Interactive Demonstrations and Hands-On Use of the *net.science* Cyberinfrastructure for Network Science

Chairs' Welcome and Tutorial Summary

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ABSTRACT

Networks are readily identifiable in many aspects of society: cellular telephone networks and social networks are two common examples. Networks are studied within many academic disciplines. Consequently, a large body of (open-source) software is being produced to perform computations on networks. A cyberinfrastructure for network science, called *net.science*, is being built to provide a computational platform and resource for both producers and consumers of networks and software tools. This tutorial is a hands-on demonstration of some of *net.science*'s features.

CCS CONCEPTS

• **Software and its engineering** → *Software as a service orchestration system.*

KEYWORDS

cyberinfrastructure, net.science, network science, networks

1 INTRODUCTION

Much of built infrastructures (e.g., power, water, communications) are networks. Humans also form many types of online and face-to-face (social) networks. The generality of networks makes them useful for study in engineering, science, history, psychology, social sciences, finance, economics, and mathematics, among other fields. These factors, coupled with the myriad computations performed on networks, make them a prime candidate for general-purpose computational tools.

A *cyberinfrastructure* consists of computing systems, data storage systems, advanced instruments and data repositories, and visualization environments all linked by high speed networks to make

possible scholarly innovation and discoveries not otherwise possible [5]. Elaborations of this concept are provided in [3, 4]. The foregoing background suggests that network science is a natural application for cyberinfrastructures (CIs). A collection of researchers from universities, national laboratories, and commercial companies are working to design and construct a CI for network science called *net.science* [1]. A concise overview of the *net.science* system given in [2] complements this tutorial.

2 TUTORIAL GOALS

This half-day tutorial on *net.science* has two broad goals: (*i*) teach participants how to use the CI through hands-on demonstrations of features and capabilities, and (*ii*) obtain feedback from participants regarding existing features and ideas for new functionality.

3 TUTORIAL TOPICS

There are four main topics. (*i*) Overview of the *net.science* CI and navigating within it. (*ii*) Demonstrations of network structural analyses. (*iii*) Demonstrations of contagion dynamics on networks. (*iv*) Participant feedback and survey on features to add and software tools and data to include in net.science, going forward.

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