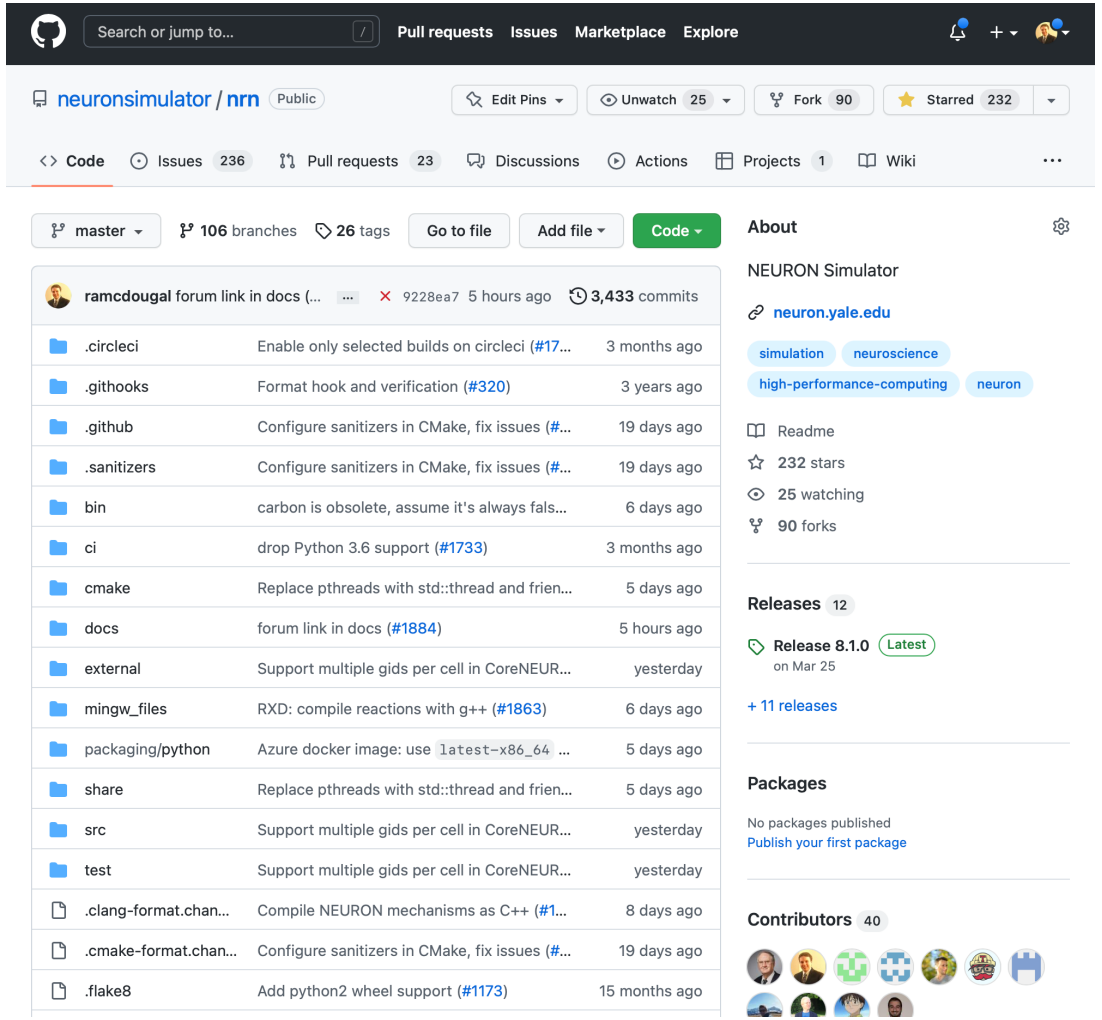
Other resources

git + GitHub

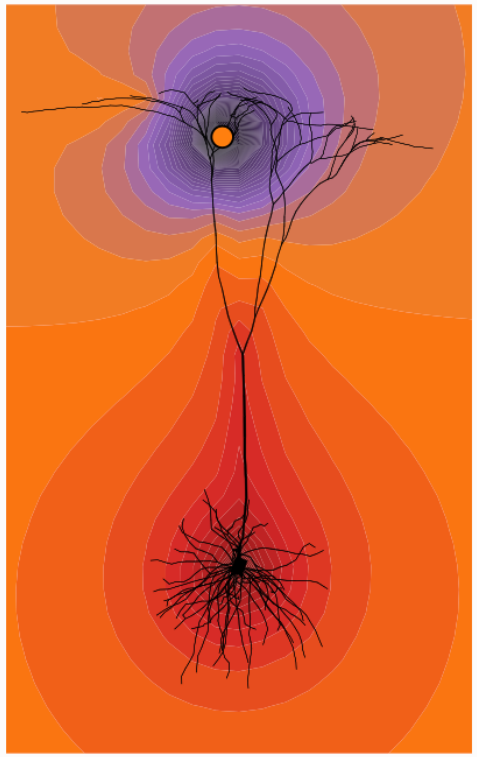
- Setup
  - git init
- Stage new/modified files for next commit:
  - git add FILENAME
- See what has changed
  - git diff
- Commit a version (so you can return to it later); you will be prompted to enter a commit message:
  - git commit
- Push to an external repository:
  - git push
- Checkout a version of a file from 2 commits ago:
  - git checkout HEAD~2 FILENAME



NSG facilitates access and use of High Performance Computing, High Throughput Computing, and academic cloud computing resources by neuroscientists for applications that include computational modeling, data processing, and development and dissemination of neuroscience software. Software currently available via NSG includes NEURON, NetPyNE, BMTK, NEST, BRIAN 2, BluePyOpt, MATLAB, EEGLAB, FREESURFER, PyTorch, TensorFlow, DEAP; this list is updated based on user needs.

Description from https://www.nsgportal.org.

http://www.nsgportal.org



LFPy

Welcome to LFPy's documentation!

(Looking for the old LFPy v1.* documentation? Follow link)

Contents

lfpy.readthedocs.io

frontiers in Neuroinformatics

TECHNOLOGY REPORT
published: 07 June 2016
doi: 10.3389/fninf.2016.00017

CrossMark

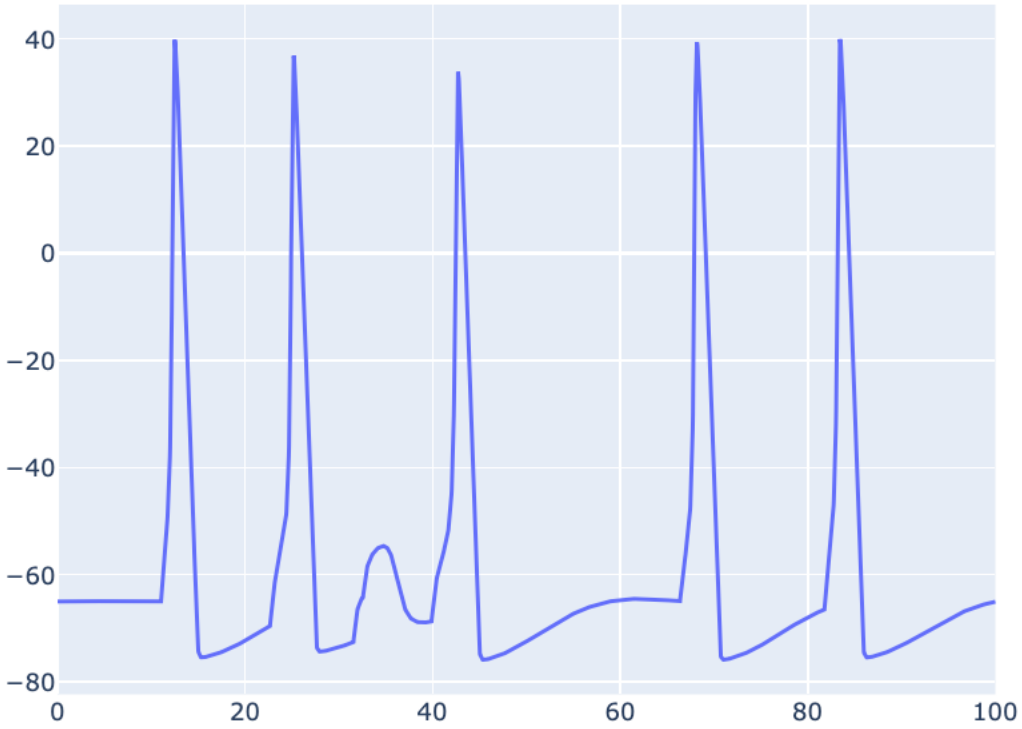
BluePyOpt: Leveraging Open Source Software and Cloud Infrastructure to Optimise Model Parameters in Neuroscience

Werner Van Geit[1], Michael Gevaert[1], Giuseppe Chindemi[1], Christian Rössert[1], Jean-Denis Courcol[1], Eilif B. Muller[1], Felix Schürmann[1], Idan Segev[2,3] and Henry Markram[1,4]**

[1] Blue Brain Project, École Polytechnique Fédérale de Lausanne, Geneva, Switzerland, [2] Department of Neurobiology, Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel, [3] The Edmond and Lily Safra Centre for Brain Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel, [4] Laboratory of Neural Microcircuitry, Brain Mind Institute, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

At many scales in neuroscience, appropriate mathematical models take the form of complex dynamical systems. Parameterizing such models to conform to the multitude of available experimental constraints is a global non-linear optimisation problem with a

pip install bluepyopt



eFEL:

Electrophys Feature Extraction Library

```
import efel

trace = {"T": t, "V": v,
         "stim_start": [5 * ms],
         "stim_end": [100 * ms]}
traces = [trace]

features = efel.getFeatureValues(
  traces,
  ["AP_amplitude", "ISIs",
   "spike_half_width", "AP_begin_time"])
```

features:

```
[{'AP_amplitude': array([103.29412261, 105.09884958, 105.28924314, 103.58659989,
         105.59554847]),
'AP_begin_time': array([11.1, 22.7, 31.6, 66.4, 81.8]),
'ISIs': array([12.7, 17.5, 25.5, 15.2]),
'spike_half_width': array([1.52675742, 1.41003978, 1.40225347, 1.48675265,
         1.64899456])}]
```

Elephant

Navigation

Installation
Tutorials
Function Reference by Module
Contributing to Elephant
Release Notes
Acknowledgments
Authors and contributors
Citing Elephant

Quick search

Go

Elephant - Electrophysiology Analysis Toolkit

Elephant (Electrophysiology Analysis Toolkit) is an emerging open-source, community centered library for the analysis of electrophysiological data in the Python programming language.

The focus of Elephant is on generic analysis functions for spike train data and time series recordings from electrodes, such as the local field potentials (LFP) or intracellular voltages. In addition to providing a common platform for analysis codes from different laboratories, the Elephant project aims to provide a consistent and homogeneous analysis framework that is built on a modular foundation. Elephant is the direct successor to Neurotools and maintains ties to complementary projects such as ephyviewer and neurotic for raw data visualization.

The input-output data format is either Neo, Quantity or Numpy array. Quantity is a Numpy-wrapper package for handling physical quantities like seconds, milliseconds, Hz, volts, etc. Quantity is used in both Neo and Elephant.

Visualization of Elephant analysis objects

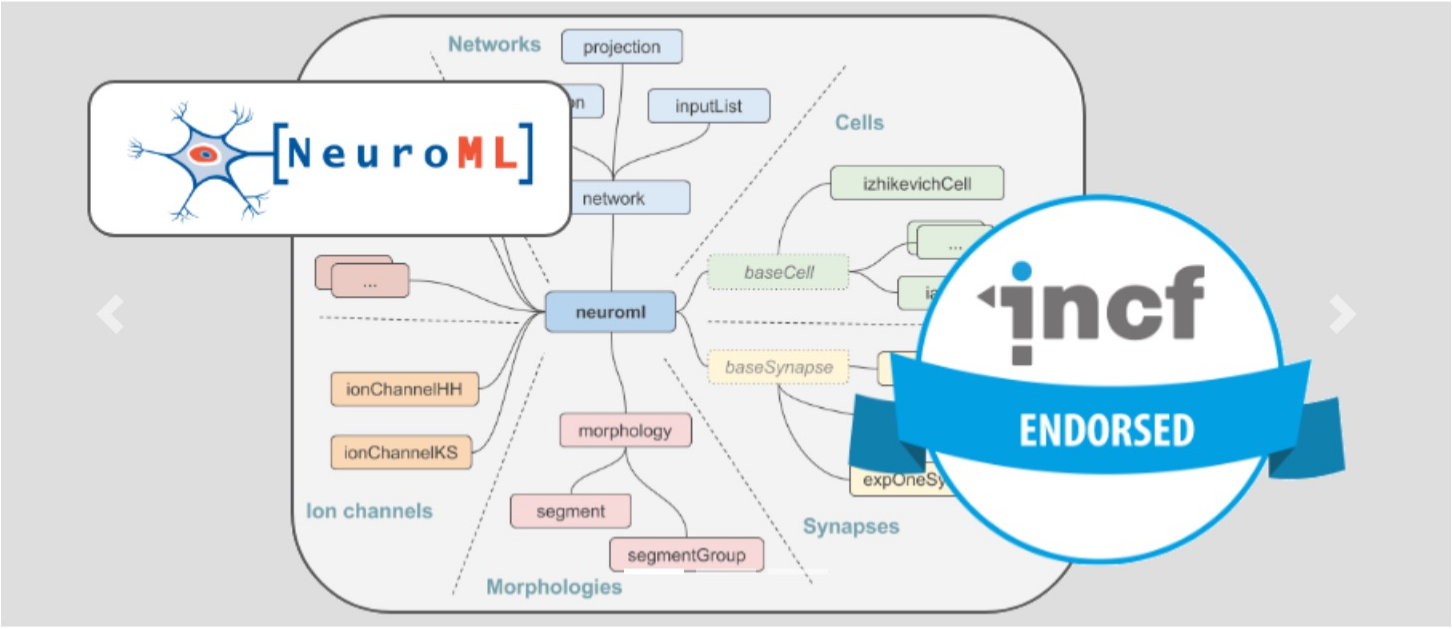
Viziphant package is developed by Elephant team and provides a high-level API to easily generate plots and interactive visualizations of neuroscientific data and analysis results. The API uses and extends the same structure as in Elephant to ensure intuitive usage for scientists that are used to Elephant.

Table of Contents

elephant.readthedocs.io

NeuroML

A model description language for computational neuroscience.



NeuroML is an international, collaborative initiative to develop a language for describing detailed models of neural systems, which will serve as a standard data format for defining and exchanging descriptions of neuronal cell and network models. NeuroML is:

To convert a NeuroML model to NEURON, use e.g.

```
pynml model.nml -neuron
```

docs.neuroml.org

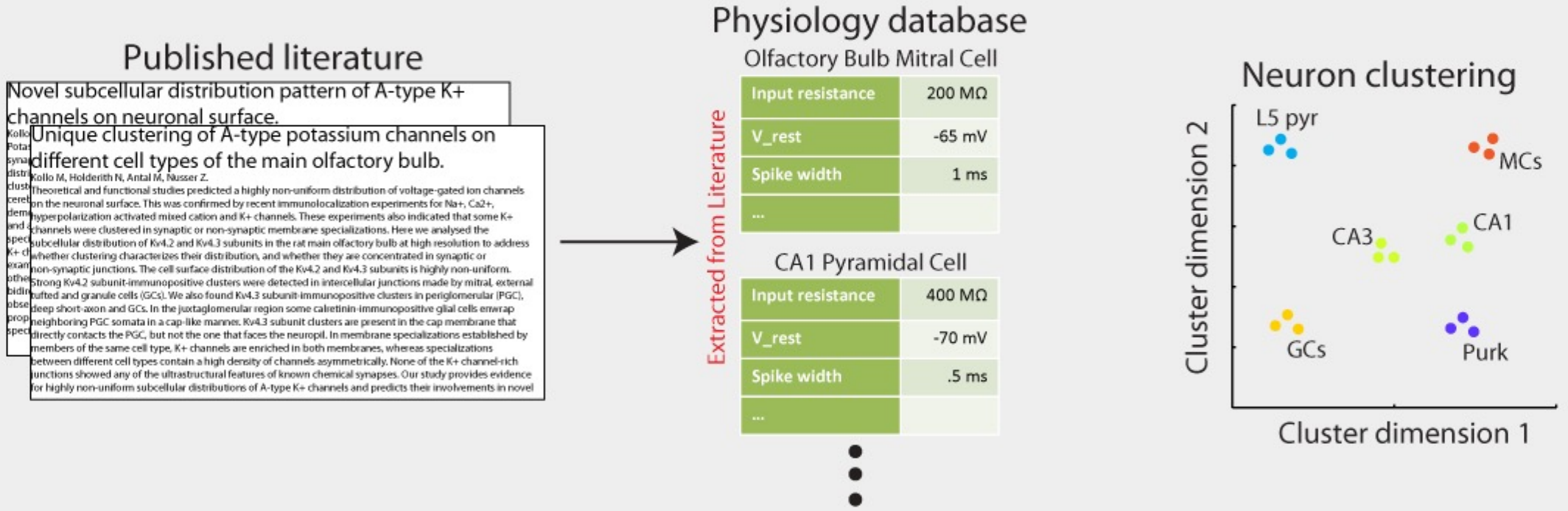
NeuroElectro

NeuroElectro Publications

About | Neuron Types | Electrophysiology Properties | Articles | FAQs | Data/API | Get Involved

NeuroElectro: *organizing information on cellular neurophysiology.*

The goal of the NeuroElectro Project is to extract information about the electrophysiological properties (e.g. resting membrane potentials and membrane time constants) of diverse neuron types from the existing literature and place it into a centralized database.



Our goal is to facilitate the discovery of neuron-to-neuron relationships and better understand the role of functional diversity across neuron types.

http://www.neuroelectro.org

Pandas:

File storage, data frames, and databases

- Saving as CSV with pandas:

```
import pandas as pd
pd.DataFrame({
  "t": t, "v": v}
).to_csv("data.csv", index=False)
```

- Loading from CSV with pandas:

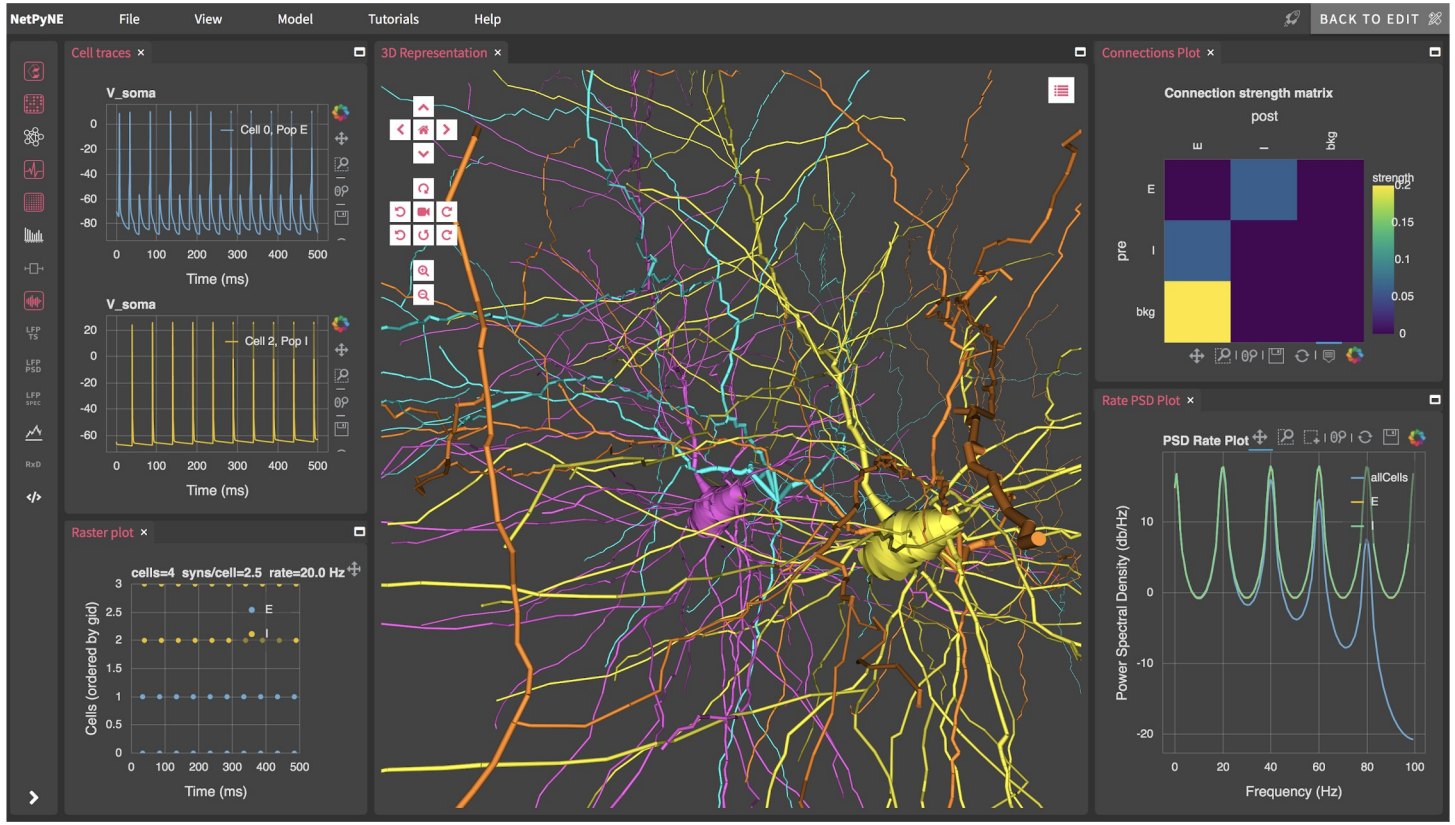
```
import pandas as pd
data = pd.read_csv("data.csv")
t = h.Vector(data["t"])
v = h.Vector(data["v"])
```

- Saving data to a database:

```
import pandas as pd
import sqlite3
import time

# do all the following inside a loop

start = time.perf_counter()
# do the simulation here

data = pd.DataFrame(
  {
    "dx": [dx],
    "L": L,
    "diam": diam,
    "alpha": alpha,
    "temperature": h.celsius,
    "spike_half_width": spike_half_width,
    "calculated_value": calculated_value,
    "runtime": time.perf_counter() - start,
  }
)
with sqlite3.connect(DB_FILENAME) as conn:
  data.to_sql("data", conn,
              if_exists="append", index=False)
```

NetPyNE

A python package to facilitate the development, parallel simulation, optimization and analysis of biological neuronal networks using the NEURON simulator.



Funded by:

National Institutes of Health