Effective Programming Practices for Economists

Numerical Optimization

Grid Search

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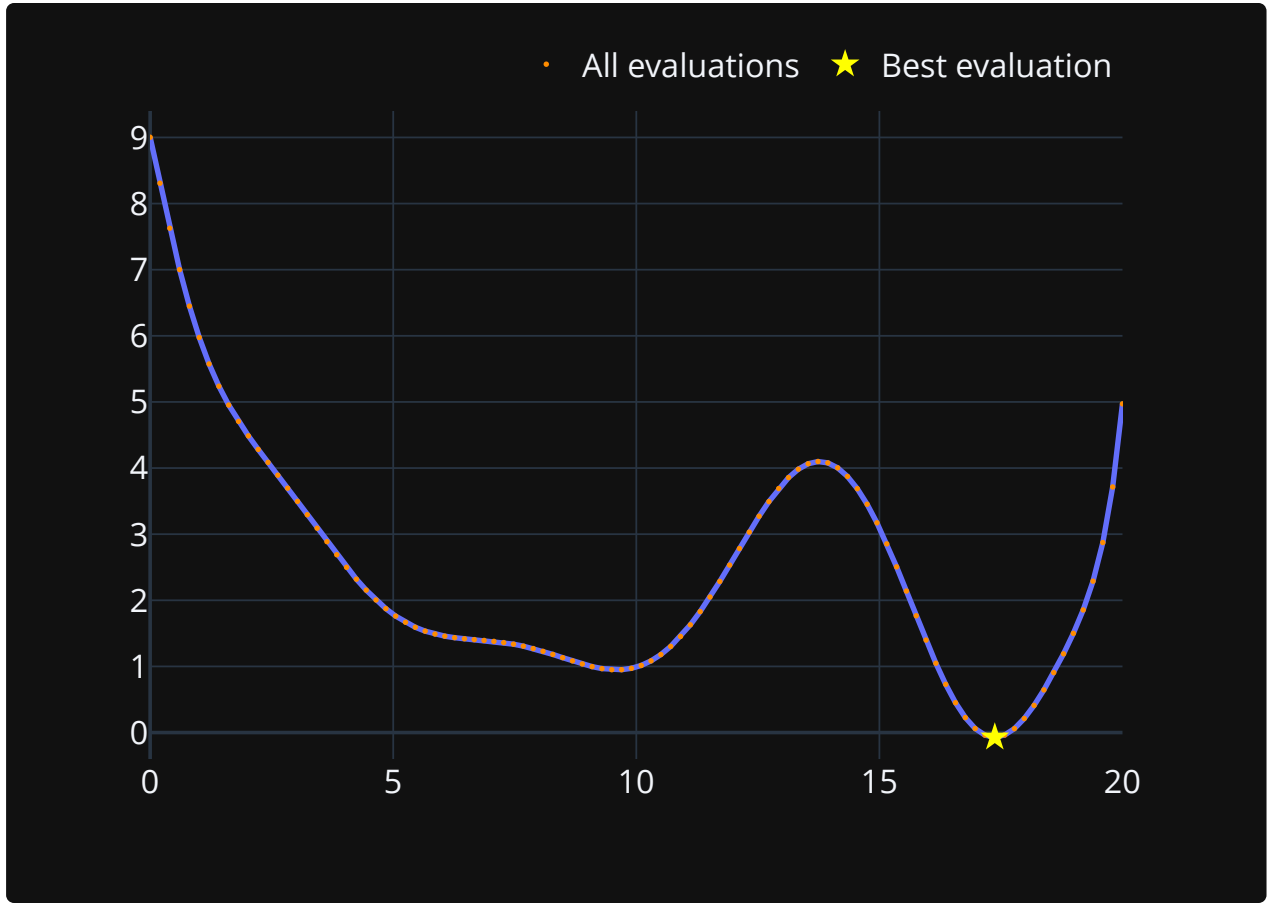
Grid Search

- Very simple!
- Fix a grid of parameter values.
- Evaluate the function at each grid point.
- Pick the best.


All evaluations
Best evaluation
9
8
7
6
5
4
3
2
1
0
0
5
10
15
20

Grid Search: Properties

- Needs bounds on the parameter (0 to 20 in our case).
- Desired precision determines number of grid points.
- Very feasible in one dimension.
- Else: Curse of dimensionality.

Curse of Dimensionality

- Suppose we have $p > 1$ parameters.
- If we use n grid points in each dimension, we require n^p function evaluations.
- This grows exponentially with p, making grid search infeasible in higher dimensions.
- Example:
  - 5 parameters and 100 grid points per parameter
  - $100^5 = 10^{10}$ required function evaluations
  - Assume one function evaluation takes 1 millisecond
  - 10^{10} milliseconds $\approx$ 115 days