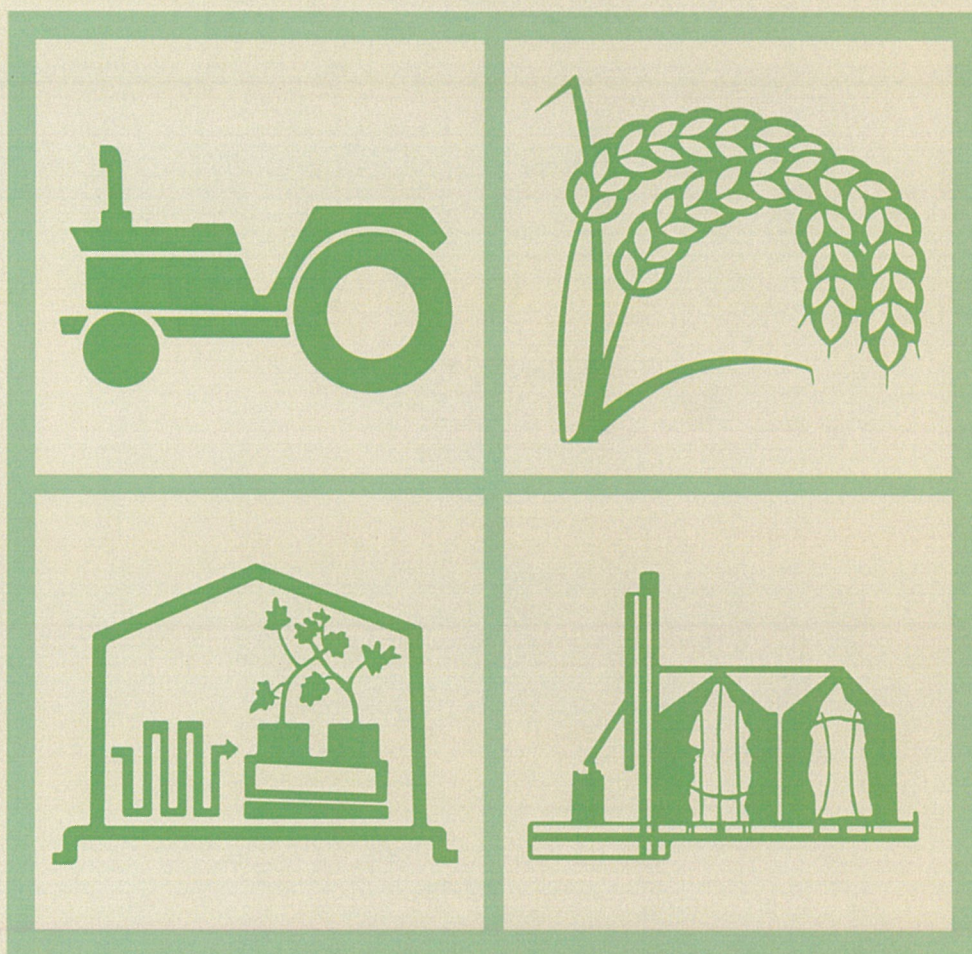


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3D Reconstruction of Trees in Apple Orchard using a Multi Camera-based UAV System

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Abstract

3D reconstruction of trees in orchards plays an important role in the studies on the biological characteristics of fruit trees. Compared with that using vertical photogrammetry, the multi-camera oblique photography can generate higher quality of 3D models, but there is no optimized method for the multiple cameras system. Therefore, the objective of this study was to establish mathematics models that can optimize the configuration parameters such as flight height, oblique angle of cameras and then reconstruct the 3D model of apple trees using UAV-based oblique photogrammetry. This study proposed three types of ground sample distance to establish the models and used maximum curvature algorithm to solve the optimal parameters. Five Survey3 cameras were used to constitute the oblique photography system. The models were validated in simulation platform and real orchard condition. The experiment results indicated the optimization of the parameters was achieved at a flight height of 8m and an oblique angle of 55 degree. With this new approach, a better accuracy of 3D model can be achieved in real orchard condition. In the future we will count the number of fruit based on the 3D model generated by this approach.

Keywords

UAV, oblique camera photogrammetry, 3D reconstruction.

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