BaTMon - Bayes Test for Monotonicity

User Manual

Introduction

This note present the code associated with the article [2]

Contents

You should find in the folder

`batmon.py` A python script that run the test on Global Warming Data

`entries.py` A python script that specifies

- The number of draws from the MCMC sampler
- The path to the dataset

`data.txt` The Global Warming Data with rescaled date adapted from [1]

`data2.txt` Simulated data from the model

$$y_i = (i/n)^2 + \mathcal{N}(0, 0.01)$$

Start-up Guide

Installation

This program is coded in python. It also require some additional packages :

- `numpy, scipy` usually package as python-numpy and python-scipy. See http://numpy.scipy.org/
- `Rpy` is require for the graph, but that can easilly be desable.

Once you have all this installed, you can run the code on the test dataset `data2.txt` to try if everything works fine. To do so lauch the program from the root folder in a terminal :

```
python Bayes_test.py
```

This should take less than a minute.

Performing the test on your data

Dataset format

The dataset has to be a `.txt` file with first column the design points and second column the data points. The file should contain no header nor column names. You can specify the value separator in the next section. Note that this code is adapted to fixed design regresison with design point $x_i = i/n, i = 0, \dots, n-1$.

Performing the test

To perform the test on your data, you just have to change the code line 3 of the `entries.py` script

```
dat = genfromtxt('path-to-your-dataset.txt',delimiter=' ')
```

> Note that this code test for a monotone **non-decreasing** regression function. To test monotone non-increasing function, you can ether replace the `-1.0` by `1.0` in the definition of y (line 34 in the `entries.py` file) or take minus your data.

Reading the output

The output is typically of this form.

```
0.99999
H0 rejected, the function is not monotone
```

The first line is the posterior probability $\pi\left(H\left(\omega, k\right) > M_n^k \left| Y^n \right.\right)$, the second line gives the result of the test.

References

[1] P.D. Jones, D.E. Parker, T.J. Osborn and and K.R. Briffa. Global and hemispheric temperature anomalies, land and marine instrumental records. 2011.

[2] Salomond, J.-B. (2013). Adaptive Bayes test for monotonicity. *ArXiv e-prints*.