UMBC CyberTraining: Multidisciplinary Training Program on

Big Data + High Performance Computing + Atmospheric Sciences

February 02 to May 18, 2018, Fridays 03:45-06:15, at UMBC

For more information, please visit http://cybertraining.umbc.edu

Introduction

CyberTraining is a new NSF-funded initiative to create a training program in big data applied to atmospheric sciences as application area and using high-performance computing as indispensable tool. The training consists of instruction in all three areas of "Big Data + HPC + Atmospheric Sciences" supported by teaching assistants and followed by faculty-guided project research in a multidisciplinary team of participants from each area. Participants can be graduate students, post-docs, and junior faculty from around the nation who will be exposed to multidisciplinary research and have the opportunity for significant career impact. Each research project is conducted in a multidisciplinary team with participants from each area, mentored by a faculty and supported by teaching assistants from each area.

Training Program Structure

Module	Topic	Goal
1	Introduction of Python/C, Linux and HPC environment	Running their own jobs on HPC
2	Numerical methods for Partial Differential Equations (PDE)	Model as PDE and solve them using numerical methods
3	Message Passing Interface (MPI)	Write MPI jobs and performance studies
4	Introduction of Data Science	Know basic tasks and techniques of Data Science
5	Basics of Big Data	Understand the basics of Big Data and demo programs
6	Big Data system: Hadoop/Spark	Write Hadoop/Spark jobs and run them on HPC
7	Basics of Machine Learning	Write a machine learning program using Spark MLlib
8	Basics of earth-atmosphere radiative energy balance and global warming	Understand basic concepts and principles of radiative energy balance and global warming
9	Basics of radiative transfer simulation framework	Understand the basic physics underlying the transport of radiation in atmosphere
10	GCM simulation and satellite observations	Understand the importance of GCM and satellite remote sensing
11	Project introduction and assignment	Each interdisciplinary team will be assigned one project
12-14	Project progress report from each team and feedback	20 minutes report from each team + Q&A + rating
15	Final project presentation	Report, software, and a final presentation from each team

Who should participate

- Students/researchers interested in interdisciplinary research and how Big Data and HPC techniques can be applied to Computational Physics and other Computational Sciences.

- Graduate students and post-doctoral researchers / junior faculty who want to participate in project-based multidisciplinary research to further their career.

Ideal prerequirite knowledge for different majors

Major	
Computing related	• Programming • Distributed Systems
Mathematics / Statistics	• Partial Differential Equations • Computational Mathematics and Programming
Physics	• Computational Physics

Instructors

- Dr. Jianwu Wang, Department of Information Systems.

- Dr. Matthias Gobbert, Dept. of Mathematics and Statistics.

- Dr. Zhibo Zhang, Department of Physics.

- Dr. Aryya Gangopadhyay, Dept. of Information Systems.

How to apply

There is no a fee to apply to the training program. Each participant who successfully finishes the program and completes all requirements will receive $1,500. We expect to have 15 participants in total (5 from each discipline). Because the capacty limit, there will be a selection process.

The application package should include applicant's CV, personal statement, transcript, and at least two letters of recommendation. The personal statement needs to address specifically why the participant is interested in interdisciplinary research, the background in software tools and languages, how participation will promote his/her career goals, and how he/she can contribute to a team of participants from each discipline. Please e-mail questions as well as the application with the requested documents as PDF attachments to cybertraining@umbc.edu before Dec. 25th, 2017.

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