Bonnie Berger
MIT

Monday, November 23
11:00am-12:00pm
CSE 1202, EBU-3B

Computational biology in the 21st century: Scaling with compressive algorithms

The last two decades have seen an exponential increase in genomic and biomedical data, which will soon outstrip advances in computing power. Extracting new science from these massive datasets will require not only faster computers; it will require algorithms that scale sublinearly in the size of the datasets. We introduce a novel class of algorithms that are able to scale with the entropy and low fractal dimension of the dataset by taking advantage of the unique structure of massive biological data to operate directly on compressed data. These algorithms can be used to address large-scale challenges in genomics, metagenomics and chemogenomics.

Bio:
Bonnie Berger is a Professor of Applied Mathematics and Computer Science at MIT, and head of the Computation and Biology group at MIT’s Computer Science and AI Lab. After beginning her career working in algorithms at MIT, she was one of the pioneer researchers in the area of computational molecular biology and, together with the many students she has mentored, has been instrumental in defining the field. Professor Berger has won numerous awards including a National Science Foundation Career Award and the Biophysical Society’s Dayhoff Award for research. In 1999 Professor Berger was named one of Technology Review Magazine’s inaugural TR100 as a top young innovator of the twenty-first century, in 2003, was elected as a Fellow of the Association for Computing Machinery, and in 2010, received the RECOMB Test of Time Award. She was recently elected to the American Academy of Arts and Sciences, selected for the NIH Margaret Pittman Director's Lecture for outstanding scholarship and lecturership, and elected as a Fellow of the International Society for Computational Biology (ISCB). She currently serves as Vice President of the ISCB, Head of the steering committee for RECOMB, and on the NIGMS Advisory Council. In addition, Professor Berger is an Associate Member of the Broad Institute, Faculty member of HST, and Affiliated Faculty of Harvard Medical School.