

Course: TERRA Summer School – Module II – Remote Rock Mass

Characterization

Exercise: Remote Rock Mass Mapping Exercise

Course instructors: D.Sc. (tech.) Lauri Uotinen, Dr. Mateusz Janiszewski

Semi-automatic planar fracture mapping

Background

Discontinuity Set Extractor (DSE) is a software programmed by Adrián Riquelme as part of his PhD studies. It's a semi-automatic method to extract fracture planes from a rock face. DSE uses a clustering-based approach to automatically extract fracture plane orientation from a point cloud of a rock mass surface.

Instructions:

1. First let's prepare the point cloud dataset in Cloud Compare:
 - a. Uncheck the mesh file.
 - b. Select the point cloud.
 - c. Save the point cloud as ASCII cloud (.txt)
2. Keep CloudCompare open as you will use it to visualize the results after analysis in DSE is done.
3. Download DSE_301 software [Discontinuity Set Extractor download | SourceForge.net](#) and install it. Note! If doing the exercise remotely, we recommend installing the standalone version (DSE_x64_301.exe). If doing the exercise in the computer classroom, please install the Matlab app (DSE_v301.mlappinstall)
4. Open DSE and import the recently created CC ASCII file of the mapping window (File -> Load XYZ .txt)
5. Calculate normals.
6. Calculate the probability density function (pdf) of the normals' poles.
7. Set the Nmax DS to 4.
8. Edit poles to investigate the sets.
9. Assign a DS to each point.
10. Export XYZ-Js early classification.
11. Import the exported .txt file back to CC and visualize the result.
12. If you are happy with the result, continue with cluster analysis.
13. If not, adjust the parameters of the calculate the pdf of the normals' poles step and repeat (e.g. set Nmax DS to a larger number and remove unwanted DS manually in Edit poles)
14. Save a screenshot with extracted sets.
15. Perform cluster analysis.
16. Edit clusters with discontinuity clusters N cluster = 100

17. Merge the coplanar clusters.
18. Export all results and investigate the exported files.
19. Save the state as .m file in case you need to go back to the analysis.
20. Visualize the final result in CC by importing (or dragging in) the -xyz-js-c.txt file (adjust the point size to make it more visible)