Assignment 3 – GGS416 Satellite Image Analysis (SAI)

Due February 22nd 2026

Using NAIP imagery, evaluate how different classical segmentation algorithms behave across three contrasting land-cover types and analyze the influence of parameter selection on segmentation quality. Select three clearly distinct environments (e.g., urban, agricultural, forested, coastal, islands, mountainous).

For Question 1, create a well-proportioned and professional looking panel plot showing your three-contrasting land-cover images (10 points). Avoid whitespace. Ensure proper labels/titles. Aim to impress.

Secondly, you must apply the following three segmentation methods to your landcover types, as covered in class this week.

Question	Method	Parameter	Comparison	Points
2	**K-means**	Clusters (e.g., k = ~3 versus ~8)	Cluster size	30
3	**SLIC**	Compactness (e.g., ~8 versus ~30)	Boundary adherence	30
4	**Felzenszwalb**	Scale (e.g., ~50 vs ~300)	Region size sensitivity	30

Produce a structured comparative analysis, making use of matplotlib panel plots and other libraries to create aesthetically pleasing graphics. Ensure you create plots which meet scientific expectations (axis labels, units, titles, etc.). Report the quantitative number of segments created for each image, method, and parameter variation.

Provide a 200-word description for each question (and please avoid copying verbatim out of AI tools, you should use your critical thinking skills to make your own assessment). Ensure you explain the parameter influence, compare across your three landscapes, identify over/under-segmentation, and critique both advantages and disadvantages for each method.

One third of the points for Questions 2-4 is for the written analytical description.

Submission format

Please write your analysis in either (i) a Google Colab notebook and then use the print function to save it to a .pdf file, or (ii) by copying the contents into a word document which you then convert to a .pdf, for submission on Canvas. Without submitting your files like this, you will receive a 50-point penalty to your overall grade (as you need to provide both the code and the answers/maps). Please make sure your printed code outputs and maps are clearly visible for grading.

Please properly number your work, so it can be easily graded.

The Mason Honor code applies. Please also remember to follow Mason AI Use Policy.