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Advanced Digital Image Processing Techniques for Natural Resource Assessment at Stephen F. Austin State University

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ADVANCED DIGITAL IMAGE PROCESSING TECHNIQUES FOR NATURAL RESOURCE ASSESSMENT AT STEPHEN F. AUSTIN STATE UNIVERSITY

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ABSTRACT

Graduate course work concentrating on land cover classification and digital image processing within the Arthur Temple College of Forestry and Agriculture at Stephen F. Austin State University is presented.

KEYWORDS

Land cover classification, digital image processing, remote sensing, natural resources

Product produced from a graduate level two course sequence concentrating on understanding how to create a land cover map followed by an understanding of multidisciplinary digital image processing techniques applied to mapping, monitoring and managing natural resources is presented (Figure 1).

The first course, titled Introduction to Digital Remote Sensing of Natural Resources, provides an introduction to the theoretical and practical applications of digital remote sensing for natural resources management. Specific topics covered include: history and overview of remote sensing; electromagnetic spectrum; analog versus digital; image acquisition; radiometric correction; geometric correction; image classification; and, accuracy assessment. Example of class product includes three land cover maps derived for three distinct geographic regions in the United States.

The second course, titled Digital Image Processing, provides an analysis digital image processing techniques applied to satellite and other non-photographic data involved with the mapping, monitoring and management of natural resources. Digital image processing techniques involved with the enhancement and analysis for both visual and digital applications are explored. Emphasis is placed in a production-oriented environment where the student produces a visual/paper product demonstrating the techniques applied in a real world situation. Examples of class product includes an example of contrast and filter enhancement techniques applied to moderate and high spatial resolution digital imagery, map product portraying the application of thermal infrared imagery to delineate thermal characteristics of lakes and vegetative ecosystem temperature zones, a map displaying the results from a change detection analysis using historical Landsat MSS data with current ETM+ imagery, a map showing high spatial resolution QuickBird imagery merged with Landsat ETM+ data, maps displaying various topographic map

layers derived from DEM's and a map showing the utility of using a DEM to visually analyze topographic map layers in conjunction with viewsheds and flight path imagery.

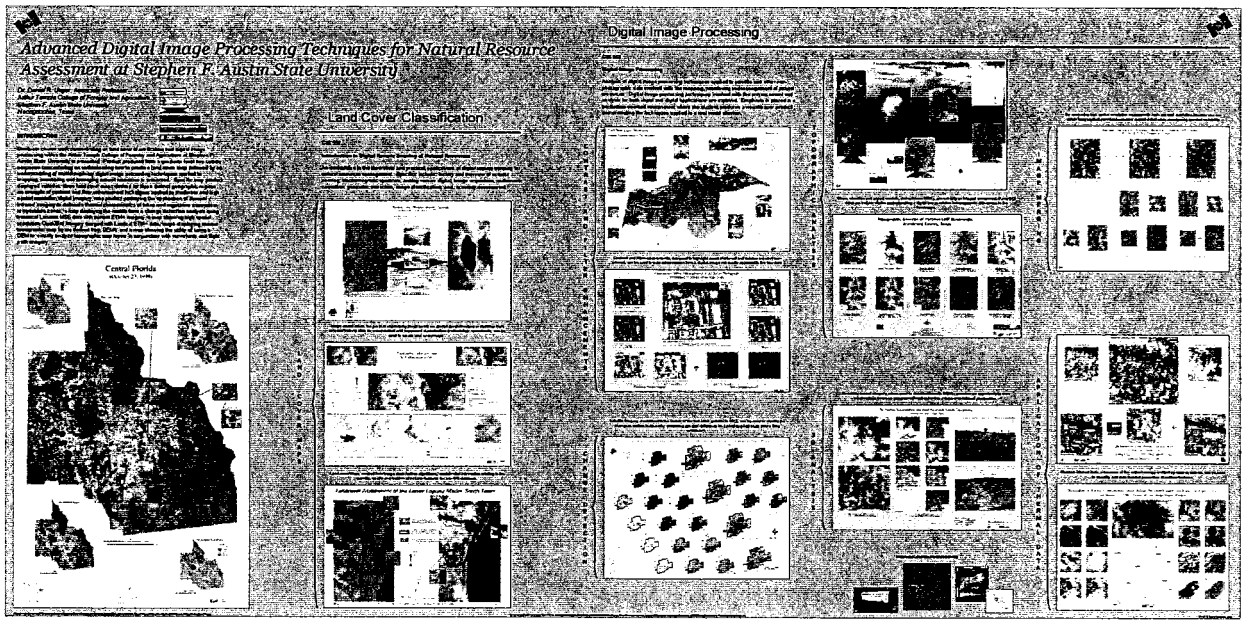

Figure 1. Class product produced from a graduate level two course sequence on land cover classification and digital image processing at Stephen F. Austin State University.