

NetworkGT Toolbox

Version 0.1

by Björn Nyberg^{1*}

Department of Earth Sciences, University of Bergen, P.O. Box 7803, 5020 Bergen, Norway.¹

Contact: bjorn.nyberg@uib.no

Contents

1.0	Background.....	2
1.1	License	2
2.0	Installation.....	2
2.1	ArcGIS Installation	2
2.2	Python Installation	2
2.3	NetworkGT Toolbox Installation.....	3
3.0	Workflow	3
1.0	Digitizing Fracture Network.....	3
2.0	Sampling Strategies	3
3.0	Geometrical Analysis	4
4.0	Topological Analysis	4
5.0	Spatial Visualization.....	4
4.0	Contact Information & Feedback	4

1.0 Background

The NetworkGT (Network Geometry and Typology) Toolbox is a set of tools designed for the geometrical and topological analysis of fracture networks in ArcGIS 10.4 >.

1.1 License

The scripts used in this program are written in the Python programming language under a GNU General Public License V3 which states:

“This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program. If not, see <<http://www.gnu.org/licenses/>>.”

2.0 Installation

2.1 ArcGIS Installation

Install ArcGIS by running the installation setup file (setup.exe)

2.2 Python Installation

2.2.1 *Python module installation*

The toolset utilizes a set of scientific third-party modules that are typically not available in a standard ArcGIS installation:

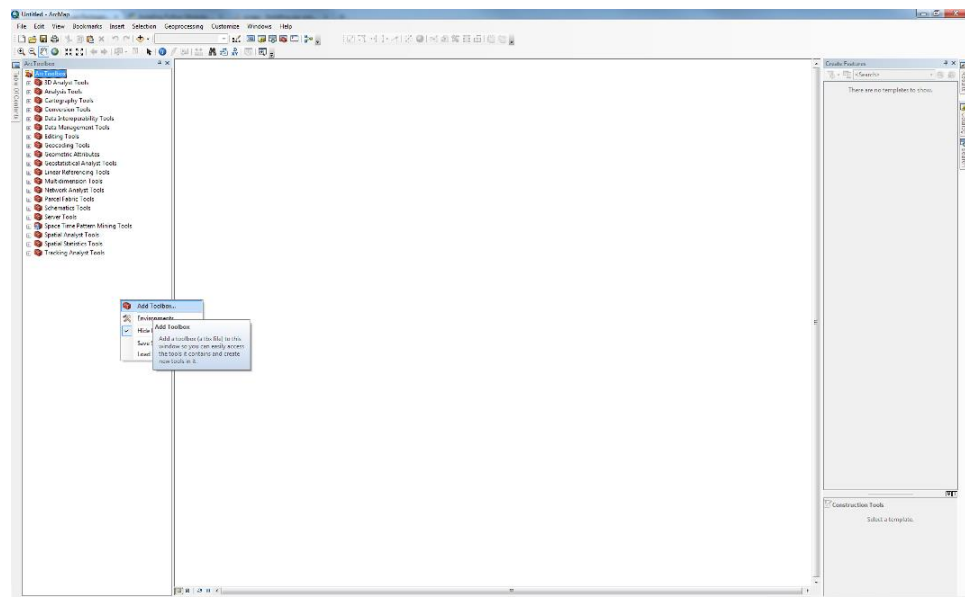
To install these modules **requires admin rights** and the following procedure.

1. Unzip the NetworkGT.zip into a **permanent working directory** that has **read/write** capabilities.

2. Navigate to the Install folder of your working directory (step 1) and find the file Install.py → right click → Edit with IDLE.
3. Press F5 to run the file and wait until a message 'Finished' is returned

2.3 NetworkGT Toolbox Installation

1. Unzip the NetworkGT.zip file (step 2.2.1) and keep a note of the working directory
2. Open ArcMap
3. Find the ArcToolbox by navigating to the tabs Geoprocessing → ArcToolbox
4. Right click the ArcToolbox icon → Add Toolbox and navigate to the NetworkGT.tbx file in your working directory (Step 1.).



5. Right click the ArcToolbox icon → Save Settings → To Default. The toolbox is now saved under the current ArcToolbox settings.
The toolset is now ready for use!

3.0 Workflow

1.0 Digitizing Fracture Network

- 1.1 Interpretation of Fracture Network
- 1.2 Repair Fracture Network

2.0 Sampling Strategies

- 2.1 Polygon and Full Area Sampling

- 2.2 Line Grid Sampling
- 2.3 Network Grid Sampling

3.0 Geometrical Analysis

- 3.1 Rose Diagrams
- 3.2 Fracture Sets
- 3.3 Spatial Heterogeneity
- 3.4 Length Distributions

4.0 Topological Analysis

- 4.1 Nodes and Branches
- 4.2 Topological Analysis and Plots
- 4.3 Clustering and Block Analysis

5.0 Spatial Visualization

- 5.1 Contour Plots
- 5.2 Contour Analysis

4.0 Contact Information & Feedback

For any assistance or feedback please do not hesitate to contact the author at bjorn.nyberg@uib.no.