In-Vivo-Imaging-Pipeline

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CHAPTER

ONE

MANAGEMENT

1.1 ConfigHandling module

ConfigHandling.**config_generator**(*Config: Optional[dict] = None*) → None

Generates a configuration file

Parameters
Config (*dict*) – Configuration to write to file (Optional)

Return type
None

ConfigHandling.**config_reader**(*File: Optional[str]*) → dict

Reads config into a dictionary

Parameters
File (*str*) – Configuration File (Optional)

Returns
Configuration

Return type
dict

1.2 Organization module

class Organization.**BehavioralExperiment**(*Meta: Tuple[str, str]*, *ExperimentName: str*)

Bases: *Experiment*

Experiment class for a generic day of a behavioral task

Required Inputs

Meta : Passed meta from experimental hierarchy (directory, mouse_id)
ExperimentName : Title of ExperimentName

Properties

mouse_id : Identifies which mouse this data belongs to
instance_data : Identifies when this behavioral ExperimentName was created

Attributes

data : Pandas dataframe of synced data
folder_dictionary : A dictionary of relevant folders for this behavioral ExperimentName
modifications : List of modifications made to this behavioral ExperimentName
multi_index: Pandas multi-index of behavioral components
state_index : look-up table / index relating states to integers
trial_parameters : behavioral parameters

Methods

copy_raw_behavioral_data : Interactive tool for copying raw behavioral data
load_data : Loads all data
record_mod : Records a modification made to the behavioral ExperimentName (Date & Time)
update_folder_dictionary : This function re-indexes all folders in the folder dictionary

`copy_raw_behavioral_data()` → Self

Interactive tool for copying raw behavioral data

Return type
Any

`load_data()` → Self

Loads behavioral data

Return type
Any

`class Organization.Data(`*Path: str*`)`

Bases: `object`

This is a class for managing a folder of unorganized data files

Required Inputs

Path : path to folder

Self Methods

find_matching_files : Finds all matching files
reindex : Function that indexed the files within folder again
find_all_ext : Finds all files with specific extension

Properties

instance_data : Data created
path : path to folder
files : List of files in folder

`property files: List[str]`

find_all_ext(*Ext: str*) → Optional[List[str]]

Finds all files with specific extension

Parameters
Ext (*str*) – Filename extension

Returns
List of files

Return type
List[str]

find_matching_files(*Filename: str*, *Folder: Optional[str] = None*) → Optional[Tuple[str]]

Finds all matching files

Parameters

- **Filename** (*str*) – Filename or ID to search for
- **Folder** (*Any*) – Specify folder filename in

Returns
Matching file/s

Return type
Any

property folders: dict

Dictionary of folders in path

Return type
dict

property instance_date: str

Date Created

Return type
str

property path: str

Path to folder

Return type
str

reindex() → Self

Function that indexes the files within folder again

class Organization.**Experiment**(*Meta: Tuple[str, str]*, *ExperimentName: str*)

Bases: object

Experiment class for a generic experiment

Required Inputs

Meta : Passed meta from mouse (directory, mouse_id)
ExperimentName : Title of experiment

Properties

instance_data : Identifies when this behavioral experiment was created

mouse_id : Identifies which mouse this data belongs to

Attributes

data : a pandas dataframe containing synchronized data
folder_dictionary : A dictionary of relevant folders for this experiment
modifications : List of modifications made to this experiment

Public Methods

copy_data : Interactive tool to copy data to directory (Intended to be overwritten during inheritance)
load_data : Loads all data (Intended to be overwritten during inheritance)
record_mod : Records a modification made to the experiment (Date & Time)
update_folder_dictionary : This function re-indexes all folders in the folder dictionary

copy_data() → Self

Interactive tool to copy data to directory

Return type
Any

property experiment_id: str

property instance_date: str

Date created

Return type
str

property mouse_id: str

ID of mouse

Return type
str

record_mod() → Self

Records a modification made to the behavioral ExperimentName (Date & Time)

Return type
Any

update_folder_dictionary() → Self

This function re-indexes all folders in the folder dictionary

Return type
Any

class Organization.**Figures**(*Path: str*)

Bases: *Data*

Data Folder specifically for storing figures.

view_figure(*Name: str*) → plt.Figure

Function identifies and views a figure based on supplied name

Parameters
Name (*str*) – Name of figure (can be partial)

Returns
the plotted figure

Return type
Any

class Organization.**Images**(*Path: str*)

Bases: *Data*

Data Folder specifically for folders containing raw images.

property channels

property file_format

property frames

property height

property imaging_files

property meta_files

property num_imaging_files

property num_meta_files

property planes

reorganize_bruker_files() → None

This function extracts out the meta files and saves in a new directory

Return type
None

property width

class Organization.**ImagingAnalysis**(*Path: str*)

Bases: *Data*

Data Folder specifically for imaging analysis folders.

Self Methods

load_fissa_exports : loads fissa exported files
load_cascade_exports : loads cascade exported files
load_suite2p : loads suite2p exported files
export_registration_to_denoised : moves registration to new folder for namespace compatibility when skipping denoising step
clean_up_motion_correction : This function removes the reg_tif folder and registered.bin generated during motion correction.
clean_up_compilation : This function removes the compiled tif files
add_notes : Function adds notes

add_notes(*Step: str*, *KeyOrDict: Union[str, dict]*, *Notes: Optional[Any] = None*) → Self

Function adds notes indicating steps

Parameters

- **Step** – Step of Analysis

- **Step** – str
- **KeyOrDict** (*Union[str, dict]*) – Either a Key or a dictionary containing multiple key-value (note) pairs
- **Notes** (*Optional[Any]*) – If using key, then notes is the paired value

Return type
Any

clean_up_compilation() → Self

This function removes the compiled tif files generated inside CompiledImagingData (You can avoid the creation of these in the first place by changing suite2p parameters)

Return type
Any

clean_up_motion_correction() → Self

This function removes the reg_tif folder and registered.bin generated during motion correction.
(You can avoid the creation of these in the first place by changing suite2p parameters)

Return type
Any

property current_ExperimentName: str

ExperimentName of Analysis

Return type
str

default_folders()

export_registration_to_denoised()

moves registration to new folder for namespace compatibility

Returns

load_cascade_exports() → Tuple[ndarray, ndarray, ndarray, dict]

This function loads the Spike Times, Spike Prob, Discrete Approximation and ProcessedInferences files exported from Cascade

Returns
SpikeTimes, SpikeProb, DiscreteApproximation, Processed Inferences

Return type
tuple[Any, Any, Any, dict]

load_fissa_exports() → Tuple[dict, dict, dict]

This function loads the prepared and separated files exported from Fissa

Returns
Prepared, Separated, ProcessedTraces

Return type
tuple[dict, dict, dict]

load_suite2p(**args: str*)

class Organization.**ImagingBehaviorExperiment**(*Meta: Tuple[str, str]*, *ExperimentName: str*)

Bases: *ImagingExperiment*, *BehavioralExperiment*

Experiment class for a generic day of an Imaging / Behavioral experiment

Required Inputs

Meta : Passed meta from experimental hierarchy (directory, mouse_id)
ExperimentName : Title of ExperimentName

Properties

mouse_id : Identifies which mouse this data belongs to
instance_data : Identifies when this behavioral ExperimentName was created

Attributes

data : Pandas dataframe of synced data
folder_dictionary : A dictionary of relevant folders for this behavioral ExperimentName
modifications : List of modifications made to this behavioral ExperimentName
meta : bruker metadata
multi_index: Pandas multi-index of behavioral components
state_index : look-up table / index relating states to integers
trial_parameters : behavioral parameters

Methods

copy_raw_imaging_data : Interactive tool for copying raw imaging data
copy_raw_behavioral_data : Interactive tool for copying raw behavioral data
load_data : Loads all data
record_mod : Records a modification made to the experiment (Date & Time)
update_folder_dictionary : This function re-indexes all folders in the folder dictionary

copy_data() → Self

Interactive tool to copy data to directory

Return type
Any

load_data(*ImagingParameters: Optional[Union[dict, list[dict]]] = None*, **args: Optional[Tuple[str, str]]*, ***kwargs*) → Self

Loads all data

Parameters
ImagingParameters – Parameters for some imaging dataset or list of datasets

(e.g., for two different sampling rates) :type ImagingParameters: Optional[dict] :param args: Optionally pass Sync Key to synchronize bruker recordings :type args: Tuple[str, str] :param kwargs: passed to internal functions taking kwargs :rtype: Any

class Organization.**ImagingExperiment**(*Meta: Tuple[str, str]*, *ExperimentName: str*)

Bases: *Experiment*

Experiment class for a generic imaging experiment

Required Inputs

Meta : Passed meta from mouse (directory, mouse_id)
ExperimentName : Title of experiment

Properties

mouse_id : Identifies which mouse this data belongs to
instance_data : Identifies when this experiment was created

Attributes

data : a pandas dataframe containing synchronized data
folder_dictionary : A dictionary of relevant folders for this experiment
meta : bruker metadata
modifications : List of modifications made to this experiment

Public Methods

add_image_sampling_folder : Generates a folder for containing imaging data of a specific sampling rate
copy_raw_imaging_data : Interactive tool for copying raw imaging data
load_data : Loads all data
record_mod : Records a modification made to the experiment (Date & Time)
update_folder_dictionary : This function re-indexes all folders in the folder dictionary

`add_image_sampling_folder`(*SamplingRate: int*) → Self

Generates a folder for containing imaging data of a specific sampling rate

Parameters
`SamplingRate` (*int*) – Sampling Rate of Dataset in Hz

Return type
Any

`copy_data`() → Self

Interactive tool to copy data to directory

Return type
Any

`copy_raw_imaging_data`() → Self

This function copies raw imaging data to the appropriate folder

Return type
Any

`load_data`(*ImagingParameters: Optional[Union[dict, list[dict]]] = None*) → Self

Loads all data

Parameters
`ImagingParameters` (*Optional[dict]*) – Parameters for some imaging dataset or list of datasets (e.g., for two different sampling rates)

Return type
Any

class Organization.**Mouse**(***kwargs*)

Bases: object

Class for Organizing & Managing Experimental Data Across Sessions

Keyword Arguments

Logfile : Path to existing log file (str, default None)
Mouse : Mouse ID (str, default None)
Condition : Experimental Condition (str, default None)
Directory : Directory for hierarchy (str, default None)
Study : Study (str, default None)
StudyMouse : Study ID (str, default None)

Properties

mouse_id : ID of Mouse
log_file : Log Filename Path
experimental_condition : Experiment condition of the mouse
instance_data : Date when this experimental hierarchy was created

Attributes

directory : Experimental Hierarchy Directory
experiments : Names of included experiments
study : Study
study_mouse : ID of mouse in study
modifications : modifications made to this file

Public Class Methods

load : Function that loads the entire mouse

Public Methods

create : This function creates the directory/logs/organization.json if it doesn't exist
check_log : Checks Log Status
create_log_file : Creates log file
pass_meta : Passes directory/mouse id
record_mod : Record modification of experiment
record_experiments_mod : Record modification of experiments
save : Saves mouse to organization.json
start_log : Starts Log

Private Class Methods

_generate_analysis_subdirectory : Generate Analysis
_generate_analysis_technique_subdirectory : Generate Analysis Technique
_generate_behavior_subdirectory : Generate Behavioral Folder
_generate_directory_structure : Generates the Directory Structure (The structured folders where data stored)

_generate_experiment_folders : Generate Behavioral ExperimentName Folder
_generate_histology_directory : Generates Histology Folder
_generate_imaging_subdirectory : Generate Imaging Folder
_generate_roi_matching_index_directory : Generate ROI Matching Folder

check_log() → Self

Checks log status

Return type
Any

create() → Self

This function generates the directory hierarchy in one step

Return type
Any

create_experiment(*ExperimentName: str*, *Type: Optional[str, Experiment] = 'Experiment'*, ***kwargs*) → Self

Generates an experiment ExperimentName folder and attribute

Kwargs are passed to underlying functions

Parameters

- **ExperimentName** (*str*) – Name of experimental ExperimentName
- **Type** (*Optional[str, Experiment]*) – Type of experiment (Optional, default = Experiment)

Return type
Any

create_log_file() → Self

Creates log file

Return type
Any

end_log() → Self

Ends Logging

Return type
Any

property experimental_condition: str

Experiment condition of the mouse

Return type
str

property instance_date: str

Date when this experimental hierarchy was created

Return type
str

classmethod load(*Directory: Optional[str] = None*) → *Mouse*

Function that loads the entire mouse

Parameters
Directory (*Optional[str]*) – Directory containing the organization.json file and associated data

Returns
Mouse

Return type
ExperimentManagement.Organization.Mouse

property log_file: str

Log Filename Path

Return type
str

property mouse_id: str

ID of Mouse

Return type
str

pass_meta() → Tuple[str, str]

Passes directory/mouse id

Returns
directory/mouse id

Return type
tuple[str, str]

record_experiment_mod(*ExperimentNameKey: str*, **args*) → Self

Record modification of experiment (Data, Time, *args)

Parameters

- **ExperimentNameKey** (*str*) – The key name for the ExperimentName
- **args** (*str*) – A string explaining the modification

Return type
Any

record_mod(**args: str*) → Self

Record modification of experiment (Data, Time, *args)

Parameters
args (*str*) – A string explaining the modification

Return type
Any

save() → Self

Saves Mouse to json

Return type
Any

start_log() → Self

Starts Log

Return type
Any

update_all_folder_dictionaries() → Self

This function iterates through all behavioral ExperimentNames to update their folder dictionaries

Return type
Any

class Organization.**Study**

Bases: object

Organization.**generate_read_me**(*AbsoluteFilePath: str*, *Text: str*) → None

Generate a read me file

Parameters

- **AbsoluteFilePath** (*str*) – Filename path
- **Text** (*str*) – Text inside

Return type
None

Organization.**get_date**()

Organization.**get_time**()

1.3 UserInterfaces module

UserInterfaces.**select_directory**(***kwargs*) → str

UserInterfaces.**verbose_copying**(*src*, *dst*) → None

CHAPTER

TWO

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