Characterization of Partial Intrinsic Symmetries
Source Code Documentation

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1 General Information

1.1 GeoXL 3.5 License

The source code is part of the GeoXL system. The base system is licensed under a permissive BSD license, and each individual module (visual studio project with files; compiled into a loadable DLL) is subject to a specific license (mostly BSD and GPL). Each individual module comes with its own license - see the <module-name>.tags.h files (or alternatively, use the module manager provided within the executable) for details. Please be also aware of license restrictions of the various third party modules included in this distribution.

1.2 Slippage Analysis Module License

The code for the paper "Characterization of Partial Intrinsic Symmetries" [2] is licensed under GNU GPL2 (third-party modules might use a different license, as explained in the source archive):

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License version 2 as published by the Free Software Foundation. `http://www.gnu.org/licenses/old-licenses/gpl-2.0.html`

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2 Setup

The executable is self-contained - just copy the whole folder hierarchy to a directory and start "GeoXL35.exe" in the folder "application/bin/«platform»/«configuration»".

To build the source code, Visual Studio 2010 and QT 4.x.x are required. If you use later versions of visual studio, you need to have Visual Studio 2010 installed in parallel

and choose the compatibility mode that uses the VS 2010 toolchain. For building the 32bit version, the environment variable `%QTDIR%` must be set such that it points to a directory with include,lib,bin subdirectories. For a 64bit build, the environment variable `%QTDIR64%` must be defined to point to the corresponding 64bit QT installation.

3 Usage

Slippage computation on a given shape as described in [2] can be done by providing an input shape and two parameters: the patch size and a threshold.

1. Import a shape into *GeoXL* :
   - Click "NewScene",
   - Double-click on the new scene created ("Scene1"),
   - Click "File → Import" (or press "Ctrl" followed by "I"),
   - Select "Unstructured In-Core Triangle-Mesh",
   - Under "Import Settings", "FileName" insert the file location path of the shape.
   - Click "Start Import".
2. Run the algorithm to compute slippage on the imported shape:
   - Select the tool "ComputeSlippage" under "Tools",
   - Press the button in the right of "Edit" in the "m_settings" field and insert a desired patch radius in the "patchRadius" field,
   - Click on "SlippageAnalysis".
3. Color the input shape based on slippage information:
   - Press the button in the right of "Edit" in the "m_settings" field and insert a desired threshold in the "globalSlippageThreshold" field,
   - Click "colorSurfaceBySlippage".

The user can save as .x4obj file the computed slippage information on the shape. In this way, the user can for example later on experiment directly with different slippage thresholds without necessarily computing again the slippage information on the shape by following the next steps:

1. Import the .x4obj file which contains the computed slippage information,
2. Double-click on the new scene created,
3. Select "ComputeSlippage" under "Tools",

4. Press the button in the right of “Edit" in the “m_settings” field and insert a desired threshold in the “globalSlippageThreshold” field.

5. Click “colorSurfaceBySlippage”.

- To open an .x4obj file in *GeoXL*, click “Open”. In the pop-up window, select through the file explorer the .x4obj file to be opened. To actually see it, double click on the file created.

- To save an .x4obj file in *GeoXL*, click “File → Save as...”. In the pop-up window, select through the file explorer the location where the .object will be stored.

3.1 Parameter settings

To view or edit the parameter settings go to *Tools* and select “computeSlippage”. Press the button in the right of “Edit” in the “m_settings” field.

1. surface settings
   (a) numNN: number of nearest neighbors in a k-nn graph (used for point clouds). Default value set to 8.
   (b) maxSampleSpacing: maximum spacing allowed between samples. Default value set to 0.1

2. slippage settings
   (a) geoSpacingFraction: the spacing between the points for which we compute geodesics (as a fraction of shape intrinsic radius),
   (b) patchSpacingFraction: the spacing between patch centres (as a fraction of shape intrinsic radius),
   (c) patchRadius: patch radius (as a fraction of shape intrinsic radius), Default value 0.1.
   (d) globalSlippageThreshold: threshold used for slippage characterization, Default value 0.1.

3. visualization settings
   These parameters are not necessary for the algorithm, but can be used for visualizing results. They can be safely ignored.

3.2 Output

The output of the algorithm is the slippage information on the shape and is stored as a .x4obj file with name “Computed_patchRadius0.1_SlippageAnalysis.x4obj” (for patch radius parameter equal to 0.1).

References

[1] http://www.staff.uni-mainz.de/wandm/software.html.

[2] Shehu et al., “Characterization of Partial Intrinsic Symmetries", ECCV NORDIA Workshop, 2014.