Inventorying trees in an urban landscape using small-footprint discrete return imaging lidar

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Dissertation submitted to the faculty of Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Forestry

Randolph H. Wynne, Chair
James B. Campbell
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Ross F. Nelson

March 28, 2011
Blacksburg, Virginia

Keywords: remote sensing, carbon, biomass, urban forestry, tree identification

Re: Permission to use illustration

kramer.ucsc@gmail.com <kramer.ucsc@gmail.com> **Wed, Mar 30, 2011 at 4:23 PM**
Reply-To: kramer.ucsc@gmail.com
To: rupesh@vt.edu, mkramer@pmc.ucsc.edu

Hi rupesh. Yes. You certainly may. I look forward to reading your dissertation. Please send a copy when it is complete.

Best, marc
-----Original Message-----
From: rupesh@vt.edu
Date: Wed, 30 Mar 2011 18:14:21
To: <mkramer@pmc.ucsc.edu>
Subject: Permission to use illustration

Dr. Kramer,

I am writing to ask permission to use an illustration of air-borne lidar from one of your paper "Kao et al., 2005. Visualizing distributions from multi-return lidar data to understand forest structure. The Cartographic Journal, 42(1), 35-47" in my doctoral dissertation. I contacted Dr. Kao, and he referred it to you. I have attached the page from my dissertation where the illustration appears.

I appreciate your consideration. Please let me know if you need additional information.

Thank you,

Rupesh Shrestha
Virgina Tech
Department of Forest Resources and Environmental Conservation
Blacksburg, VA

Email: rupesh@vt.edu

On Wed, Mar 30, 2011 at 3:55 PM, David Kao <david.l.kao@nasa.gov> wrote:
Rupesh,

Thanks for referencing the our paper. The illustration from the paper was provided to me by Marc Kramer (UCSC, mkramer@es.ucsc.edu). You should contact Marc for permission to use the illustration in your dissertation.

I would be interested in reading your dissertation when it is completed.

Best regards,
David Kao

dense forests (Ogunjemiyo et al., 2006), but large-footprint systems have limitations due to their low spatial resolution and high per unit area acquisition costs (Lee, 2006).

A typical lidar device consists of (1) an orientation unit, consisting of a geographic positioning system (GPS) and an inertial navigation system (INS) to provide the spatial and attitude positioning of a laser vector, (2) a ranging unit to provide the magnitude (range) of the laser vector and – optionally – auxiliary information about the footprint, (3) a scanning unit that deflects the laser beam into different directions to obtain specific footprint patterns, and (4) a control unit to control the sub-systems and their interaction, record the data, and perform real-time processing (Schenk, unpublished). The device may be operated from aircraft or helicopters. Most systems also record the intensity of the reflected return, which is to some extent a measure of the surface reflectance (Forlani et al., 2006). A typical lidar data acquisition is shown in Figure 1.1.

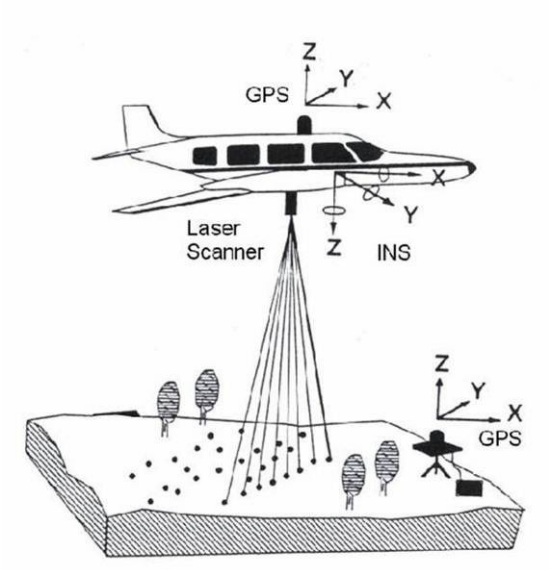

Figure 1.1. Airborne lidar data acquisition (Source: Kao et al., 2006, used with permission of the authors)

Lidar systems of the present day are capable of achieving vertical accuracies of 15 cm root mean square error (RMSE) and horizontal accuracies about two times the footprint size (usually at sub-meter) (Renslow et al., 2000). Lidar scans produce a very large and dense cloud of point returns. Often the first step of the lidar data processing is to reduce the number of points clouds by filtering operations, such as those used to separate returns from ground and non-ground objects. For computing digital terrain model (DTM), the returns from non-ground objects

Request for copyright permission

Paz,Maria <mpaz@ufl.edu> **Tue, Jan 18, 2011 at 2:18 PM**
To: "rupesh@vt.edu" <rupesh@vt.edu>

Rupesh, you may use the images, but the web address you have for your citation is incorrect. The correst address is http://hort.ifas.ufl.edu/database/trees/trees_scientific.shtml
Good luck in your thesis,

Maria del Pilar Paz
Biological Scientist
Environmental Horticulture Department
University of Florida
Gainesville, F

_____
From: Olejownik,Cindy M
Sent: Tuesday, January 18, 2011 8:14 AM
To: Gilman,Edward F; Paz,Maria
Subject: FW: Request for copyright permission

Dr. Gilman,

Can you handle this?

Thanks,
Cindy

Cindy Olejownik
cindyo@ufl.edu
(352) 273-4582
(352) 392-6270/Fax

-----Original Message-----
From: rupesh@vt.edu [mailto:rupesh@vt.edu]
Sent: Friday, January 14, 2011 4:04 PM
To: Olejownik,Cindy M
Subject: Request for copyright permission

Dear Ms. Olejownik,

I am using some of the tree silhouette diagrams from your department's website (http://hort.ufl.edu/database/trees/trees_scientific.shtml) in my dissertation to illustrate shape of trees in my study area. I have attached the page from my dissertation where I have used those figures. Can you please tell me if those papers are copyrighted? If so, can you please point me to proper contact with whom I can ask for permission to use.

Thank you very much for your help,

Rupesh Shrestha

Virginia Tech, Department of Forest Resources and Environment Conservation Blacksburg, VA 24061

Juniperus virgiana
(columnar; oval; pyramidal)

Pinus nigra
(oval; pyramidal)

Platanus occidentalis
(round; spreading; pyramidal)

Ulmus pumila
(vase shape)

Pyrus calleryana
(pyramidal)

Acer saccharinum
(dense and spreading)

Ulmus parvifolia
(round; vase shape)

Quercus shumardii
(pyramidal and spreading)

Fraxinus pennsylvannica
(oval; upright)

Figure 3.3. Shapes of the major trees of the study area

(Source: http://hort.ufl.edu/database/trees/trees_scientific.shtml, used with permission of University of Florida)