ABSTRACT

Interest in remote sensing data and technology among students has increased over the recent years due to various factors. Advances in computing technology and software now enable students to view and analyze large volumes of imagery in 2D or 3D (virtual world). Interactive learning approaches provide an opportunity to capitalize on students’ interest in geospatial imagery and visualization. In these interactive learning sessions, the instructor is a facilitator encouraging the learning process through dialogues and questions, rather than traditional lectures aimed at transferring maximum knowledge from the instructor to the students. Through the use of real-world examples such as forest fires, crop growth, range vegetation, and water quality issues students learn remote sensing principles and image processing skills. In recent years, several undergraduate and graduate students at University of Wyoming have used different types of remotely sensed data to monitor, map and assess a variety of agricultural, forest, range, and environmental issues. This presentation outlines the interactive learning process and discusses the challenges faced by the instructor and students in an interactive learning environment.

INTRODUCTION

Availability of no- and low-cost satellite data through WyomingView has lead to a renewed interest among students and faculty on the University of Wyoming campus (Sivanpillai and Driese 2007). WyomingView satellite data archive has more than 400 Landsat and 1800 ASTER scenes and students from various academic departments on campus have used these images for class projects, thesis, and dissertation research. Availability of multi-temporal imagery for large areas has enabled multiple studies focusing on land cover changes and vegetation response to weather and climate. Two new remote sensing courses have been added to the university curriculum, and enrollment in all remote sensing courses has reached its full capacity. One of the new courses is an applied remote sensing course that focuses on the use of this technology for agricultural (cropland and rangeland) management. Students with natural resource management focus are enrolling for this course and bring a wealth of experience with them. Several students have worked on their parent’s ranches, with the Bureau of Land Management, or the US Forest Service personnel in fighting wildfires. Students can obtain image(s) for their area of interest and apply the knowledge they gained on the ground for gaining insights about the processes, which provides an ideal setting for the interactive learning process.

Unlike a traditional academic course, where the emphasis is placed on transferring the knowledge from the instructor to the students, interactive learning provides more latitude for the students (and instructors) to “learn as they go”. Every interaction results in a new knowledge (or finding) which then leads to a new line of enquiry. Students get a sense of accomplishment and also take credit for the outcome. In this approach, the instructor’s role is as a facilitator – enabling the learning process through intervention at appropriate stages and providing ample encouragement.

INTERACTIVE LEARNING PROCESS

Over the last two years approximately 30 students have enrolled and completed the applied remote sensing courses. This course was taught once in the traditional format with 22 students and thrice in an independent or problem study format. Independent study format allowed for more frequent interaction between the student and instructor in comparison to when the course was taught in the traditional format. The first few weeks of these courses focused on understanding the basic principles of remote sensing. Towards the end of the formal instruction session, students were asked to identify project themes based on their interest or career goals. Students selected a
wide range of topics from croplands, rangelands, forestry, invasive species, and vegetation recovery in abandoned mines. Most of the project areas they selected were within Wyoming.

Once the project scope and objectives were discussed with the instructor, students selected necessary Landsat or ASTER images from the WyomingView archive. Review of previous studies formed an important component of the learning process that helped the students to identify both the potential and limitations of satellite data for the application they selected. Students were required to report their research findings and modify the scope and objectives of their project if necessary. Next, students processed their satellite data based on their research findings while consulting with the instructor when necessary. When students ran into major obstacles or encountered difference of opinion within a group, they were required to consult with the instructor to address or resolve them. Basically the instructor’s role was to oversee the entire process to ensure that students are on track and intervene only when it was absolutely necessary.

In most cases, the final outcome was above the agreed expectations between student and instructor. Most of the students incorporated several additional processes to derive additional information from the images. For example, one of the expected outcomes in a project was to identify the reasons beyond the pattern of wildfire in the Casper Mountains. Students who worked on this project compared the observed pattern of fire-scar with other fires that occurred in the nearby areas and were able to obtain additional insights about the movement of fire in forested landscapes. In another study, students whose objectives were to compare crop growth in agricultural fields in western Wyoming assessed the effect of spatial resolution of Landsat data. In addition to their objectives, they compared their studies with other studies that used higher resolution remotely sensed data.

From an instructor’s perspective the entire process requires more time and resources since the outcome of each student project is largely unknown to begin with. The instructor must be prepared to answer questions or to point out the appropriate resources in various disciplines, which requires further time commitment. The instructor also must be prepared to trust the students in terms of their commitment. However, some students underestimated the time it would require to complete the tasks and under these circumstances the instructor has to intervene and provide specific guidelines. Under a few circumstances, the interactive learning process was overwhelming for the students and these students were assigned to traditional research projects.

CONCLUSION

To conclude, the interactive learning process provides opportunities for the students to gain valuable experience and to enhance their image processing skills. Interactive learning processes enable them to frame their own research questions, which gives them a sense of ownership of the project. The instructor’s role is more of an enabler for the learning process but also to point the student to the appropriate resources. Remotely sensed images contain a wealth of information in them and are ideally suited for interactive learning process.

REFERENCE