Topic 4: (Python (or R)) Probabilistic Programming for Causality Perception in Schizophrenia

When doing data analysis, we often want to identify relations, maybe make some valid predictions and ideally also know how confident we can be in our results. Bayesian regression is one way to do that. In the end, we are only fitting an arbitrary function – it might be linear, then that would be linear regression – but in contrast to approaches such as Least squares, we can here get an estimate of the *distribution* of the function's parameters. The parameters themselves tell whether to trust them or not!

The dataset we provide you with here was collected at the Translational Neurscience Lab in Marburg and contains causality judgements (binary) and reaction times for a range of Michotte launching events. Have a look at one of the papers linked below for more information. The experiment was conducted on neurotypical participants and patients with Schizophrenia Spectrum Disorder (SSD) and there were quite a few conditions (varying angle of egress, delay or brain stimulation).

While you'll be provided with a Jupyter Notebook to get you started, your task is to get implement your own Bayesian Generalized Model and research what actually drives causality perception and/ or reaction times in this experiment!

Getting Started

You should start by getting familiar with the experiment and the research already conducted on the date. You can have a look at the first chapter of the notebook and skim through the papers.

You can find an example video of one of the stimuli here or download it from one of the paper's website (https://www.nature.com/articles/s41537-025-00614-0).

Finally, go through and execute the rest of the provided notebook.

Recommended Prerequisites

- No fear of statistics
- Programming experience in python
- Basic understanding of Bayesian statistics can help but are not required

Materials

The Dataset

https://osf.io/kj57r/files/osfstorage

Related Publications on this Dataset

Streiling et al. https://www.nature.com/articles/s41537-025-00614-0

Schülke et al. https://pubmed.ncbi.nlm.nih.gov/37402578/