

Getting Started With Neuroimaging Analysis

Friday, July 26, 2024 | 8 a.m. – noon
Marriott (Grand Ballroom D) — Philadelphia, USA
All times are in Eastern Standard Time
In-person attendance only

Overview

The Getting Started with Neuroimaging Analysis Workshop is a ½-day immersive organized by the ISTAART Neuroimaging PIA. This workshop provides hands-on training on the basics of neuroimaging, targeting trainees and early-career researchers who are interested in neuroimaging research but have not had much opportunity for formal training working with neuroimaging data.

The workshop is coupled with five 'Basics of Neuroimaging' webinars, also organized by the ISTAART Neuroimaging PIA, which cover background information and fundamental neuroimaging concepts and are requisite materials for workshop attendees to view prior to attending. The workshop covers basic concepts in neuroimaging data formats, coordinate systems, data visualization and image processing software. There are lessons in structural, functional, and diffusion magnetic resonance imaging (MRI) and positron emission tomography (PET). The format consists of a general introduction, followed by brief (~5 min) introductions to each of five tutorial lessons offered. Trainees then have three one-hour self-paced working sessions: during the first session all attendees complete tutorials on data visualization and structural MRI, during the last two working sessions, attendees work on the remaining lessons of their choice.

All guided tutorials are hosted on a standardized training environment (cloud-based virtual machine) with neuroimaging data and software preloaded. Neuroimaging experts that organize and present the content and tutorials circulate around the room to facilitate training and to answer questions as they arise. Upon completion of the session, a survey is provided to gain feedback about the workshop and ways we can improve in future offerings.

This will be the third year this workshop series is offered.

Organizing Committee

- Tobey Betthausen, University of Wisconsin-Madison
- David Cash, UCL Queen Square Institute of Neurology
- Tavia Evans, Erasmus University Medical Center
- Ludovica Griffanti, University of Oxford

- Luigi Lorenzini, Amsterdam UMC
- Alexa Pichet Binette, Lund University

Presenters

- Tobey Betthausen, University of Wisconsin-Madison
- David Cash, UCL Queen Square Institute of Neurology
- Tavia Evans, Erasmus University Medical Center
- Luigi Lorenzini, Amsterdam UMC
- Alexa Pichet Binette, Lund University

Target Audience

This ISTAART Immersive workshop is targeted to attendees who are involved in research and is pitched at a beginner level. This hands-on workshop can serve as a beginner or refresher course for established investigators, clinicians, and trainees involved in using imaging techniques to study Alzheimer's disease, related disorders and normal aging. Participants from any career stage are encouraged to join, including undergraduate students, graduate students, post-doctoral researchers and assistant professors engaged in clinical practice, research or teaching.

Learning Objectives

1. Evaluate the different elements of imaging data structure and their respective functions
2. Employ standard processing methods on various MRI and PET data
3. Review results from neuroimaging processing steps and pipelines to ensure data quality and to interpret results in a research context.

Registration

Educational workshops are offered for in-person attendance only. Workshops require a separate registration fee in addition to AAIC full conference registration, or they may be purchased as stand-alone events.

Requirements

Registrants must bring their own laptops to do the exercises (tablets or smartphones will not be sufficient). They will be provided with this repository and links to the “Basics of Neuroimaging” series webinars from April 2023. The links to the webinars and the slides are below.

Webinar Title	Slides
Data Structure and Formats	Slides
The Basics of Neuroimaging: Structural Magnetic Resonance Imaging (MRI)	Slides
Positron emission tomography (PET)	Slides
Diffusion-Weighted Imaging (DWI)	Slides
Functional Magnetic Resonance Imaging (fMRI)	Slides

Agenda

The workshop will consist of hands-on interactive sessions. The first session will focus on understanding the basic structure of imaging data, how to traverse images, data extraction, and how voxels relate to world coordinates. We will then go through the basic processing steps involving structural MRI data, demonstrating simple workflows including tissue segmentation, and registration.

The second half will consist of two independent working sessions, where facilitators will present interactive tutorials around different forms of neuroimaging analysis (structural MRI, fMRI, DTI or PET data), and the participants will then work on the tutorials of their choice, with assistance from the facilitators. The objective of the workshop is to ensure participants gain an understanding of how to start processing and analyzing various imaging modalities used in dementia research.

Time	Session Details	Speakers and Moderator
7:00 a.m. - 8:00 a.m.	Light Breakfast	
8:00 a.m. - 8:30 a.m.	Opening Remarks	David Cash and Tobey Betthauser

8:10 a.m. - 8:40 a.m.	Image data: Basic Structure and Function	Tobey Betthauser
8:40 a.m. - 9:10 a.m.	Structural MRI	David Cash
9:10 a.m. - 9:20 a.m.	Break	
9:20 a.m. - 9:50 a.m.	Introduction to Advanced Image Analysis Sections (PET, dMRI, fMRI)	Tobey Betthauser, Alexa Pichet Binette, Luigi Lorenzini
9:50 a.m. - 10:40 a.m.	Independent working session 1: dMRI, fMRI, or PET	Facilitated by organizers
10:40 a.m. - 10:50 a.m.	Break	
10:50 a.m. - 11:40 a.m.	Independent working session 2: dMRI, fMRI, or PET	Facilitated by organizers
11:40 a.m. - noon	Wrapup, Q&A, Feedback survey	David Cash and Tobey Betthauser
Noon - 1:00 p.m.	Lunch	

Acknowledgements

These lessons are developed as part of the [Health and Biosciences IDEAS](#) project, which is a training initiative funded by [UKRI Innovation Scholars](#) (MR/V03863X/1)

Thanks to the generous support of the Alzheimer's Association, the [International Society to Advance Alzheimer's Research and Treatment \(ISTAART\)](#) and the ISTAART Neuroimaging Professional Interest Area in terms of travel funding for the organizers.

The data for this course comes from the [Open Access Series of Imaging Studies](#) (OASIS) dataset. Many thanks to Pamela LaMontaigne and the OASIS team at Washington University for their support with the data.

Special thanks to Christian Haselgrove (NITRC-CE), Courtney Waugh (Amazon), and Mark Watts (UCL) for their support in creating the infrastructure for this project.