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Segmentation Lab Report

Task

ArcGIS / ArcGIS Pro (mean shift)
or
▪ OTB Toolbox https://www.orfeo-toolbox.org/
or
▪ Any other environment you prefer
▪ Compare (visually) the results (using different parameters) to the results you achieved using the MRS in eCognition
▪ Write a short statement (small paragraph about differences or similarities you notice) about the comparison, including some screenshots of the results of the two different algorithms used. Limit the report to 2 pages max.!

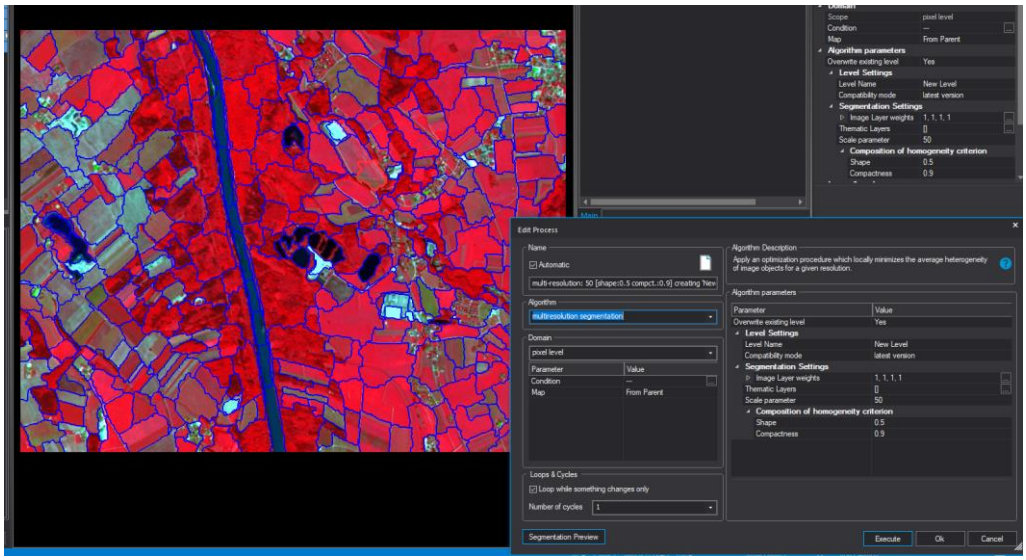

Figure 1 SPOT Ecognition Segmentation

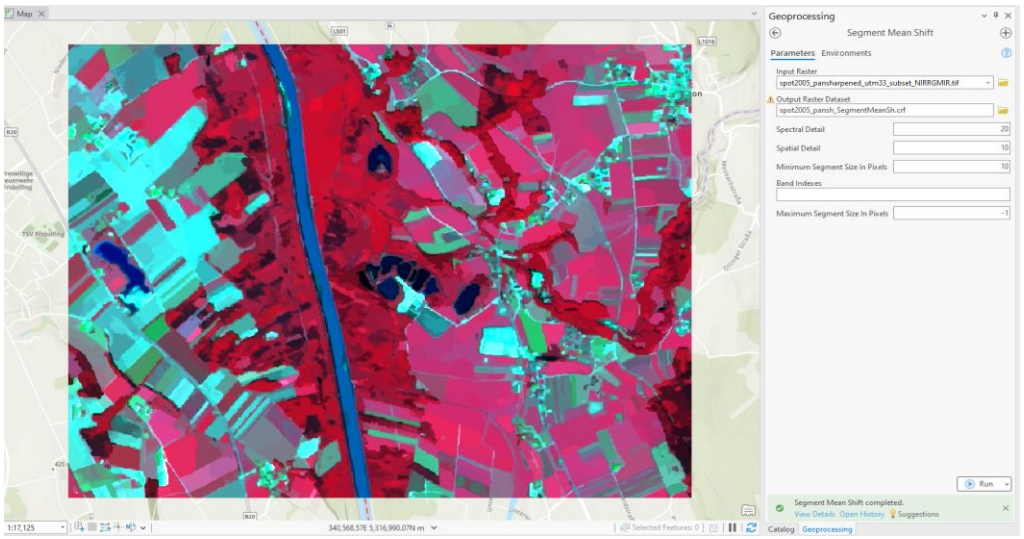

Figure 2 SPOT ArcGIS Pro

1. **Compare (visually) the results (using different parameters) to the results you achieved using the MRS in eCognition**

   Objective: The goal is to compare segmentation results from two different algorithms: MRS (Multiresolution Segmentation) in eCognition and the mean shift algorithm in ArcGIS Pro, using SPOT images. Image segmentation is a crucial step within the remote sensing information retrieval chain. As a step prior to classification, the quality of the segmentation result is of fundamental significance (Soomro et., al 2022).

Methodology:

Software Tools Used: eCognition for MRS segmentation and ArcGIS Pro for mean shift segmentation.

Parameters Adjustment: Various segmentation parameters were adjusted to observe visual differences between the algorithms.

Observations:

Boundary Definition:

eCognition (MRS): The segmentation appears to capture more intricate boundaries, distinguishing finer features within the image. This segmentation method maintains higher boundary accuracy and detail, likely due to MRS's multi-scale approach, which adapts to image heterogeneity.

ArcGIS Pro (Mean Shift): The segments are generally larger and smoother, possibly due to the mean shift's tendency to merge regions based on color and spatial proximity. This method results in less detailed boundaries but provides smoother segment transitions.

Segment Size and Homogeneity:

eCognition (MRS): The segmentation results show smaller, more homogeneous segments, especially in areas with distinct features.

ArcGIS Pro (Mean Shift): The segments are larger and tend to combine similar adjacent areas, which can help generalize large homogeneous regions but may obscure finer details.

Parameter Sensitivity:

eCognition (MRS): The MRS segmentation parameters are more sensitive, allowing for fine-tuning to capture specific features. Adjusting parameters like scale and compactness in MRS has a more noticeable impact on segment shapes and sizes.

ArcGIS Pro (Mean Shift): The mean shift algorithm is less sensitive to parameter changes than MRS, making it more straightforward but offering limited flexibility in detailed segmentation.

Suitability for Different Applications:

eCognition (MRS) is ideal for applications that require detailed boundary and feature extraction, as it provides more control over segment sizes and shapes.

ArcGIS Pro (Mean Shift) might be better suited for applications where broader, less detailed segmentation is sufficient, such as identifying large homogeneous land cover classes.

2. **Write a short statement (small paragraph about differences or similarities you notice) about the comparison.**

Noticeable differences emerge after comparing the segmentation results from eCognition's MRS (Multiresolution Segmentation) and ArcGIS Pro's mean shift algorithm. The MRS segmentation in eCognition captures finer details, with more precise boundary delineation, making it well-suited for identifying smaller, heterogeneous features within the image. In contrast, ArcGIS Pro's mean shift segmentation produces larger, smoother segments, merging similar areas more readily, which can be beneficial for broader, homogeneous classifications but sacrifices some detail. Both algorithms are effective within their respective scopes, with MRS offering more customization for detailed work and mean shift providing a simpler, generalized segmentation.

References

Soomro, T. A., Zheng, L., Afifi, A. J., Ali, A., Soomro, S., Yin, M., & Gao, J. (2022). Image segmentation for MR brain tumor detection using machine learning: a review. *IEEE Reviews in Biomedical Engineering*, *16*, 70-90.