

# AutoML: Algorithm Selection

## Overview and Motivation

Bernd Bischl   Frank Hutter   Lars Kotthoff  
Marius Lindauer   Joaquin Vanschoren

Given a problem, choose the best algorithm to solve it. [Rice. 1975]

# Algorithm Selection

## More formally

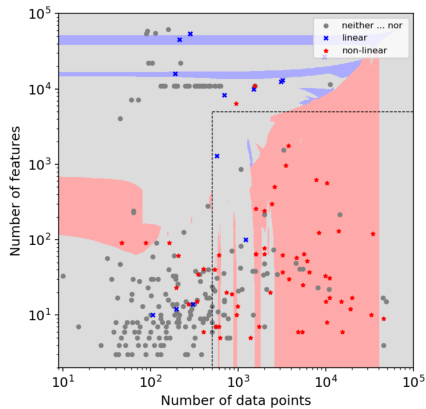
Let

- $p(\mathcal{D})$  be a probability distribution over datasets  $\mathcal{D} \in \mathbf{D}$ ,
- $\mathbf{P}$  a portfolio of algorithms  $\mathcal{A} \in \mathbf{P}$ , and
- $c : \mathbf{P} \times \mathbf{D} \rightarrow \mathbb{R}$  be a cost metric

the *per-instance algorithm selection problem* is to obtain a mapping  $s : \mathcal{D} \mapsto \mathcal{A}$  such that

$$\arg \min_s \int_{\mathbf{D}} c(s(\mathcal{D}), \mathcal{D}) p(\mathcal{D}) \, d\mathcal{D}$$

# Motivation: Performance Differences [Strang et al. 2018] I



# Motivation: Performance Differences [Strang et al. 2018] II

