GEOG 482/582: Satellite Image Classification & Change Detection

Contact Information: Geoffrey Duh (jduh@pdx.edu, 503-725-3159)
4 credits with lectures and lab components. Lab attendance is mandatory.

Course Objectives

This course focuses on advanced satellite image classification methods that can be used for thematic information extraction as well as digital change detection methods for measuring land use/land cover change. The course includes computer exercises in advanced classification methods (e.g., Fuzzy and decision tree classification), radiometric normalization, and change detection using leading satellite image processing software packages including ERDAS Imagine and IDRISI Andes.

Readings

The course readings are a series of papers that will be distributed by the instructor as well as digital documents. The course will be taught in a seminar format. Each student will pick and read several journal papers and be a discussion leader to review and criticize these papers. The optional textbook can be used as a reference book for term project.


Grading

Discussion/Article Critique- Synopsis 40%
Labs 30%
Project/Portfolio 30%
(There will be no exams in this course.)

Attendance to this course is mandatory. If you miss more than two class periods then you will be penalized five percent of your final grade per absence. PLEASE DO NOT MISS CLASS. You are expected to take part in the discussions and if you are not in class then you cannot. If you are repeatedly late you will be given an absence.

Discussion/Article Critique- Synopsis (40%)

The course will be taught in a seminar format, which means that students are not passive members of the class. Each student is expected to actively contribute to each class period. To facilitate an interactive discussion each student will lead journal article discussion once during the semester for which they will receive a grade. The discussion leader must do three things. First, s/he must thoroughly read the readings and write a 1-2 page critique/synopsis. The synopsis part should highlight the main points of the
readings and the critique part should identify strengths and weaknesses of the readings. Second, this person should develop 4 discussion questions. These questions, as well as the critique/synopsis, should be typed with answers and given to the instructor one day before the class. Third, this person is responsible for leading the classroom discussion along with the instructor. It is important that everyone in the class take part in these discussions. Therefore, class attendance and participation are mandatory.

Labs (30%)

You will conduct labs that will help you learn the methods necessary to do a project. The practical exercises provide a way to acquire skills using ERDAS Imagine and IDRISI Andes (i.e., Version 15) and to apply the course concepts to real data. The lab manual (ERDAS Tour Guide) and ERDAS Field Guide are available in Acrobat pdf format in the I:\Students\Instructors\Geoffrey_Duh\ERDAS Imagine folder.

Project/Portfolio (30%)

A satellite remote sensing project is required for all students. You can follow this link to find public remotely sensed data for your project. The project is intended to provide a deeper understanding of image classification and/or change detection through experience. You must submit an outline of your project in the 4th week and present the project during a scheduled time at the end of the term. Every project presentation must include the following sections: an Introduction, Data, Methods, Results, and Conclusions. At the end of the course you must hand in a portfolio of all of your lab work and project (including a digital copy of their powerpoint ppt). The portfolio should present the highlights of your labs and project. You must compile a one-page synopsis and a one-page images/pictures/maps for each lab (except for Lab 1) and a two-page (maximum) synopsis and a two-page (maximum) pictures for your project. These documents should be bound or stapled together with a cover page showing your name, course information, and date.

Course Schedule

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<thead>
<tr>
<th>Week</th>
<th>Lecture/Seminar</th>
<th>Lab/Project</th>
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<tbody>
<tr>
<td>1</td>
<td>Syllabus Lab 1. Journal articles search (Due by noon pm April 9) (10 points)</td>
<td>Course Overview &amp; Review of Digital Image Analysis</td>
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<td>2</td>
<td>Remote Sensing Applications (NASA Online Tutorial Section 3: vegetation Applications)</td>
<td>Lab 2. Knowledge-based classification</td>
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<td>3</td>
<td>GIS in Action conference</td>
<td>Lab 2.</td>
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<tr>
<td>4</td>
<td>Change Detection (Readings Mas 1999 and Lu et al. 2004) Project Outline Due</td>
<td>Lab 3. Radiometric normalization</td>
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<td>Journal Article Discussion</td>
<td>Lab 4. Change vector analysis</td>
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<td>6</td>
<td>Multispectral and LiDAR remote sensing for vegetation mapping</td>
<td>Lab 5. Advanced classifier</td>
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<tr>
<td>7</td>
<td>Journal Article Discussion</td>
<td>Lab 3.</td>
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<tr>
<td>8</td>
<td>Journal Article Discussion</td>
<td>Portfolio/Project discussion</td>
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<tr>
<td>9</td>
<td>Journal Article Discussion</td>
<td>Students work on their project</td>
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<tr>
<td>10</td>
<td>Journal Article Discussion</td>
<td>Students work on their project</td>
</tr>
<tr>
<td>Final</td>
<td>Project presentations (during scheduled exam time)</td>
<td>PORTFOLIO DUE</td>
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**Sample Journal Articles**

**Week 4. Change Detection I**

**Week 5. Fuzzy/Subpixel Classification**

**Week 6. No readings**

**Week 7. Radiometric Correction / Change Detection II**

**Week 8. Change Detection III**
Week 9. Object-Based Classification

Week 10. Advanced Image Processing for Image Classification