

Summer School: Mathematics in Brain Imaging

Monday July 14, 2008

- 8:00–12:00 *Week 1*
- 8:00–8:50 *Check-In/Light Breakfast (Hosted by IPAM)*
- 8:50–9:00 [Welcome and Introduction](publications/mbi2008/intro.ppt)
- 9:00–12:00 *Surface-Based Computational Anatomy (Chair: Paul Thompson)*
- 9:00–9:45 **David van Essen** (Washington University in St.Louis - School of Medicine)
Surface-Based Computational Mapping of the Cerebral Cortex
- 9:45–10:00 *Break*
- 10:00–10:45 **Guido Gerig** (University of Utah)
Mapping Brain Changes Over Time during Development
- 10:45–11:00 *Break*
- 11:00–11:45 **Zhuowen Tu** (University of California, Los Angeles (UCLA))
Towards Automated Whole Brain Image Segmentation
- 12:00–2:00 *Lunch (on your own)*
- 2:00–2:45 **Bruce Fischl** (Harvard Medical School)
Automated Analysis of Cortical & Subcortical Anatomy in Brain MRI
- 2:45–3:00 *Break*
- 3:00–3:45 **Guillermo Sapiro** (University of Minnesota, Twin Cities)
Computing Sulcal Curves and the complexity of brain connectivity

Tuesday July 15, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Computational Anatomy of Shape (Chair: Michael Miller)*
- 9:00–9:45 **Michael Miller** (Johns Hopkins University)
Computational Functional Anatomy
- 9:45–10:00 *Break*
- 10:00–10:45 **Laurent Younes** (Johns Hopkins University)
Evolutions Equations in Computational Anatomy
- 10:45–11:00 *Break*

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- 11:00–11:45 **Anqi Qiu** (National University of Singapore)
Computational Functional Anatomy
- 12:00–2:00 *Lunch (on your own)*
- 2:00–2:45 **Sarang Joshi** (University of Utah)
Statistics of Shape: Simple Statistics on Interesting Spaces
- 2:45–3:00 *Break*
- 3:00–3:45 **Stephanie Allasonniere** (Johns Hopkins University)
Generative Models and Stochastic Algorithms for Population Average Estimation and Image Analysis.
- 4:00–5:30 *Reception (Location: IPAM Lobby)*

Wednesday July 16, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Mathematics of Diffusion Tensor Imaging (Chair: Christophe Lenglet)*
- 9:00–9:45 **Christophe Lenglet** (Siemens Corporate Research, Inc.)
Mathematical Concepts for DTI and High-Angular Resolution Diffusion Imaging
- 9:45–10:00 *Break*
- 10:00–10:45 **Carl-Fredrik Westin** (Harvard Medical School)
Trends in Diffusion MRI Tractography
- 10:45–11:00 *Break*
- 11:00–11:45 **Steve Smith** (University of Oxford)
Tract-Based Spatial Statistics
- 12:00–2:00 *Lunch (on your own)*
- 2:00–2:45 **Baba Vemuri** (University of Florida)
Mathematics of higher order SPD tensors and their estimation from DW-MRI
- 2:45–3:00 *Break*
- 3:00–3:45 **Lauren O'Donnell** (Harvard University)
Tract-Based Morphometry: White Matter Tract Clustering and Correspondence in Populations
- 3:45–4:00 *Break*
- 4:00–4:45 **Ganesh Sundaramoorthi** (University of California, Los Angeles (UCLA))
Tubular Surface Evolutions for Segmentation of Tubular Structures with Applications to Fiber Bundles From DW-MRI
- 5:00–7:00 *Speakers' Dinner (Wednesday Evening)*

Thursday July 17, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Mapping Anatomy in Population Studies (Chair: James Gee)*
- 9:00–9:45 **John Ashburner** (University College London)
Pre-processing for Voxel-Based Morphometry
- 9:45–10:00 *Break*
- 10:00–10:45 **Christos Davatzikos** (University of Pennsylvania)
Morphological appearance manifolds for computational anatomy
- 10:45–11:00 *Break*
- 11:00–11:45 **Steve Pieper** (Harvard Medical School)
Large-Scale Computing Frameworks for Developing Image Analysis Tools
- 12:00–2:00 *Lunch (on your own)*
- 2:00–2:45 **Tom Goldstein** (University of California, Los Angeles (UCLA))
Improving Image Reconstruction in MRI
- 3:00–4:00 **Monica Hurdal** (Florida State University)
Cortical Mapping using Conformal Geometry
- 4:00–5:30 *Student Presentations (10 minutes each; sign up on Monday)*

Friday July 18, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Statistics on Manifolds for Computational Anatomy and DTI (Chair: Christos Davatzikos)*
- 9:00–9:45 **James Gee** (University of Pennsylvania)
Geodesics in Deformation Morphometry and DTI
- 9:45–10:00 *Break*
- 10:00–10:45 **Xavier Pennec** (Institut National de Recherche en Informatique Automatique (INRIA))
Statistics Computing on Manifolds: from Riemannian Geometry to Computational Anatomy
- 10:45–11:00 *Break*
- 11:00–11:45 **Natasha Lepore** (University of California, Los Angeles (UCLA))
Generalized Tensor-Based Morphometry for the Analysis of Brain MRI and Diffusion Tensor Images
- 11:45–12:00 *Closing Remarks*

Saturday July 19, 2008

8:30–3:00 [CCB Demo Day at the Neuroscience Research Building Auditorium](http://cms.loni.ucla.edu/CCB_Demo_Day_2008.aspx) (Optional)

Monday July 21, 2008

8:00–12:00 *Week II*

8:00–8:50 *Check-In/Light Breakfast (Hosted by IPAM)*

8:50–9:00 *Welcome and Opening Remarks*

9:00–12:00 *Advances in first-level modeling (Chair: Tom Nichols)*

9:00–9:45 **Martin Lindquist** (Columbia University)
Modeling fMRI data with uncertain hemodynamic response or stimulus functions

9:45–10:00 *Break*

10:00–10:45 **Steve Smith** (University of Oxford)
Modeling temporal structure

10:45–11:00 *Break*

11:00–11:45 **Thomas Liu** (University of California, San Diego (UCSD))
fMRI Design Optimization

12:00–2:00 *Lunch (on your own)*

2:00–12:00 *Bayesian Methods in fMRI (Chair: Steve Smith)*

2:00–2:45 **DuBois Bowman** (Emory University School of Public Health)
A Bayesian hierarchical framework for spatial modeling of fMRI data

2:45–3:00 *Break*

3:00–3:45 **Timothy Johnson** (University of Michigan)
Modeling inter-subject variability in activation locations of fMRI data: A Bayesian hierarchical spatial modeling approach

3:45–4:00 *Break*

4:00–4:45 *Panel Session (Glover, Nichols, Poline, Poldrack, Smith, Strother, Worsley) "Remaining Challenges in Multi-Subject fMRI"*

Tuesday July 22, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Reproducibility in fMRI (Chair: Lars Kai Hansen)*
- 9:00–9:45 **Gary Glover** (Stanford University)
Considerations in Multi-site fMRI
- 9:45–10:00 *Break*
- 10:00–10:45 **J.B. Poline** (Commissariat à l'Énergie Atomique (CEA))
Reproducibility in group modeling
- 10:45–11:00 *Break*
- 11:00–11:45 **Stephen Strother** (University of Toronto)
Reproducibility across analysis methods
- 12:00–2:00 *Lunch (on your own)*
- 2:00–12:00 *Random Field Methods (Chair: J-B Poline)*
- 2:00–2:45 **Jonathan Taylor** (Stanford University)
Multiple comparisons and random field methods
- 2:45–3:00 *Break*
- 3:00–3:45 **Keith Worsley** (University of Chicago)
The statistical analysis of cortical surface data
- 3:45–4:00 *Break*
- 4:00–4:45 **Ruth Heller** (University of Pennsylvania)
Advances in FDR for fMRI

Wednesday July 23, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Improved modelling with Multivariate Methods (Chair: Keith Worsley)*
- 9:00–9:45 **Lars Kai Hansen** (Technical University of Denmark)
Decomposition methods for explorative neuroimaging
- 9:45–10:00 *Break*
- 10:00–10:45 **Vince Calhoun** (University of New Mexico)
Group ICA of fMRI
- 10:45–11:00 *Break*

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- 11:00–11:45 **Ola Friman** (MeVis Research GmbH, Center for Medical Image Computing)
Adaptive Multivariate Analysis
- 12:00–2:00 *Lunch (on your own)*
- 2:00–12:00 *Imaging Genomics (Chair: Tom Nichols)*
- 2:00–2:45 **Nelson Freimer** (University of California, Los Angeles (UCLA))
What makes a genetic association significant?
- 2:45–3:00 *Break*
- 3:00–3:45 **Vince Calhoun** (University of New Mexico)
Combining fMRI, ERP and SNP data with parallel ICA: Introduction and examples

Thursday July 24, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Connectivity models (Chair: Russ Poldrack)*
- 9:00–9:45 **Clark Glymour** (Carnegie-Mellon University)
Graphical Causal Models and Inferences to Mechanisms from Brain Imaging: Possibilities and Limitations
- 9:45–10:00 *Break*
- 10:00–10:45 **Marta Garrido** (University of California, Los Angeles (UCLA))
Dynamic causal modeling
- 10:45–11:00 *Break*
- 11:00–11:45 **Judea Pearl** (University of California, Los Angeles (UCLA))
The Mathematics of Cause and Effect
- 12:00–2:00 *Lunch (on your own)*
- 2:00–12:00 *Meta-analysis (Chair: Jeanette Mumford)*
- 2:00–2:45 **Tor Wager** (Columbia University)
Meta-analysis of neuroimaging data
- 2:45–3:00 *Break*
- 3:00–3:45 **Lars Kai Hansen** (Technical University of Denmark)
Knowledge discovery in neuroimaging databases
- 3:45–4:00 *Break*
- 4:00–4:45 **Angela Laird** (University of Texas Health Science Center at San Antonio)
Coordinate-Based Meta-Analysis using Activation Likelihood Estimation (ALE)

Friday July 25, 2008

- 8:00–9:00 *Continental Breakfast*
- 9:00–12:00 *Machine learning methods (Chair: Walt Schneider)*
- 9:00–9:45 **Francisco Pereira** (Princeton University)
Introduction to Machine Learning for fMRI Data
- 9:45–10:00 *Break*
- 10:00–10:45 **Stephen LaConte** (Baylor College of Medicine)
Classification of fMRI-based cognitive states
- 10:45–11:00 *Break*
- 11:00–11:45 **Isabelle Guyon** (Clopinet)
Feature selection methods
- 12:00–2:00 *Lunch (on your own)*
- 2:00–12:00 *Advanced topics in machine learning (Chair: Francisco Pereira)*
- 2:00–2:45 **Nikolaus Kriegeskorte** (National Institute of Mental Health)
Pattern-information fMRI and representational similarity analysis
- 2:45–3:00 *Break*
- 3:00–3:45 **Ken Norman** (Princeton University)
Testing psychological theories with multivariate pattern analysis
- 3:45–4:00 *Break*
- 4:00–4:45 **Janaina Mourao-Miranda** (King's College London)
Analysis of fMRI data using Machine Learning Methods

