pypet: Python Parameter Exploration Toolkit

Robert Meyer, Klaus Obermayer
Neural Information Processing Group Technische Universität Berlin &
Bernstein Center for Computational Neuroscience Berlin
robert.meyer@ni.tu-berlin.de

pypet

pypet is a new multi-platform python toolkit for **management** of simulations and **storage** of numerical data.

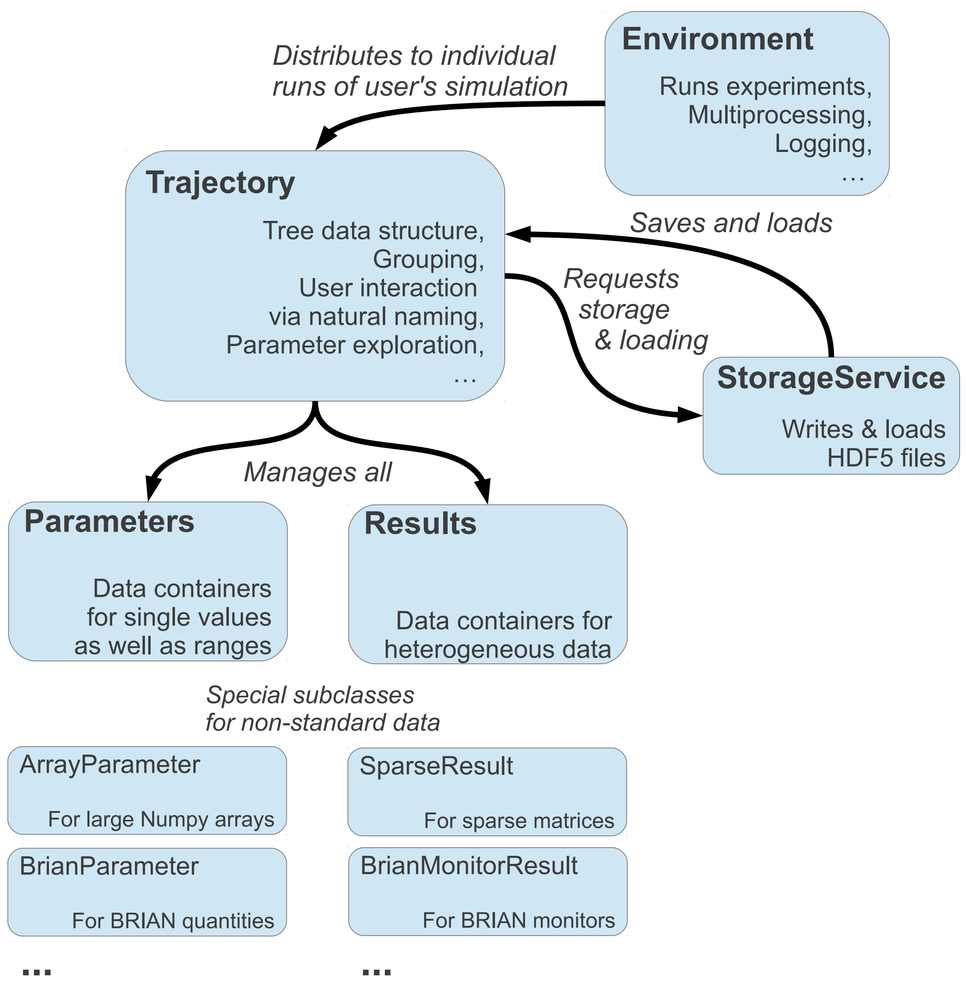
No longer waste your time writing I/O functionality to serialize the results and parameter settings of your numerical experiments. Put your data into the novel *Trajectory* container and *pypet* handles storage into **HDF5** [1] files for you. For instance, let *pypet* help you **explore** and analyse different parameter configurations of a neural network model.

Features

- **Novel tree container** *Trajectory* for managing parameters and results
- Sort your parameters and results into **groups** and categories
- Access data via **natural naming**,
  e.g. `traj.parameters.network.neurons.Vm`
- Automatic **storage** of simulation data into **HDF5** [1] files via **PyTables** [2]
- Support for many **data formats**
  → python native data types, lists, dictionaries, etc.
  → Numpy arrays and Scipy sparse matrices
  → pandas DataFrames [3]
  → **BRIAN Neural Network Simulator** quantities and monitors [4]
  → and more
- Easily **extendable** to other data formats
- Easy **exploration** of the parameter space and parameter ranges
- Support for **multiprocessing**, *pypet* can run your simulations in parallel
- **Dynamic loading**, load only the parts of your data you need
- **Annotate** your data
- **Git integration**, let *pypet* make automatic commits of your codebase
- and many more

[1] HDF5: `http://www.hdfgroup.org/HDF5`
[2] PyTables: `http://pytables.github.io`
[3] pandas: `http://pandas.pydata.org`
[4] BRIAN: `http://briansimulator.org`

Control Flow



Example Code Snippet

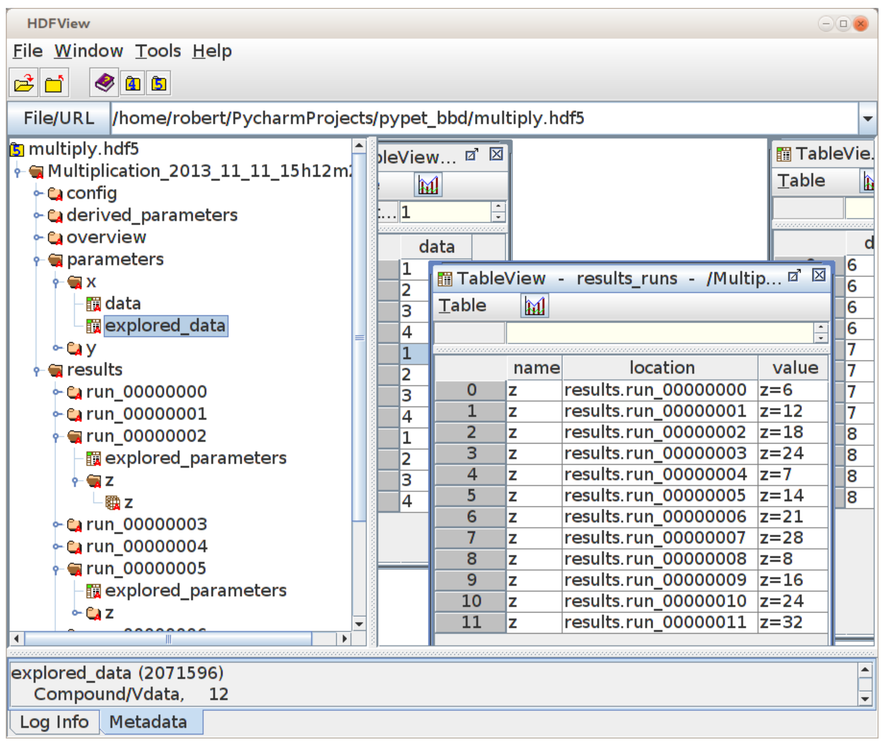
```
from pypet.environment import Environment
from pypet.utils.explore import cartesian_product

def multiply(traj):
    """Example of a sophisticated numerical experiment
    that involves multiplying two integer values.
    :param traj:
        Trajectory containing the parameters in a particular
        combination, it also serves as a container for results.
    """
    z = traj.x * traj.y
    traj.f_add_result('z', z, comment = 'Result of x*y')

# Create an environment that handles running the experiment
env = Environment(trajectory = 'Multiplication',
        filename = 'multiply.hdf5',
        comment = 'A sophisticated simulation of multiplication')

# The environment provides a trajectory container for us
traj = env.v_trajectory
# Add two parameters, both with default value 0
traj.f_add_parameter('x', 0, comment = 'First dimension')
traj.f_add_parameter('y', 0, comment = 'Second dimension')
# Explore the Cartesian product of x in {1,2,3,4} and y in {6,7,8}
traj.f_explore(cartesian_product( {'x': [1, 2, 3, 4], 'y': [6, 7, 8]} ) )
# Run simulation function 'multiply' with all parameter combinations
env.f_run(multiply)
```

Stored Trajectory in HDF5 File



Where to get it?

Documentation: `http://pypet.readthedocs.org`
Releases: `http://pypi.python.org/pypi/pypet`
Sourcecode: `http://github.com/SmokinCaterpillar/pypet`

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