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Development was funded by the Department of Labor (DOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant No. TC-22525-11-60-A-48; The National Information Security, Geospatial Technologies Consortium (NISGTC) is an entity of Collin College of Texas, Bellevue College of Washington, Bunker Hill Community College of Massachusetts, Del Mar College of Texas, Moraine Valley Community College of Illinois, Rio Salado College of Arizona, and Salt Lake Community College of Utah.

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties or assurances of any kind, express or implied, with respect to such information, including any information on linked sites, and including, but not limited to accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability or ownership.

## GST 105 – Exam 2

This exam covers the material for Units 4-7.

1. What is photogrammetry and how is it used with remotely sensed imagery?

**Photogrammetry is the science of making highly accurate adjustments to aerial imagery that has a number of inherent distortions in them (such as differences in scale, distortion of objects, and those due to camera and attitude of the air craft). Photogrammetry is used to remove these distortions to produce a highly accurate image base where measurements can be made as well as have the imagery serve as a high quality base image data set.**

2. What is an orthorectified image? What is considered a “true ortho image”?

**An orthorectified image is one that has all of the distortions removed from it and can serve as a high quality base. “True Ortho” images also have building tilt and feature tilt removed from the images and so the location of tall structures are more accurate. Examples are buildings, bridges, and towers.**

3. What are the 3 major image classification methods discussed in this course? Briefly describe each.

- a. **Unsupervised** – this method uses the computer to autogenerate spectral classes that need further review and refinement by an image analyst
- b. **Supervised** – this method uses a set of spectral signatures created by the analyst as the input to classify an image into spectral classes.
- c. **Object-based** – this method uses a series of image segmentation and hierarchical rule sets to identify features and land cover categories. This method is typically useful for high resolution image datasets.

4. What is a spectral signature and how is it created in the unsupervised and supervised classification processes?

**A spectral signature is a set of pixel values that have similar spectral characteristics. A spectral signature or class is one that results from an unsupervised classification. A spectral class from an unsupervised classification may represent one or more land cover types and typically needs further analysis and evaluation. A spectral signature is manually created and identified by an**



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**image analyst that is used as an input into a supervised classification. A spectral signature created by the image analyst represents a single land cover category.**

5. Why is it important to have a “high quality” set of spectral signatures to use with a supervised classification method?

**A set of high quality spectral signatures is required so that a good representation of the spectral characteristics for each land cover type is provided with the expectation that the resulting image classification will accurately represent the land cover categories from the classification scheme.**

6. What is the difference between a “spectral” and “information” class?

**A spectral class represents a group of pixels that have similar spectral characteristics (such as similar pixel values, standard deviations and variances). Multiple spectral classes can represent a single “information class.” An information class is a specific land cover class created and defined in the classification scheme. Often a recoding operation is required to convert spectral classes to information classes.**

7. Why is an accuracy assessment important for an image classification?

**An accuracy assessment is required to quantitatively assess the quality of the final image classification. The image classification provides quantitative values for each land cover category.**

8. Briefly describe the computed measures of a typical accuracy assessment for an image classification.

**The specific measures of an accuracy assessment are:**

- a. *User’s accuracy* for each land cover category – provides a measure of quality of each land cover in the final classification data set**
- b. *Producer’s accuracy* for each land cover type – provides a measure of quality for the methods used to produce the final classification product.**
- c. *Overall accuracy assessment* – this can include a percentage and Khat value which is a more conservative number than the overall accuracy assessment value**



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**d. *Confidence intervals* for each land cover type which provides a range that the accuracy for a specific land cover type can fall within.**

9. Briefly summarize some of the challenges faced in the independent final project. Explain some of the methods you used to overcome them. Were they successful or not? Briefly describe.

**The answers here will vary, depending on the kind of project and image processing steps used to produce the final products.**

**The answers will be written and summarized in a number of paragraphs and will describe the methods and the problems encountered and some reasonable explanations of which methods the student used to “fix” and/or improve the output and some statement of the quality of the solution(s). No quantitative assessment is required, but the student should describe with details the processes used to improve the quality of the product and how well these methods did or did not help and some additional statements about next steps. If the steps seem logical for “next steps” in a given process, then points can be awarded appropriately.**



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