Train In Data

Hyperparameter Optimization

Hyperparameter Optimization

- The process of finding the best Hyperparameters for a given dataset is called **Hyperparameter Optimization** or **Hyperparameter Tuning**.

- The best hyperparameters are those that maximize the performance of the machine learning algorithm.

Hyperparameter Tuning: Search

A search consist of:

- Hyperparameter space (section 2)
- A method for sampling candidate hyperparameters
- A cross-validation scheme (section 4)
- A performance metric to minimize (or maximize) (section 3)

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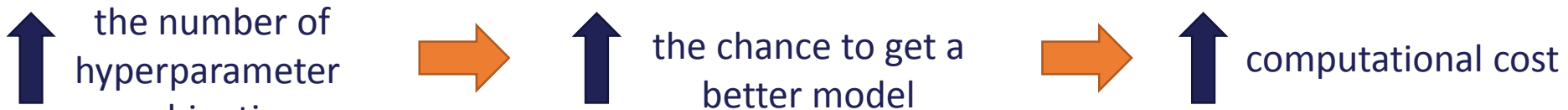
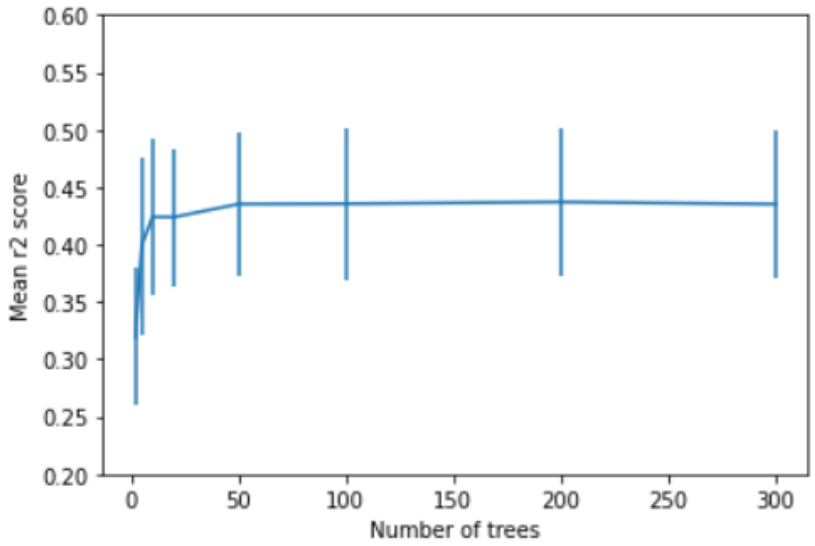
Hyperparameter Tuning: Challenges

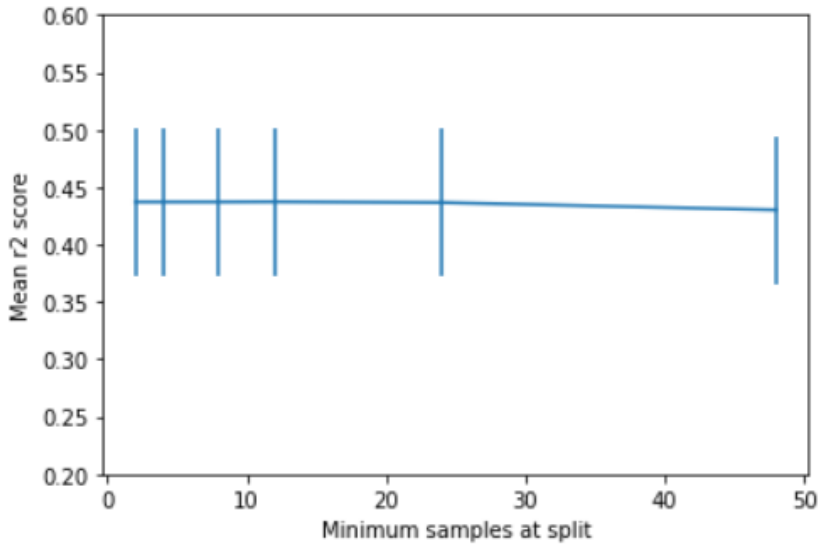
- We can't define a formula to find the hyperparameters
- Try different combinations of hyperparameter and evaluate model performance
- The critical step is to choose **how many** different hyperparameter combinations we are going to test.

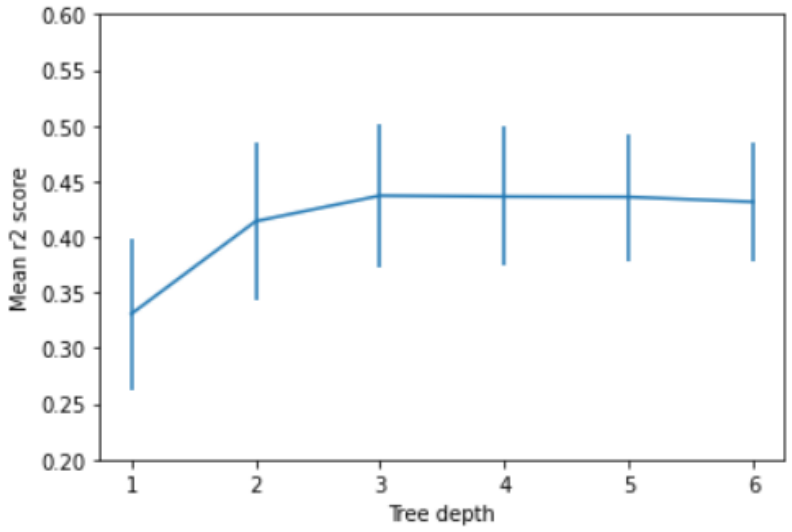
Hyperparameter Tuning: Methods



Low effective dimension







- Some hyperparameters affect performance a lot
- Most hyperparameters do not have a huge effect on model performance

Hyperparameter Nature

- Some hyperparameters are discrete
  - ✓ number of estimators in ensemble models
- Some hyperparameters are continuous
  - ✓ Penalization coefficient
  - ✓ Number of samples per split
- Some hyperparameters are categorical:
  - ✓ Loss (deviance, exponential)
  - ✓ Regularization (Lasso, Ridge)

Hyperparameter Tuning: Considerations

When we create hyperparameter sampling strategies we need to consider:

- Number of hyperparameters of the machine learning model
- The low effective dimension
- The nature of the parameters (discrete, continuous)
- The computing resources available to us

Basic Hyperparameter Tuning Methods

- Manual Search
- Grid Search
- Random Search

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THANK YOU

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