Association Mapping: GWAS and Sequencing Data

Instructors: Timothy Thornton and Michael Wu

Summer Institute in Statistical Genetics (SISG)

July 2021

Introduction: Course Aims

This is a course on statistical methods and software for genetic association studies of complex traits. We aim to cover:

▶ Case-Control Association Testing

▶ Genetic Association Testing with Quantitative Traits

▶ Gene and Pathway Level Analysis

▶ Population Structure/Ancestry Inference

▶ Genetic Association Testing in Samples with Structure

▶ Interaction Analysis

▶ Collapsing Tests for Rare Variant Analysis

▶ Kernel Tests and Omnibus Tests for Rare Variants

▶ Power and Sample Size, Design Considerations, Emerging Issues

Introduction: Resources

Importantly, the class site is:
http://faculty.washington.edu/tathornt/SISG2021.html

Contains (or will contain);

- ▶ PDF copies of slides (in color)
- ▶ Datasets needed for exercises
- ▶ Exercises for you to try
- ▶ Our solutions to exercises (later!)
- ▶ Links to software packages

Introduction: About Mike

- ▶ Associate Member,
  FHCRC Public Health Sciences Division
- ▶ Affiliate Associate Professor,
  UW Boistatistics
- ▶ Research in:
  High dimensional data
  Kernel machine methods
  Variable selection and regularization
  Pathway and network based analysis
  Translational research
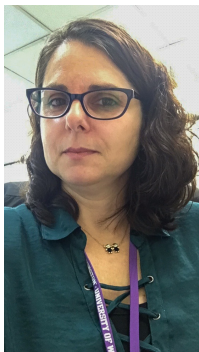 Statistical genomics/genetics

Introduction: About Tim

- ▶ Professor,
  UW Biostatistics
- ▶ Affiliate Investigator,
  Fred Hutchinson
  Cancer Research Center
- ▶ Research in:
  Genetic Association Studies
  Correlated Genetic Data
  Inferring Genetic Ancestry
  Relatedness Estimation
  Pharmacogenomics

Our department's finest – here to help you:

Andrea Horimoto	Amarise Little	Anya Mikhaylova

Slack Channel

Expect to 'see' them on Zoom chat, and our Slack channel:
https:
//uwbiostatisticssisg.slack.com/archives/C0239BJBG5P

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Introduction: Course Structure

- ▶ 10 sessions, 80 minutes each, over 2.5 days
- ▶ What to expect in a typical session;
    - ▶ 40 mins teaching/lecture
    - ▶ 25 mins hands-on exercises
    - ▶ 15 mins summary, discussion