Sherpa, Python, and Iris

A two-part workshop at the Wolbach Library

Iris	Sherpa and Python
Jan 27, 2017	Feb 3, 2017
9:30am - 12:00pm	9:30am - 12:00pm

Description

Recent improvements in instrumentation and the data collection process across the entire electromagnetic spectrum have resulted in an increasing amount of high quality multi-wavelength observations. The analysis of these modern data sets present several statistical challenges that require new methods and techniques to support the scientific inference. Our session will focus on the discussion of applied methodology that can be used to tackle some of these challenges. We will present tutorials based on the Sherpa-Python and IRIS tools developed by the Chandra X-ray Observatory.

Sherpa is a Python based general modeling and fitting application that provides an environment for modeling multi-dimensional data with a set of optimization methods, including MCMC simulations for sampling posterior distributions. Sherpa provides flexible mechanisms for modeling Poisson (sparse) and Gaussian (rich) data with appropriate likelihoods, including both pre-defined models and an interface to incorporate user defined models (Python functions or external code). Sherpa can be used for modeling 1D, 2D, or 3D data, i.e., spectra, time-series, or images, and can be extended to spectral-timing and spatial-timing domains. An upcoming 'Sherpa to Astropy' Python package will allow users to use Sherpa's optimizers and error estimators seamlessly within the Astropy's modeling framework. Iris has been built on top of Sherpa for fitting SEDs to multi-wavelength data. Iris also provides a front-end to *Virtual Observatory* archival catalogs that can supply the appropriate data for the modeling session.

We will use IPython Notebooks to guide the participants through Sherpa-Python sessions and present a tutorial demonstration showing Iris connectivity to the archives and examples of SED modeling.

There will be free time for participants to explore any of the several science threads provided at the end of the demonstrations, or to work on their own analysis. The session leaders will be

available for help and answering any questions participants have on Sherpa and Iris during this free time.

Registration

Register for the workshop.

If you plan on using a Windows machine, leave your operating system as a note in the registration form under "*What are a few things you're hoping to learn?*"

Contact Us

Have any questions about the session? Would you like more information on the software tools to be used? Send us an message at modelingws229aas at cfa.harvard.edu.

Workshop Organizers

This workshop is an extended version of the workshop given at the 229th AAS. The same organizers will be present at each workshop.

- Jamie Budynkiewicz
- Raffaele D'Abrusco
- Janet Evans
- Omar Laurino
- Giuseppina (Pepi) Fabbiano (AAS Chair)
- Aneta Siemiginowska

Schedule

Each session will begin with an introduction to the challenges of data analysis, followed by presentations and demos of the tool. Afterwards, attendees will have around 2 hours of free time to play around with the tools by themselves or with help from the instructors.

Please feel free to bring your own data and science tasks! We'll be available to help you run your analysis threads with the tools.

Date	Time	Description
Jan 27	9:30am	Introduction to Sherpa
	10:00am	Introduction to Iris with demos
	10:30am	Hacking with Iris
	12:30pm	Workshop ends
Feb 3	9:30am	Sherpa and Python: Bridge to Astropy, Sherpa Notebooks
	10:15am	Hacking with Sherpa

	12:00pm	Workshop ends

Download Software

Iris and Sherpa are supported on Linux and OS X (10.7+). Windows users can email modelingws229aas at cfa.harvard.edu for directions on using Docker to run Sherpa or Iris on Windows (prototype).

- Download and Install Sherpa
- Download and Install Iris

Worksheets

Pre-made science threads for users to work through during the free time part of the session. Thumb drives with the worksheets and datasets will be provided at the meeting for those who are unable to download the files before or during the meeting.

Sherpa worksheets

The Sherpa worksheets are Jupyter notebooks which you can download from Github. If you followed the Sherpa installation instructions, you have already downloaded the notebooks, which should be in `<path_to>/sherpa-standalone-notebooks`.

You can always download the notebooks again from Github

```
$ cd <some_directory>
$ git clone https://github.com/olaurino/sherpa-standalone-notebooks
$ cd sherpa-standalone-notebooks
$ git checkout -b cfa_workshop   # create a branch in git; save your changes as you go

$ jupyter notebook        # start the notebook server
```

If the internet connection is slow, you will be able to download the notebooks and datasets from thumb drives during the workshop.

Iris worksheets

Browse/download the PDF worksheets and datasets from Github

```
$ cd <some_directory>
$ git clone https://github.com/ChandraCXC/aas229iris
$ cd aas229iris
$ ls
README.md   ots/        worksheets/

# if you downloaded the git repository before, pull up latest changes with:
$ git pull origin master
```

Or, download a tar package: aas229iris.tar.gz

Presentations

This workshop is an extended version of the workshop presented at the 229th AAS meeting. Here are the presentation slides from the AAS the session. Look at the worksheets to run through the demos shown.

- Introduction: multi-wavelength research with Sherpa - Pepi Fabbiano / Aneta Sieminigowska
- Sherpa overview and examples (ODP format) - Omar Laurino
- Iris overview and examples - Jamie Budynkiewicz

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