
neurodesign Documentation

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Contents

1	Getting started	3
1.1	Installing NeuroDesign	3
1.2	About Design Optimisation Using the Genetic Algorithm	3
1.3	Design efficiency	3
2	Neurodesign documentation	5
2.1	Neurodesign: design optimisation	5
2.2	Generate: generating stimulus order and ITI's	5
2.3	Msequence: generating msequences	5
2.4	Report: summarise results from optimisation	5

We have built a GUI for this package, in the form of an online toolbox available at [‘www.neuropowertools.org<http://www.neuropowertools.org>’](http://www.neuropowertools.org). The GUI uses functions from the neurodesign package.

1.1 Installing NeuroDesign

neurodesign is available on pypi. To install, run:

```
pip install neurodesign
```

1.2 About Design Optimisation Using the Genetic Algorithm

This toolbox is for the optimization of experimental designs for fMRI. Minimizing the variance of the design matrix will help detect or estimate (depending on the outcome of interest) the effect researchers are looking for. The genetic algorithm for experimental designs was introduced by Wager and Nichols (2002) and further improved by Kao, Mandal, Lazar and Stufken (2009). We implemented these methods in a python package and a userfriendly web-application and introduced some improvements and allows more flexibility for the experimental setup.

1.3 Design efficiency

The core idea of this package is to run an optimization algorithm that (among others) optimizes the design efficiency of an fMRI design using A-optimality, with this formula:

$$Eff(C\beta) = \frac{n}{Trace(CX'X^{-1}C')}$$

2.1 Neurodesign: design optimisation

2.2 Generate: generating stimulus order and ITI's

2.3 Msequence: generating msequences

2.4 Report: summarise results from optimisation

