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A Short Course on Remote Sensing

A multimedia approach to an interdisciplinary field, presented monthly, features case studies, optional hands-on activities, and personal interaction with the staff.

During the first week of each month a unique training program is conducted at Purdue University. The program is entitled "A Short Course on Remote Sensing Technology and Applications" and is co-sponsored by Purdue's Laboratory for Applications of Remote Sensing (LARS) and the Division of Conferences and Continuation Services. A group of eight to fifteen individuals from business and industry, education and government agencies comes to West Lafayette, Indiana to learn the fundamentals of remote sensing technology.

Abstract: *Analysis techniques and applications of remotely sensed data are rapidly expanding. The result is a wealth of information being produced by individuals in widely separated fields including engineering, agriculture, forestry, geology, and many others. The Laboratory for the Applications of Remote Sensing (LARS) at Purdue brings subject matter specialists and technical staff together in a unique team effort to solve remote sensing problems. A portion of the LARS staff has been charged with the responsibility for bringing the results of these team efforts to the attention of the possible use community. To accomplish this, a monthly, week-long short course in the fundamentals of remote sensing has been designed. The individualized training program gives each participant a background in remote sensing, then provides actual practical applications tailored to his individual needs.*

Remote Sensing

Remote sensing is the science of acquiring information about distant objects from measurements made without coming into contact with them. The sensors, which may be cameras or other energy measuring instruments, record the energy reflected or emitted from objects on the earth. The sensors can be mounted in field-based units, aircraft, or satellites. The applications of remote sensing technology are very diverse and the number of them continues to grow. One example is the identification and mapping of agricultural crops. Remote sensing also can be used to distinguish the types of trees in a forest and to identify areas of diseased trees. Land-use maps, helpful in urban planning, can be produced from remote sensing data. Remote sensing also has been used for detecting pollution, studying environmental problems, exploring for mineral resources, and assessing rapidly the damage from natural disasters.

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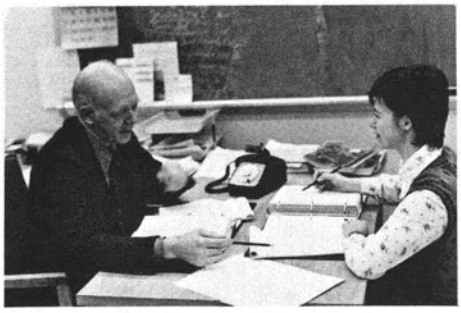

FIG. 1. Coordinator Doug Morrison discusses an individualized plan of study with a Short Course participant.

LABORATORY FOR APPLICATIONS OF REMOTE SENSING

The short course is conducted by the Laboratory for Applications of Remote Sensing which was founded at Purdue in 1966. The overall objectives of the laboratory are to attack, in an interdisciplinary environment, specific remote sensing problems of current national and world interest in areas of earth resources, physical measurements, and the computer processing of remotely sensed data. The major efforts of LARS are in conducting research, developing effective applications, and transferring an understanding of remote sensing technology to those who are addressing natural resources and environmental questions. Closely integrated within the university structure, LARS attracts to its programs outstanding scientists who develop strong bridges between disciplines.

INSTRUCTIONAL STATEGIES

The short course is modeled after the interdisciplinary nature of the laboratory. The participants are taught by a team of instructors who present specific areas of remote sensing, and at the same time attempt to show the overlap and inter-related nature of the field. Films, slides, and transparencies are used to augment the verbal presentations. Presentations by specialists from various areas of remote sensing have been video taped. Viewing notes are available which provide an outline of the video tape content. This approach allows the fundamental content to be presented by an expert in the field and, at the same time, frees him from having to repeat the same basic presentation each month. However, the expert is usually available for questions and discussion following the video tape.

Individualized instruction is available through minicourses consisting of audio tapes, slides, study guides, and other materials which are used during the instruction. The topics of these individual units range from the general "Remote Sensing: What is it?" through more specific information on topics such as "Multispectral Scanners," "Side-Looking Airborne Radar," and "LANDSAT: An Earth Resources Satellite System." Specific uses of remote sensing are also covered in areas such as agriculture, forestry, geology, water quality, and others. Nineteen separate minicourses are available now and others are being developed. The number of participants is limited to fifteen; therefore, one-to-one tutoring can be used frequently.

About 25 percent of the short course is devoted to a case study in which the participants learn the basics of computer-oriented techniques used to analyze remotely sensed data. No prior computer experience is required to gain an understanding of the processes involved. The case study developed by the LARS staff presents the process in a step-wise sequence and allows the participants to actually make the same decisions an analyst has to make when analyzing LANDSAT data. Computer output is supplied and the results of the participants' decisions are discussed with the staff. The goal is a "working knowledge" of the advantages and limitations of computer-assisted analysis of remotely sensed data.

A TYPICAL WEEK

On the first day of the short course, each participant with the aid of one or more staff members develops a unique prescription for learning tailored to his/her individual needs. Since most attendees have a limited background in remote sensing, a core of materials is presented giving the fundamentals needed for a basic understanding of terms and techniques.

FIG. 2. The "hands-on" activity allows the participant to analyze multispectral data by using a remote terminal.

FIG. 3. Minicourses provide a multimedia approach and allow for interaction between participants.

By the second day, the participant is beginning to develop a basic understanding of remote sensing through a continuation of the core program and by studying materials (minicourses, library resources, films, video tapes, etc.) which are pertinent to his needs and interests. The day-by-day prescription provides guidance but is not limiting. He is free to explore other resources.

During the following days additional core materials are presented. Work periods for the case study are scheduled and time blocks are reserved for independent study such as viewing minicourses, meeting with LARS staff, and browsing through the remote sensing library.

HANDS-ON OPTION

For those with an interest in a more in-depth interaction with the computer facility and related software algorithms, a series of coordinated evening activites is available. During three consecutive evenings, the participant is presented a remote sensing problem. He may generate his own problem if the data are available. Each participant interacts directly with the computer, performing many of the same functions discussed in the case study. He gets hands-on experience with a remote terminal, cardpunch, card reader system, and printout devices. Since each analysis (and analyst) is unique, a one-to-one tutoring system is provided by LARS staff.

OTHER EXPERIENCES

Since it has long been established that not all learning occurs in the classroom, outside activities also are available. Each day the participant attends a luncheon hosted by various LARS personnel. Casual conversation allows all to relax while discussing topics of specific interest to the participants. LARS staff from the various disciplines are available during the week for one-to-one or small group discussions.

STUDENT FEEDBACK

Anonymous evaluations by the participants have indicated an extremely favorable reaction to the course and its content. One item on the evaluation form asks the participants to indicate the strongest aspect of the course. Whereas no single aspect has dominated the responses, five have been noted with regularity. One strength is the use of the minicourses which allows the participant to go in depth on certain aspects of remote sensing and to do so at his own pace. Another is the use of a variety of media and the overall organization of the course and materials available. A third is the case study which allows a vicarious involvement in the tasks an analyst performs. The fourth is the optional "hands-on" activity. The majority of those who have been involved indicate it is a very worthwhile experience. A fifth aspect is the personal interaction with LARS staff. Restricting the number of participants each month has allowed this to be possible. These types of responses have been encouraging. However, because no two individuals are alike, each group provides an unending challenge for the instructors and staff. Additional information about the short course is available from the authors.

BOOK REVIEWS

Photogrammetrie, 7th edition, by K. Schwidefsky and F. Ackermann. B. G. Teubner, Stuttgart, 16.2 × 22.9 cm; 385 pages; 170 figures. Hard Cover, 1976. DM 120.

Photogrammetry is a rapidly developing science. This means that every book dealing with photogrammetry becomes obsolete a few years after being published. Fortunately, some authors and publishing houses do their best to keep up with the information explosion, even if it takes ten years or more to republish Schwidefky's well known *Photogrammetrie*, the 6th edition of which dates from 1962.