GTNA

A Framework for the Graph-Theoretic Network Analysis

Benjamin Schiller Dirk Bradler Immanuel Schweizer
Max Mühlhäuser Thorsten Strufe

TECHNISCHE UNIVERSITÄT DARMSTADT

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Graph-Theoretic Network Analyzer

Outline

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- Introduction
- Modules & Workflow
- Available Networks
- Available Metrics
- Runtime & Memory Usage

Introduction

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- Simulation: research tool of choice for network analysis
- Mostly consider dynamic properties (no structural analysis)
  - Our approach: graph-theoretic analysis of network snapshots
- GTNA: extendable plugin interface
  - Topology generators
  - Metric implementations

Modules & Workflow

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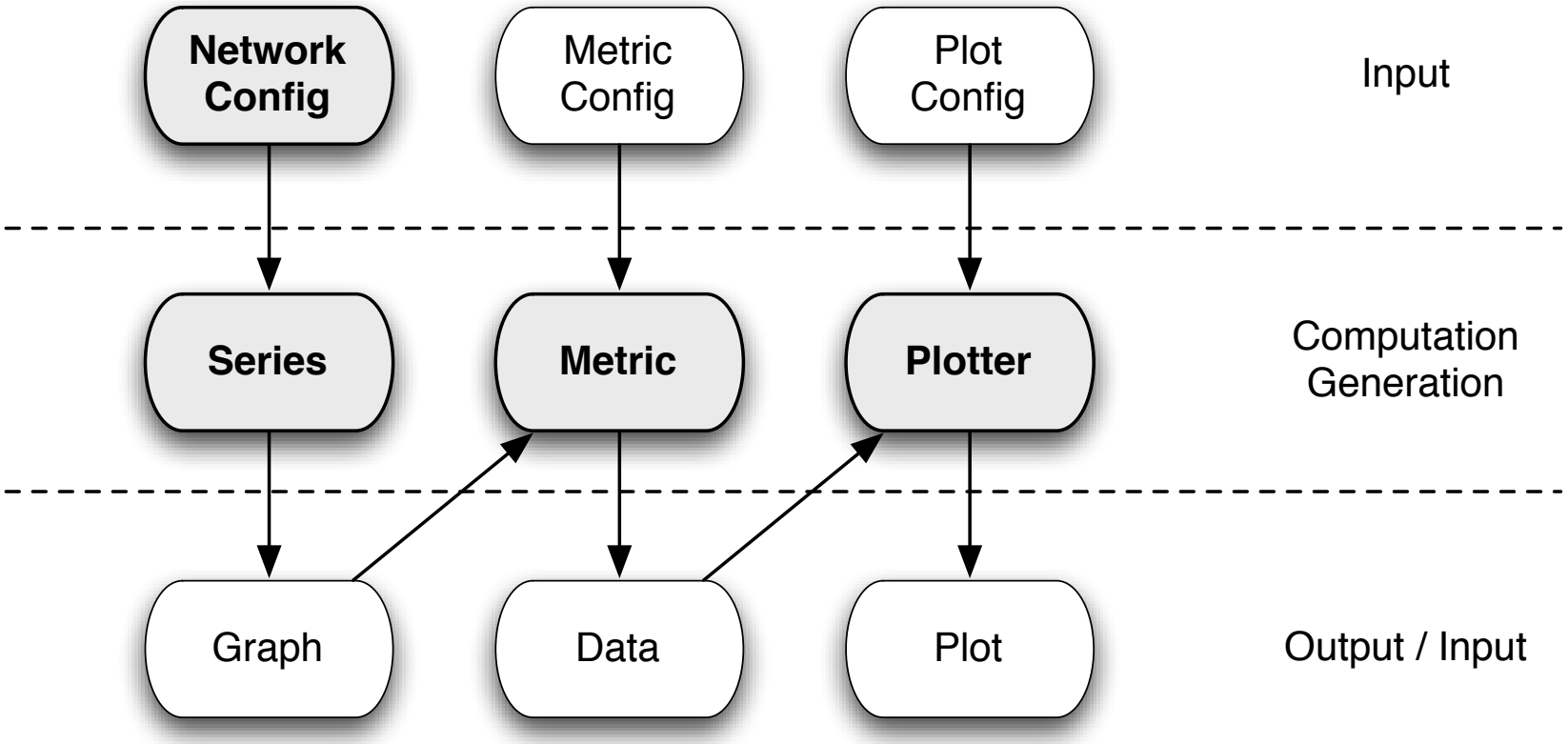

Available Networks

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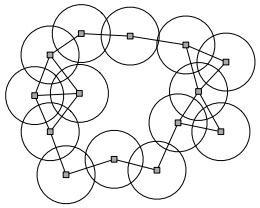
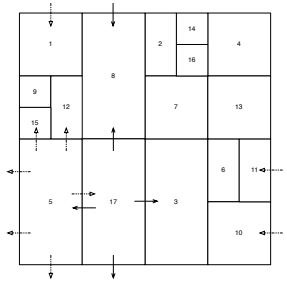
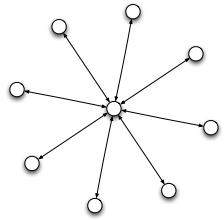
- Network Models
  - *Barabasi Albert, De Bruijn*
  - *Erdos Renyi, Gilbert*
  - *GNC, GNR, Kleinberg*
  - *UnitDisc, Watts Strogatz*



- P2P Systems
  - *CAN, Chord*
  - *Gnutella 0.4 / 0.6*
  - *Kademlia, ODRI, Pastry*
  - *PathFinder, Symphony*



- Canonical Networks
  - *Complete, Ring, Star*



- Import Mechanisms
  - *Singe Files, Lists*
  - *Many Formats*
- Transformations
  - *Add Edges Per Node*
  - *Add Edges Randomly*
  - *Rewire*
  - *Same Degree Distribution*

Available Metrics

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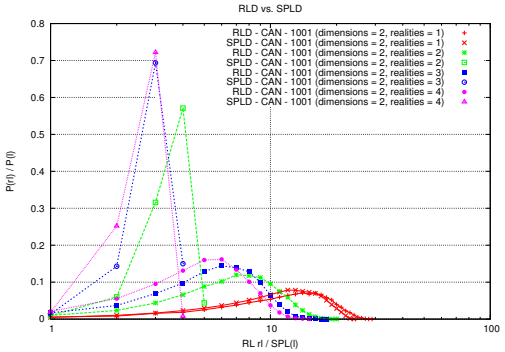
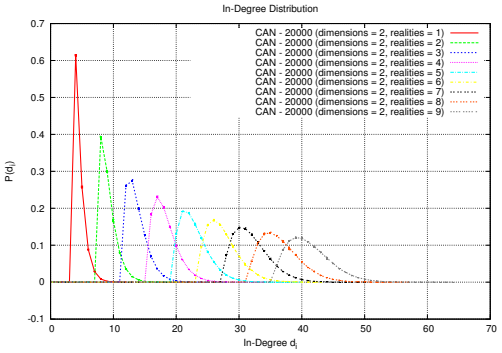
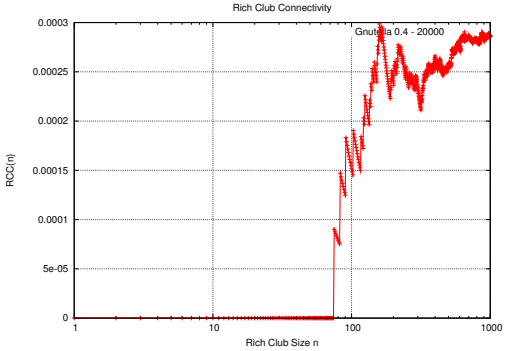
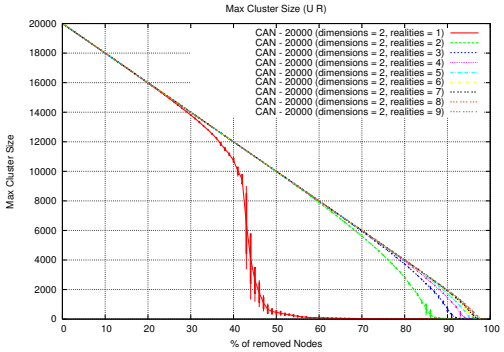
- Degree Distribution
- Shortest Path Length
- Routing Length
- Network Fragmentation
- Clustering Coefficient
- Rich Club Connectivity

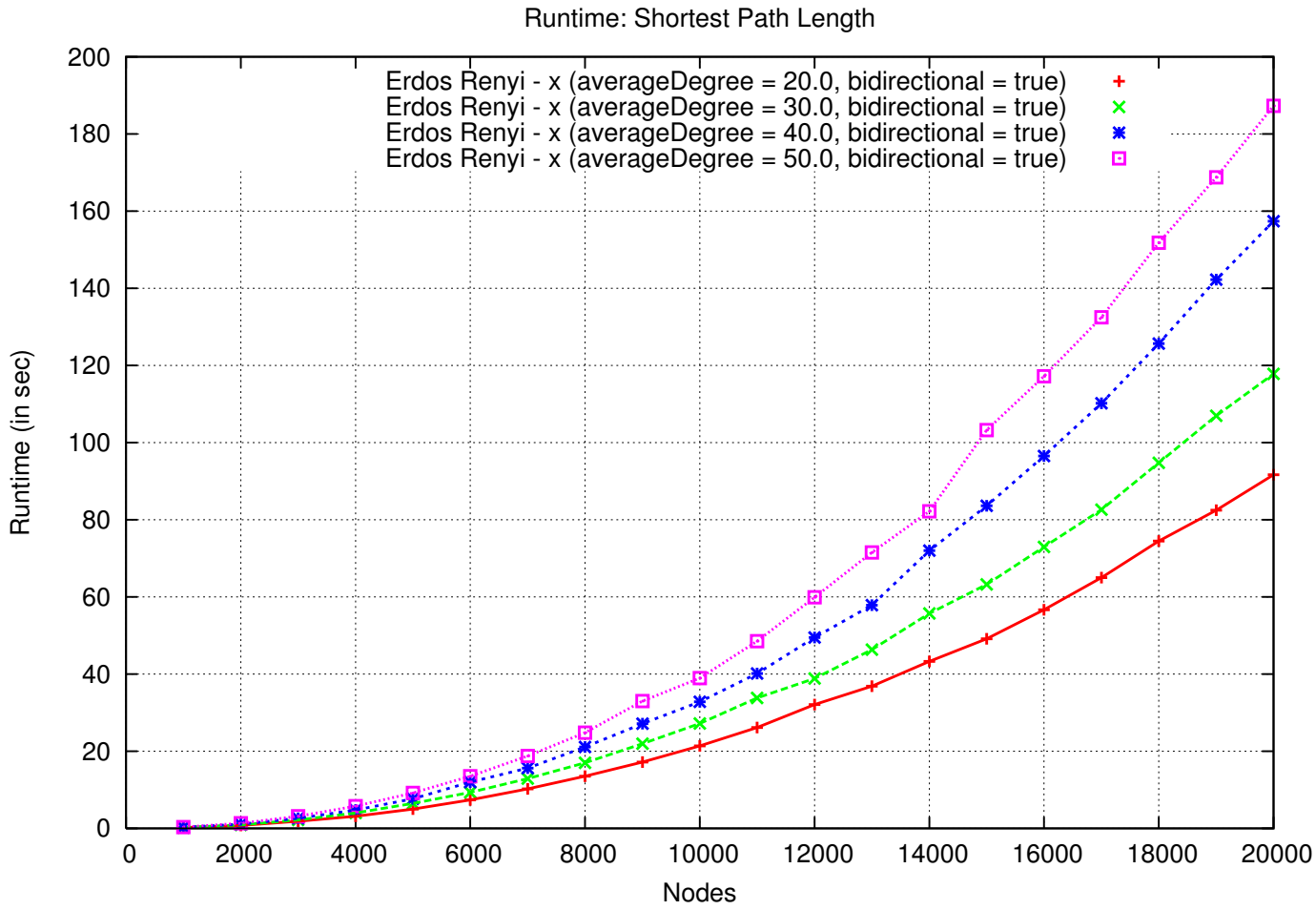




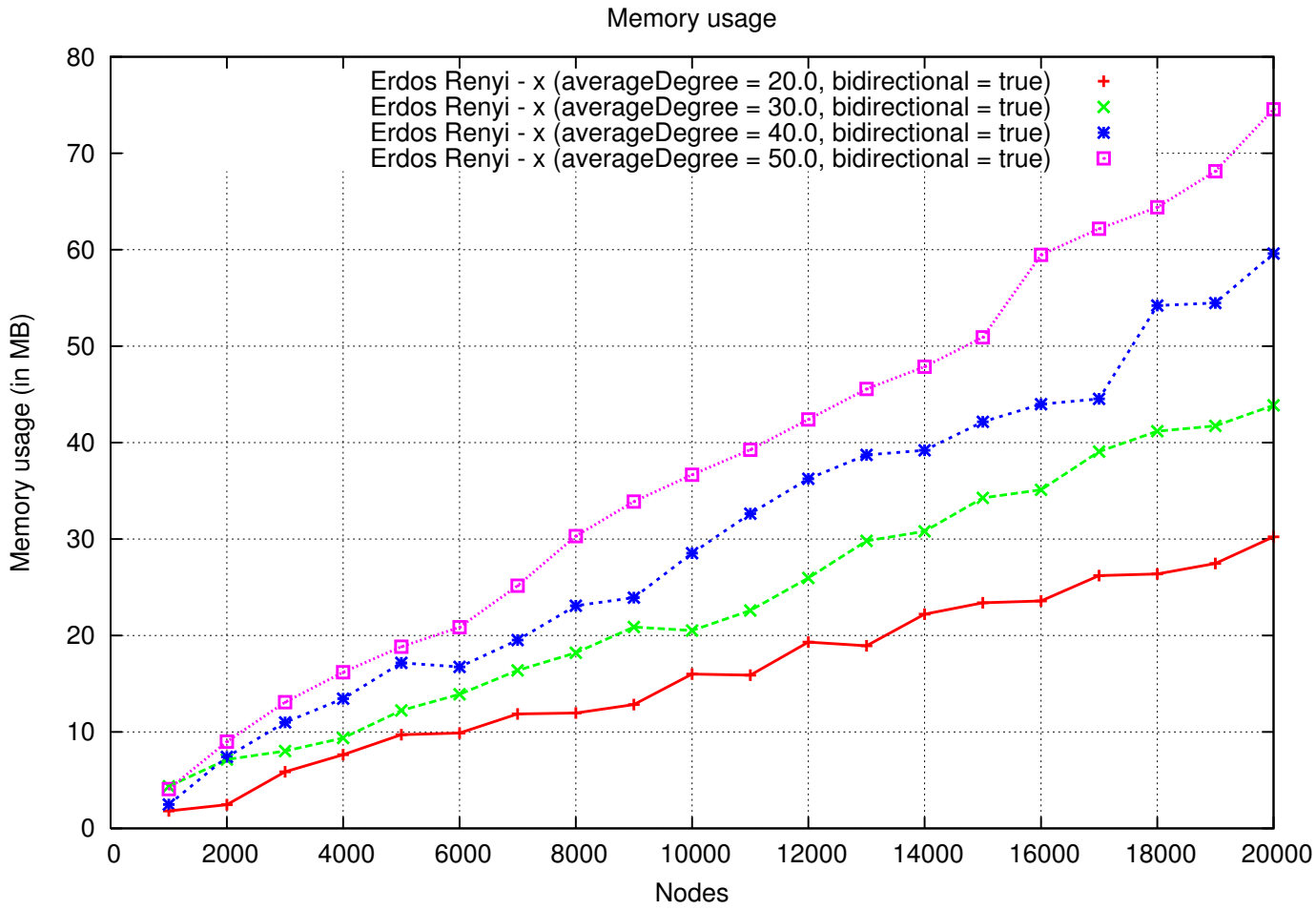




Runtime


Runtime: Shortest Path Length
Erdos Renyi - x (averageDegree = 20.0, bidirectional = true)
Erdos Renyi - x (averageDegree = 30.0, bidirectional = true)
Erdos Renyi - x (averageDegree = 40.0, bidirectional = true)
Erdos Renyi - x (averageDegree = 50.0, bidirectional = true)
Runtime (in sec)
Nodes
0
20
40
60
80
100
120
140
160
180
200
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000

Memory Usage



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schiller@cs.tu-darmstadt.de