Pre-Symposium Tutorial on "Close Range Photogrammtery and Terestrial Laser Scanning"

December 6, 2016

Abstract

In recent years it has been possible to collect vast quantities of 3D data using new technology, and to interpret and visualize the data in new ways. The third dimension has become an integral part of geospatial information. Different methods and techniques are adopted to acquire 3D data from space borne, airborne and terrestrial sensors. 3D technology is finding huge utility in resource monitoring, facilities management, urban planning , defense and internal security and has not only revolutionized the surveying and mapping applications but it has emerged as a powerful tool for planning, monitoring and evaluation of developmental activities, informed decision making in governance. A few potential users of the technique are administrators, decision makers, engineers, researchers in medical profession, city planners, natural resource scientists, entertainment industry.

Photogrammetry has dealt with the 3D reconstruction of objects from images. It provides low cost, accurate, photo-realistic object models using digital images and allows a virtual first-person experience of the real world. On the other hand, laser scanning technology has emerged as a very promising alternative for many kind of surveying and modeling applications. Laser scanners allow for rapid acquire of a huge amount of 3D data which can be often combined with color high-resolution digital images.

This tutorial will introduce the participants to basic concepts of Close range photogrammetry and terrestrial laser scanning in terms of equipment requirements, data capture, processing and output generation. It will attempt to make them aware of the latest trends and challenges in 3D model generation and their applications. The tutorial will consist broadly of two technical sessions. The forenoon session will mainly focus on topics related to close range photogrammetric concepts and application, followed by a hands on experience. The afternoon session will focus on conceptual aspects of terrestrial laser scanning, challenges in data analysis followed by a practical demonstration.

The tutorial will start with a short overview session highlighting the trends and challenges in ground based 3D modelling applications. The session on Close range photogrammetry will begin with an introduction to the basic concepts, principles and applications of the technique. This will be followed by project planning details which will include important considerations that will influence the success of the project i.e. developing a strategy based on characteristics of the site/object, selecting the equipment and software to be used, calibrating equipment if needed. Next section will focus on image and control acquisition, image processing and block triangulation and finally discussing the essentials of creating and exporting deliverables. These will be further elaborated through case examples pertaining to different applications. Theoretical discussion will be followed by a practical hands on demonstration using commercial and open source applications.

The session on Terrestrial laser scanning will begin by explaining the principle and applications of range based 3D modelling methods followed by methods and procedures for data capture, control requirement, registration and merging of multiple scans culminating with dense point cloud generation and surfacing. Case example will be demonstrated to show the applicability of the technique in diverse fields. A demonstration will be made to familiarize the participants with the practical aspects of data capture and generation of dense point cloud.

Outline of the Tutorial

Coordinator: Dr. Poonam S. Tiwari **Speakers/ Resource Persons:** Dr. Poonam S. Tiwari, Dr. Hina Pande, Mr. S. Raghavendra and Dr. Subrata Nandy
Trends and challenges in ground based 3D modelling
Close Range Photgrammetry - Close Range Photogrammetry: Principles and Applications - Data Capture: Issues and challenges - Data Processing and Analysis - Case examples - Demonstraton and hands-on exercises on 3 D modelling using image based techniques.
Terrestrial Laser Scanning - Principle and Applications of range based 3D modelling methods - Data Capture: Methods and Procedures - Data Registration and Merging - Dense point cloud generation and surfacing - Case examples - Practical Demonstration on TLS data capture and processing
Summary and Discussion

Coordinator and Speaker(s)

	Dr. Poonam S. Tiwari is scientist and teaching faculty at the Indian Institute of Remote Sensing, ISRO, Dehradun. Her area of expertise focuses on 3D data processing and analysis and automated feature extraction using remotely sensed data. She has 15+ years of research and teaching experience in photogrammtric applications, laser data analysis and automated feature extraction. She has obtained her Ph.D in earth science from IIT, Roorkee.

	Dr. Hina Pande is scientist and core teaching faculty at the Indian Institute of Remote Sensing, ISRO, Dehradun. Her research interest and area of expertise is in the field of high resolution image analysis for automated feature extraction and 3D modelling. She has over 12 years of teaching and research experience in these domains. She has a PhD in earth science from IIT,Roorkee.
	S. Raghavendra is a scientist at the Indian Institute of Remote Sensing, ISRO, Dehradun His area of interest in research focuses on Lidar data analysis , Photogrammetry and UAV remote sensing. He holds a Masters degree in Technology from IIT, Kanpur.
	Dr. Subrata Nandy is a scientist at Forestry and Ecology Department of Indian Institute of Remote Sensing, ISRO, Dehradun. His research interests are Forest biomass/carbon assessment, Forest ecology and LiDAR remote sensing in forestry. He has a Ph.D. degree in Forest Informatics from Forest Research Institute University, Dehradun.