

Activities of the Simons Foundation

A little history

- The Simons Foundation's mission is to advance the frontiers of research in mathematics and the basic sciences
- It was founded by Jim and Marilyn Simons
- The Simons Foundation celebrated its 20th anniversary last year
 - The Simons Foundation at its core exists to support basic — or discovery-driven — scientific research, undertaken in pursuit of understanding the phenomena of our world without specific application in mind

Private Foundations

- Traditionally, governments have been the primary supporter of pure science research
 - Applied research has been supported by industry and governments
- In the last 5-10 years there has been growing visibility in foundations that support pure science
 - Normally organizations endowed by wealthy individuals or families
 - Keck, Kavli, Thiel, Broad are some other examples
 - Many of the people involved have signed the “The Giving Pledge”

Rules and Freedom

- Endowed Foundations choose what they support
 - Whatever problems they find interesting
 - Grant application process can be less bureaucratic and sometimes faster
 - They set the rules on how the money is spent
 - Overhead is frequently capped
 - Lots of other rules do not exist
 - Fly America Act, Nationalities that are supported, Etc.

Simons Funding Areas

- Math and Physical Sciences
- Life Sciences
- Autism Research Initiative
- Full range of supported programs
 - There are small awards for mathematicians travel programs up to a theoretical computer science building at Berkeley
 - The arxiv.org site to a microwave telescope in Chile.

Areas Supported

- Math and Physical Sciences
 - Targeted Grants to Institutes
 - Symposia Program
 - Collaborating Grants for Mathematicians
 - Targeted Grants for Mathematicians and Physical Sciences
 - Simons Collaborations in Mathematics and Physical Sciences
 - Targeted Grants in the Modeling of Living Systems

Some Changes

- About 2 years ago the Simons Foundation decided to make an in-house research group to tackle data intensive science problems
 - The Simons Center for Data Analysis (SCDA)
 - Target size 30-40 scientists
 - Infrastructure Groups for Computing, Software and Algorithms
 - Initial Science Groups were Systems Biology, Genomics, and Neuro-Science
 - Science problems could be anything
 - Not a grant awarding division of the Simons Foundation
 - Scientific Collaborations

Common Problems

- The genomic research community has seen an explosion in data volume
 - A factor of 10 in the last 2 years
 - Machines that can affordably sequence the entire genome are now in production
 - An individual used to be 10GB and is now 200GB
 - Projects involving 1000 families (4000 people are now possible)
 - The Autism research initiative will write ~2PB into FNAL and BNL active archival storage over the next 12 months

Data Management

- When data volumes increase by an order of magnitude it is easy to go from manageable to unmanageable
 - Problems like data management and improved data access through distributed data federation
 - Communities would be interested in adopting and evolving technology

Common Techniques

- Systems biology is a field that has adopted machine learning analysis techniques
 - Deriving relationships and correlations from independent samples
 - Looking for how genes enhance and suppress conditions
 - How regulatory networks work
 - Unsupervised training techniques

Gear

- Since in the center for Data Analysis we have to support a variety of applications we have a lot of breadth in the technology
 - A small Tier-2 worth of processing ~1k cores
 - (8GB/core)
 - ~1PB of storage all hardware connected at 10Gb/s
 - 1 system with 1.5TB of RAM and 48 cores
 - 5 Tesla K40s
 - 1 Intel Phi

Outlook

- There are support opportunities from private funding sources
 - Does require refining your approach a little
- There are also opportunities for collaboration
 - Solving common problems
 - Sharing expertise