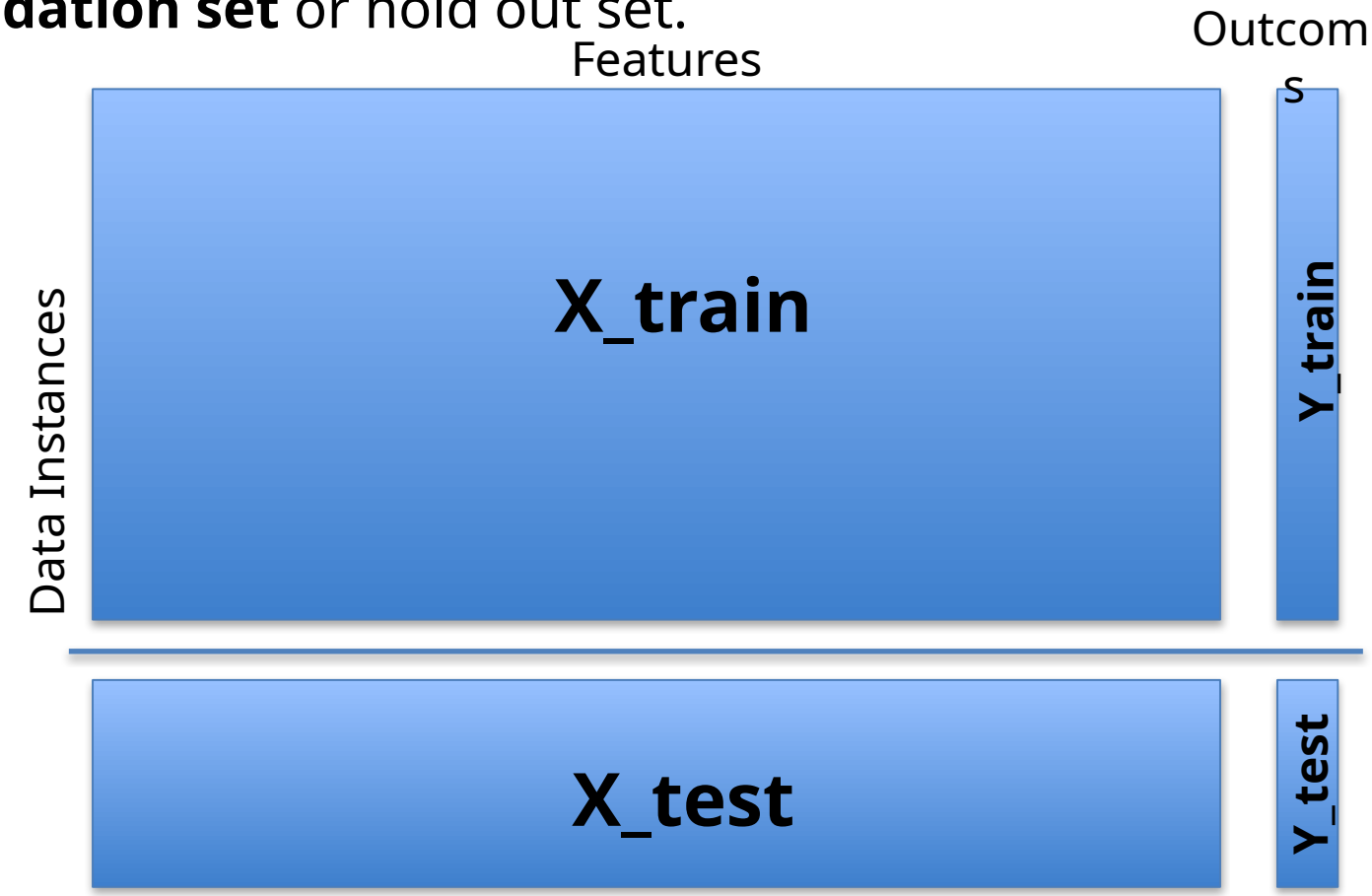
Model Validation of Continuous Response

The Validation Set Approach Review

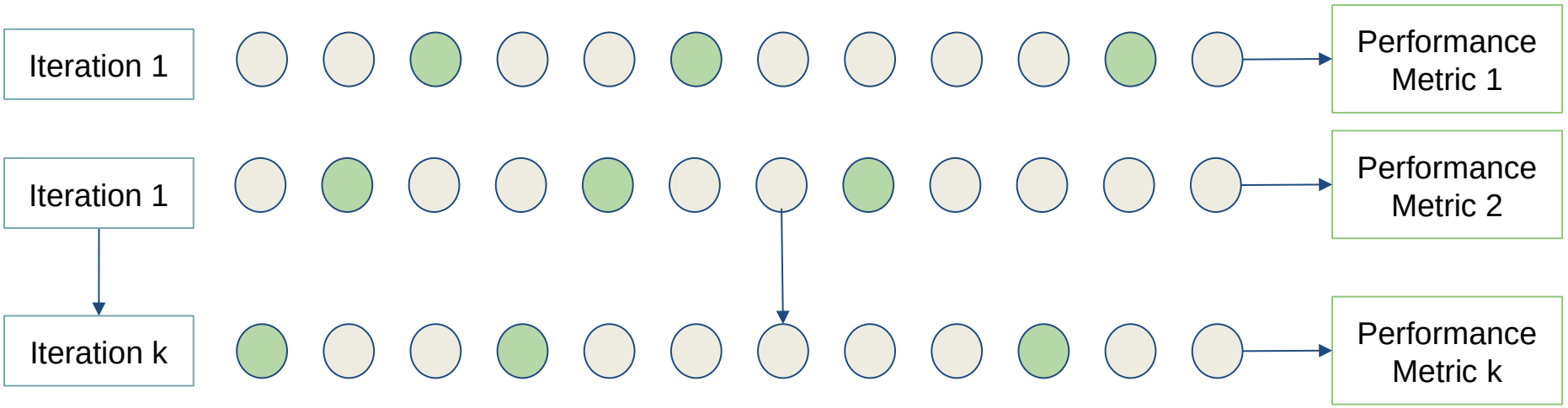
The **validation set approach** allows us to take a single dataset and break it up into two groups - a **training set** and a **validation set** or hold out set.



Cross Validation Review

The cross validation process is generally split into the following steps:

1. Data is split into training and testing sets
2. A model is trained using the training data
3. The model is validated using the testing data. i.e. a performance metric is calculated between the values predicted by model and those in the sample data
4. This is repeated k times. Aggregate the performance metrics across k.



$$overall\ performance = \frac{1}{k}\sum_{i=1}^{k} performance_i$$

Error Metrics - Continuous Data

- **Mean Squared Error (MSE)**
  - Take the difference between predicted and actual result, square it, take average for all points
  - *Makes outliers more heavily weighted. In squared units of the response.*

$$MSE = \frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2$$

- **Root Mean Squared Error (RMSE)**
  - Square root of MSE.
  - *Is in the same units as the response.*

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2}$$

- **Root Mean Squared Percentage Error (RMSPE)**
  - *Scales the RMSE based on the value of the response.*

$$RMSPE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}((Y_i - \hat{Y}_i)/Y_i)^2}$$

- **Mean Absolute Error (MAE)**
  - Average of absolute value of differences
  - *Does not make outliers more heavily*

$$MAE = \frac{1}{n}\sum_{i=1}^{n} abs(Y_i - \hat{Y}_i)$$