Coursework Research Project for GGS416 Satellite Image Analysis

To succeed in GGS416 it is important to submit a high-quality research project on a topic of your choosing. This coursework will consist of submitting a research paper which uses satellite imagery, along with the code being pushed to a public GitHub repository, for examination in tandem.

The aim of this exercise is for each class participant to understand and apply the basic processing steps required to use satellite imagery in a piece of analytical research, thereby achieving the course learning objectives.

To recap, the learning objectives for GGS416 are as follows:

1. Understand practical computer programming techniques for processing satellite imagery.
2. Develop introductory Python-based approaches for object detection and extraction.
3. Utilize introductory JavaScript for running image processing tasks using cloud computing.

Groups are allowed to choose whichever programing method best suits their topic. Seek advice if you are unsure which path to take. Indeed, plenty of time is allocated in the course to help refine these projects. In fact, the exercises set each week can be seen as preparatory steps for the research project. Tasks set in class will complement the necessary processing steps for your chosen topic.

Students are advised to consider this exercise as a piece of work which constitutes a potential job market paper, consequently demonstrating your competence when applying for future positions beyond GMU.

The project requirements include:

- Submission of a research paper which utilizes satellite image analysis techniques with a total paper length dependent on the number of people in each group. It is expected that per group member, ~2,000 words and ~200 lines of code need to be submitted. For example:
    - If you choose to work individually, you will need to submit an assignment of at least ~2,000 words and ~200 lines of code.
    - If you choose to work in a group of 4 participants, you will need to submit at least ~8,000 words and ~800 lines of code.

  Students are allowed to organize into their own groups, although it is best to do this around common interests (e.g., environmental, military intelligence etc.). It is advised these groups sit together in class for ease of collaboration. You will receive weekly supervision on your chosen topic to guide the research process.
- The paper should be submitted on MyMason BlackBoard (as both a Microsoft word (.docx) and pdf document), and also uploaded to a GitHub repository with the developed code. LaTeX/MarkDown documents can also be submitted if you prefer, just make sure to also provide a .pdf file of the final submission.

The paper needs to include:

- A properly written research abstract which summarizes the paper, including the motivation, research question, results, and findings (<250 words).
- An introductory section which provides background information, the motivation for the analysis and a stated research question(s) which the analysis aims to answer (<500 words).
- A comprehensive literature review on your chosen topic summarizing past theoretical and empirical research in this area, with at least 20 citations per group member (25% of the overall paper).

- A high-quality methodology section which details the data sources and processing steps involved in the analysis (25% of the overall paper). This must include a box diagram illustrating the sequencing of the processing steps, from input data to results output.
- Fully written-up results of the satellite image analysis undertaken, including graphs (e.g. using Matplotlib) or other data plots, and if necessary, any example imagery (25% of the overall paper).
- A discussion section which critically evaluates the ramifications of the results in relation to the research question(s) specified in the introduction (25% of the overall paper). Areas of future research could also be discussed. There must be a subsection on the limitations of the analysis.
- A conclusion section containing a summary of the purpose of the paper, and then the main findings (250 words).
- A fully documented bibliography which states the citations used in the paper. To reiterate, there needs to be at least 20 citations per group member.