3D SURFACE RECONSTRUCTION OF TERRESTRIAL LASER SCANNER DATA FOR FORESTRY

Hongjoo Park (hj.park@student.unsw.edu.au)
School of Surveying and Spatial Information Systems, University of New South Wales, Sydney, Australia

Samsung Lim (s.lim@unsw.edu.au)
School of Surveying and Spatial Information Systems, University of New South Wales, Sydney, Australia

John Trinder (j.trinder@unsw.edu.au)
School of Surveying and Spatial Information Systems, University of New South Wales, Sydney, Australia

Russell Turner (Russel1T@sf.nsw.gov.au)
Forests NSW, Department of Primary Industries, NSW, Australia

Abstract

Recently, Terrestrial Laser Scanners (TLS) have received considerable attention for their potential applications in forest management, archaeology, ecology as well as remote sensing and urban planning applications. The TLS systems differ from Airborne Laser Systems (ALS) in that they do not utilise an integrated Global Positioning System (GPS) and Inertial Navigation System (INS) for geo-referencing. Conventional TLS methods involve ground control points and benchmarking to support the geo-referencing. Although TLS is limited for the use in small areas, it is feasible to be applied to forest inventory and deliver better sampling accuracy, objectivity, and can enhance or replace field surveys in forestry. The advantage of TLS is the flexibility for precision forestry operations.

This paper uses TLS measurements taken by Leica HDS6000 TLS to produce 3D point cloud data and model individual trees. In particular, the quantitative and qualitative analysis of the 3D point cloud data for four different types of trees derived by TLS is discussed and the processing steps are presented. The Curst algorithm is used for the reconstruction of surfaces of arbitrary topology from the 3D point cloud data. The four individual tree models derived from the TLS system and their 3D surface reconstruction were assessed by the traditional field survey techniques. The test results show that the 3D visualisation of individual tree surfaces and detailed

shapes are well matched with the digital features obtained by the traditional field survey techniques.