

Effective Programming Practices for Economists

Scientific Computing

Introduction to numerical optimization

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Applications of numerical optimization

- Probit, many Logit models, ...
- Fitting machine learning models
- Estimating structural models
 - Maximum likelihood
 - Method of simulated moments
- Calculating optimal policies from a structural model
- Solving utility maximization problems

What is an optimization algorithm

- **Our definition:** A function that takes a criterion function and start parameters and returns a solution, possibly after a long time
- There are many different optimizers
- Picking the right one can make a huge difference but is hard
- Use a mix of theory and experimentation to get there

Libraries for optimization

- There are many optimization libraries in Python
- All are a bit different
- We will use estimagic to access all of them with a unified interface
- Estimagic is developed by Open Source Economics in Bonn