



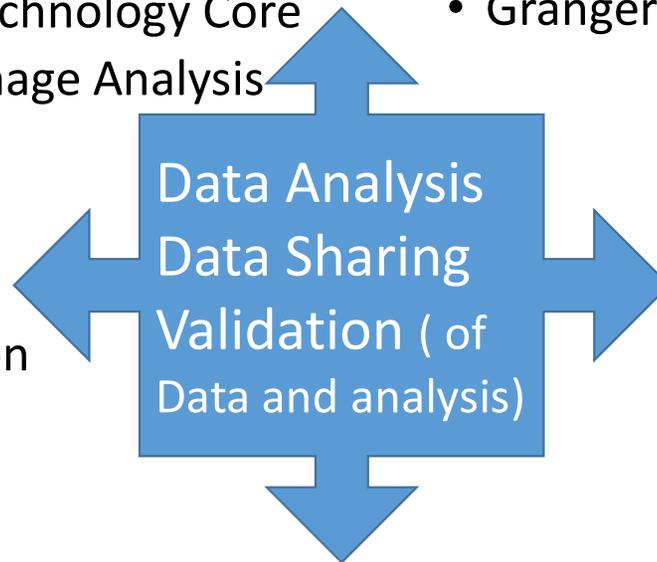
U19 SENSATION Data Science Core (Maunsell PI)

Data Science & Technology

- Wolfgang Losert
 - Technology Core
 - Image Analysis
- Behtash Babadi
 - Granger Causality

Experiment

- Postdocs and Students from each experimental lab



Theory

- Stefano Panzeri
 - Intersection Information
- Dante Chialvo
 - Criticality

Systems Software Engineering

- Madeline Diep, Fraunhofer CESE

Shared Software and Data Analysis Platform

Fraunhofer CESE leads development

BRAIN Platform GUI: *Manage, Share & Validate Workflow*

Create Workflow

Available Modules

Name	Type	
Automatic Cell Registration	Cell Selection	Add
Compute DFF	Signal Detection	Add
Single-step DFT Image Registration	Motion Correction	Add
Manual Cell Selection	Cell Selection	Add
Motion Correction	Motion Correction	Add
Read NWB	File Acquisition	Add
Read Prairie	File Acquisition	Add
Read Thor Image	File Acquisition	Add

Workflow Nodes

Save & Continue Save Workflow

Workflow Name

Give a short, descriptive name to the workflow

► Read Prairie File Acquisition

▼ Motion Correction Motion Correction

Configuration Description

dffResolution Number **Required**

10

Upsampling factor during dff correction (0-100). Higher value uses more memory.

NumberOfImagesToProcess Number

Specify the number of images to process if not the whole file.

Remove

Run a Workflow

Workflows

DFF Analysis

Run Workflow

Experiment Name

DFF_Analysis_2020-02-21_114320

Give a short, descriptive name to the experiment

The Workflow

Result Directory

MyLabResults

Choose where to store the experiment results. You can manage these options in settings

▼ Read Prairie File Acquisition

Parameters Description

TiffDirectory Directory **Required**

Select

Workflow Library

New Workflow

Name	Date Modified	Date Created	Actions
Complete Working	2020-01-14 04:43 PM	2020-01-14 02:02 PM	Run Edit Delete
Default Workflow	2020-01-01 12:34 PM	2020-01-01 12:34 PM	Run Edit Delete
Full Workflow	2020-01-23 03:05 PM	2020-01-14 09:42 AM	Run Edit Delete
uuid fail	2020-01-15 11:55 AM	2020-01-15 11:55 AM	Run Edit Delete

New Workflow

► Compute DFF Signal Detection

Key Features

Streamlines the process of collaborating and sharing data, algorithms and analysis pipelines

Adaptive workflow management: Integrates multiple open source and custom built calcium imaging tools in multiple languages

Future vision: share workflow configuration with ease

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The screenshot displays the Brain Platform interface. At the top, there is a navigation bar with options: Brain Platform, New Workflow, Explore Workflows, Run Workflows, Executions, and Settings. The main content area is divided into two sections. On the left, under the 'Executions' tab, there is an 'Execution History' section with the subtitle 'Monitor experiment executions and view results'. Below this is an 'Active Executions' table with columns for Name, Workflow, and Ex. The table lists two active executions, both using the 'Default Workflow'. Below the active executions is another 'Execution History' section with a table listing past executions, including their names, workflows, and dates. On the right, there is a detailed view of an 'Experiment Result' for 'DFF_Analysis_2020-01-30_14:54:24'. This view includes the execution ID, start time, duration (2 minutes 35 seconds), and the HDF5 file path. Below the metadata, there is a list of workflow steps: 'Read Prairie File Acquisition' (17 seconds, completed), 'Motion Correction Motion Correction' (1 minute 14 seconds, completed), 'Automatic Cell Registration Cell Selection' (2 seconds, completed), and 'Compute DFF Signal Detection' (46 seconds, completed). At the bottom of the detailed view, there is a 'Parameters' tab and a 'Figures' tab. The 'Figures' tab shows a line graph with multiple colored lines representing signal detection over time, with the x-axis ranging from 0 to 300 and the y-axis from -100 to 350.

Ability to “queue” up execution

Track execution progress in real time and maintain history of executions: including workflow configuration used

Shows execution result in detail

Easily shares results with team members

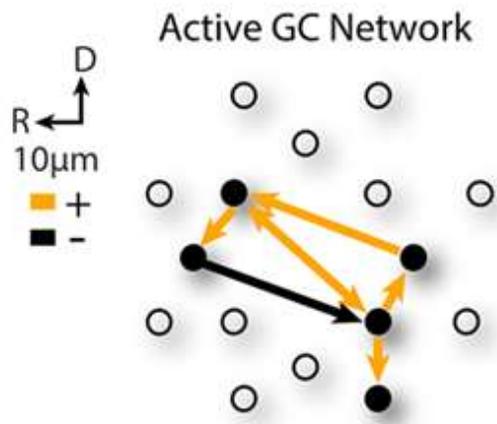
Leverages HDF5 to store intermediate and final results

Automatically save and organize Matlab figures

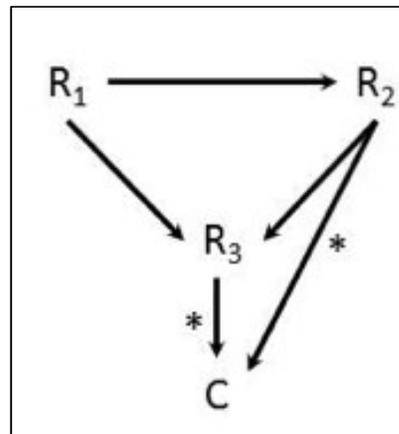
Aim 3: Theory Guided Experiment Design

- Integrate multiple approaches to analysis of experimental data

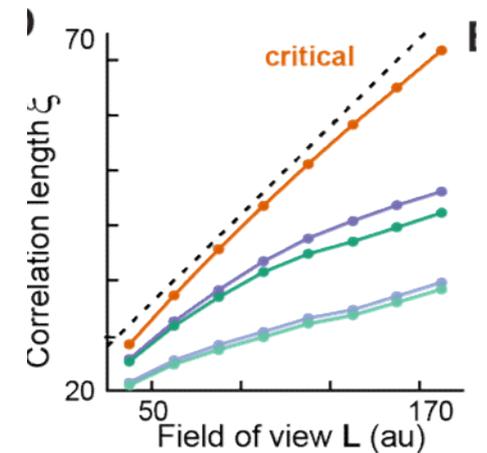
Babadi: Granger Causality (GC)



Panzeri: Intersection Information (II)



Chialvo: Criticality



Ongoing:

- Integrating GC and II Analyses.
- Computational Speedup, Real Time Analysis of Imaging Data



Core Activities

Data Science Hackathons:

Students/Postdocs working on Ca data shared their analysis workflow with each other and systems software engineers and theory groups

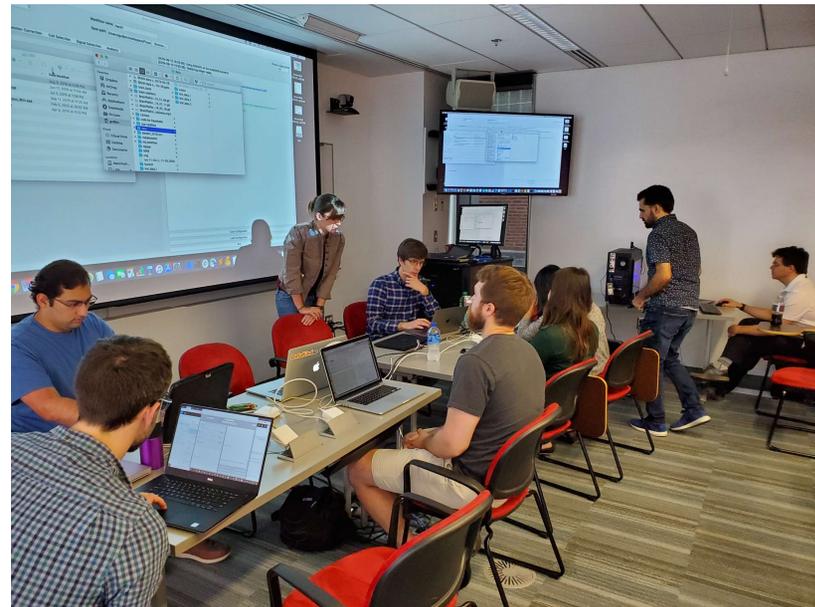
Data Sharing:

AWS

NwB Hackathon Participation



May 2019



Oct 2019