Distributed Network Algorithms: Foundations and Future Directions

Overview

With the rise of the Internet, distributed communication networks, and distributed processing of large-scale data, our goal in this course is to provide an opportunity to understand the fundamentals of distributed network algorithms and also present ideas to pursue novel, significant, and useful research questions in this area. The course will comprise two modules, one for each week.

Foundations: To teach the foundations of distributed network computing focusing on models, algorithms, and complexity. Various fundamental distributed network algorithms including broadcast, convergecast, maximal independent set, coloring, leader election, spanning tree algorithms, shortest paths, and routing will be covered. Basic issues arising in distributed network systems such as communication, synchronization, fault-tolerance, and resource allocation will be addressed. Applications to real-world networks such as the Internet, peer-to-peer networks, wireless networks, sensor networks and dynamic networks will also be discussed.

Future Directions: To expose the students/participants to state-of-the-art research topics and future research directions in distributed network algorithms. The course will cover the following topics that have seen significant new developments in the last five years: (1) techniques for showing lower bounds of distributed algorithms (2) distributed random walks with applications (3) distributed computation of large-scale data, and (4) dynamic network algorithms. Much of the research topics in the future directions part will be based in part on the recent research of the instructors.

Dates for the Course	**1st August to 12th August, 2016**
Host Institute	**IIT Madras**
No. of Credits	**2**
Maximum No. of Participants	**30**
You Should Attend If…	▪ You are a student/faculty member from an academic institution interested in learning about the foundations of distributed network algorithms, Internet, Peer-to-Peer networks, wireless networks, and Big Data computing. ▪ You have an undergraduate or postgraduate background in design and analysis of algorithms. ▪ You are a professional or research scientist in software industry with an interest in distributed systems, big data, and cloud computing.
Course Registration Fees	The participation fees for taking the course is as follows: **Student Participants:** Rs.2000 **Faculty Participants:** Rs.5000 **Government Research Organization Participants**: Rs.10000 **Industry Participants:** Rs.20000 The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges. **Mode of payment: Demand draft in favour of "Registrar, IIT Madras" payable at Chennai.**
Accommodation	The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel

Course Faculty

Prof. Gopal Panduranganis an Associate Professor in the Department of Computer Science at the University of Houston. He received his Ph.D. in Computer Science from Brown University in 2002. He has held faculty and visiting positions at Nanyang Technological University in Singapore, Brown University, Purdue University, and Rutgers University. He is a Senior Member of the ACM and the IEEE. He has made research contributions to the foundations of distributed computing and networks. In particular, his work has led to new and uniform techniques for showing lower bounds for distributed algorithms. He has also made contributions to the design and analysis of distributed algorithms for fundamental distributed computing problems and to the development of the foundations of dynamic networks.

Prof. John Augustineis an Assistant Professor in the Department of Computer Science and Engineering at IIT Madras. He received his Ph.D. in Computer Science from the University of California at Irvine in 2006. Prior to IIT Madras, he worked as a scientist at Tata Research Development and Design Centre in Pune and also as a Research Fellow at Nanyang Technological University. He has a wide array of research interests ranging from distributed network algorithms (esp., dynamic network algorithms), online algorithms, computational geometry, combinatorial optimization, and also applied algorithms, esp., in the context of inexact computing.

Course Coordinator

Name: **John Augustine**
Phone: +91-44-2257-4383
E-mail: augustine@iitm.ac.in

URL: http://www.cse.iitm.ac.in/~augustine/