

PyAutoFit: A Classy Probabilistic Programming Language For Cosmology and Cancer

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A major trend in astronomy and healthcare is the rapid adoption of Bayesian statistics for data analysis and modeling. With modern data-sets growing by orders of magnitude in size, the focus is now on developing methods capable of applying contemporary inference techniques to extremely large datasets. To this aim, I present PyAutoFit (<https://github.com/rhayes777/PyAutoFit>), an open-source probabilistic programming language for automated Bayesian inference.

PyAutoFit is an offshoot of the astrophysics project PyAutoLens (<https://github.com/Jammy2211/PyAutoLens>), which uses PyAutoFit's advanced modeling tools to automate the analysis of images of strong lens galaxies. In collaboration with UK tech-healthcare company ConcR, PyAutoFit is now being adapted to a healthcare setting, for example modeling patient responses to cancer treatments and as part of a clinical trial run by healthcare company Roche.

In this hands on demonstration, I will:

- Give an overview of how to compose a model in PyAutoFit.
- Demonstrate a simple model-fitting example using an Astronomy based science-case.
- Illustrate PyAutoFit's graphical modeling tools using a healthcare based toy-model, which is the core feature we are developing with ConcR for analysing large patient datasets.

PyAutoFit offers a generalized framework for performing Bayesian inference which can be adapted to many different scientific domains. The aim of this presentation is therefore to instigate new multi-disciplinary collaborations which will enable the statistical techniques being developed in Astronomy to be applied by the wider science community.

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