CIShell Features

A framework for easy integration of new and existing algorithms written in any programming language.
Algorithm Definition

Data[]
User-entered parameters
CIShell Context

Algorithm

Metadata
key=value
key=value
key=value

Data[]
CIShell Portal (http://cishell.org)

Cyberinfrastructure Shell (CIShell)
CIShell supports the plug-and-play of datasets and algorithms and their bundling into custom tools that serve the specific needs of a user group or research community. It has been applied to develop diverse custom tools, see below. Feel free to take plugins from any of these tools to design your personal dream tool.

Provided by the Cyberinfrastructure for Network Science Center at Indiana University.

Learn more about existing CIShell-powered tools below.

Network Workbench Tool (NWB)
The NWB Tool supports researchers, educators, and practitioners interested in the study of biomedical, social and behavioral science, physics, and other networks. It comes with a 77-page user manual.

Science of Science Tool (Sci²)
The Sci² Tool was specifically developed for science policy makers and researchers that study science by scientific means. It supports the temporal, geospatial, topical, and network analysis and visualization of scholarly datasets at the micro (individual), meso (local), and macro (global) levels. There exists a 114-page user manual and 24 hours of NIH tutorials in this tool.
Algorithm Developer's Guide

Overview

The Cyberinfrastructure Shell (CIShell) is an open source, community-driven platform for the integration and utilization of datasets, algorithms, tools, and computing resources. Algorithm integration support is built in for Java and most other programming languages. Being Java based, it will run on almost all platforms. The software and specification is released under an Apache 2.0 License.

This guide attempts to aid algorithm developers in creating algorithms for CIShell (and applications built on CIShell).

This guide tries to contain all the information a new developer needs, but where necessary, it may cite the CIShell 1.0 Specification (API) or the OSGi Service Platform Specification, Release 4 (API). While the guide tries to make beginning algorithm development easier, the CIShell Specification has the last word on how the CIShell Platform works.

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Sci² Tool: Algorithms
See https://nwb.slis.indiana.edu/community

Preprocessing
- Extract Top N% Records
- Extract Top N Records
- Normalize Text
- Slice Table by Line
- Extract Top Nodes
- Extract Nodes Above or Below Value
- Delete Isolates

Modeling
- Random Graph
- Watts-Strogatz
- Small World
- Barabási-Albert Scale-Free
- TARL

Analysis
- Network Analysis Toolkit (NAT)
- Node Degree
- Degree Distribution
- K-Nearest Neighbor (Java)
- Watts-Strogatz Clustering Coefficient
- Watts-Strogatz Clustering Coefficient over K
- Diameter
- Average Shortest Path
- Shortest Path Distribution
- Node Betweenness Centrality
- Weak Component Clustering
- Global Connected Components
- Extract K-Core
- Annotate K-Coreness
- HITS

Weighted & Undirected
- Clustering Coefficient
- Nearest Neighbor Degree
- Strength vs Degree
- Degree & Strength
- Average Weight vs End-point Degree
- Strength Distribution
- Weight Distribution
- Randomize Weights

Blondel Community Detection

HITS

Unweighted & Directed
- Node Indegree
- Node Outdegree
- Indegree Distribution
- Outdegree Distribution

K-Nearest Neighbor
- Single Node in-Out Degree Correlations

Dyad Reciprocity
- Arc Reciprocity
- Adjacency Transitivity

Weak Component Clustering

Strong Component Clustering

*See https://nwb.slis.indiana.edu/community*

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**Visualization**
- GnuPlot
- GUESS
- Image Viewer

- Radial Tree/Graph (prefuse alpha)
- Radial Tree/Graph with Annotation (prefuse beta)
- Tree View (prefuse beta)
- Tree Map (prefuse beta)
- Force Directed with Annotation (prefuse beta)
- Fruchterman-Reingold with Annotation (prefuse beta)

- DrL (VxOrd)
- Specified (prefuse beta)

*Horizontal Bar Graph*
*Circular Hierarchy*
*Geo Map (Circle Annotation Style)*
*Geo Map (Colored-Region Annotation Style)*
*Science Map (Circle Annotation)*

**Scientometrics**
- Remove ISI Duplicate Records
- Remove Rows with Multitudinous Fields
- Detect Duplicate Nodes
- Update Network by Merging Nodes

- Extract Directed Network
- Extract Paper Citation Network
- Extract Author Paper Network

- Extract Co-Occurrence Network
- Extract Word Co-Occurrence Network
- Extract Co-Author Network
- Extract Reference Co-Occurrence (Bibliographic Coupling) Network

- Extract Document Co-Citation Network

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**Textual**
- Burst Detection

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**Extract K-Core**
**Annotate K-Coreness**
**HITS**
**PageRank**
**Weighted & Directed**
**HITS**
**Weighted PageRank**

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**Soon:**
Database support for ISI and NSF data.
Network Analysis, Scientometrics, and Visualization

Sci Maps

Geo Maps

GUESS Network Vis

Co-Authorship Network