End to End ML Project

S4

- [x] Pipeline
- [x] Cross validation
- [x] Hyperparameter Tuning
- [x] Evaluation Metrics (Reg.)
- [x] Inference

S5

Next

- [ ] Logistic Reg. (clf Model)
- [ ] clf Evaluation Metrics
- [ ] project

Regression Evaluation

Metric

- Error
  - MSE
  - RMSE
  - MAE
  - } No limited Range
- Accuracy (R2 Score) } 0-1

Data

- Validation Data → During training (Model selection)
  - for Tuning
- Testing Data → Final Evaluation
  - (unseen)

R_2 Score

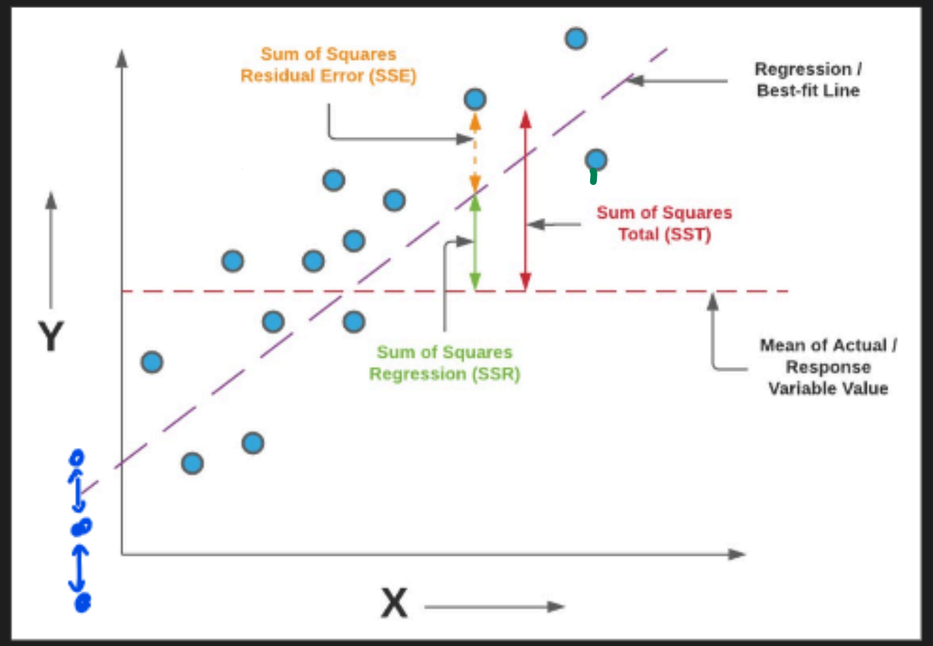
→ Error (Some Model)

vs.

→ Error (Ref Model)

↳ Worst Case ($\bar{Y}$)

Dummy Regressor



$$R_2 = 1 - \frac{\sum_{i=1}^{m} (y_{act_{(i)}} - y_{pred_{(i)}})^2}{\sum_{i=1}^{m} (y_{act_{(i)}} - \bar{y})^2}$$

(SSE) / (SST)

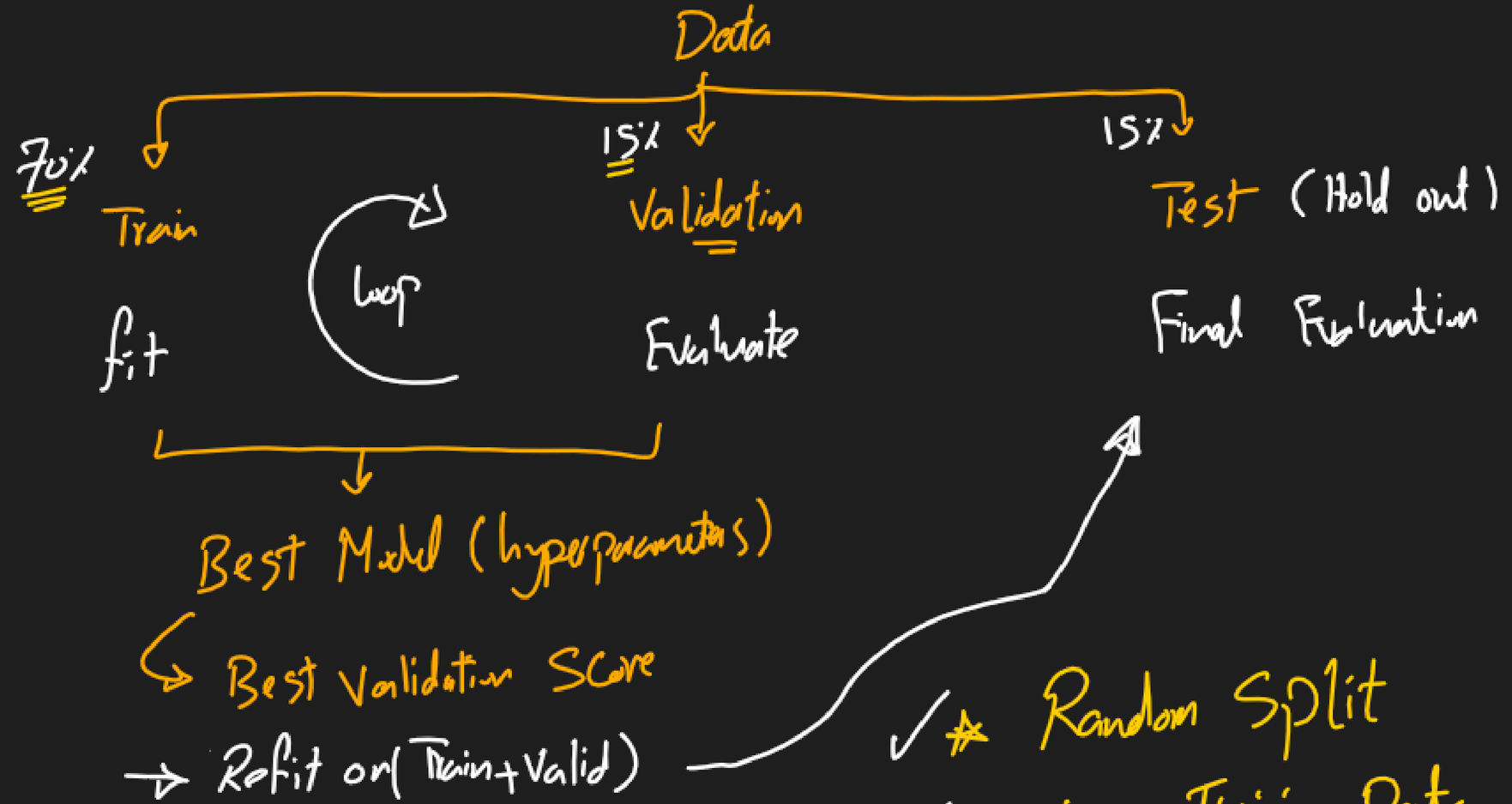
R_2 Score

→ $y_{pred} = y_{act}$ (Best Scenario) $R_2 = 1$

→ $y_{pred} = \bar{y}$ (Worst Case) $R_2 = 0$

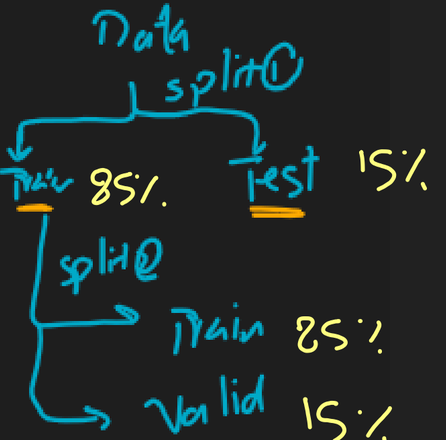
→ y_{pred} is worse than $\bar{y}$ $R_2 = -ve$

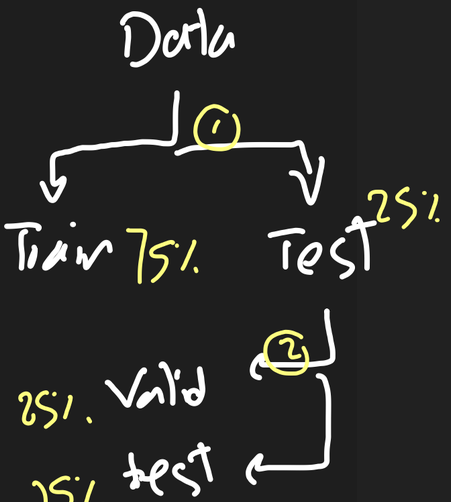
□ Validation Split (Do not use test data during learning)



✓ ★ Random Split

✓ ★ Less Training Data





Cross Validation

Used for training & Validation

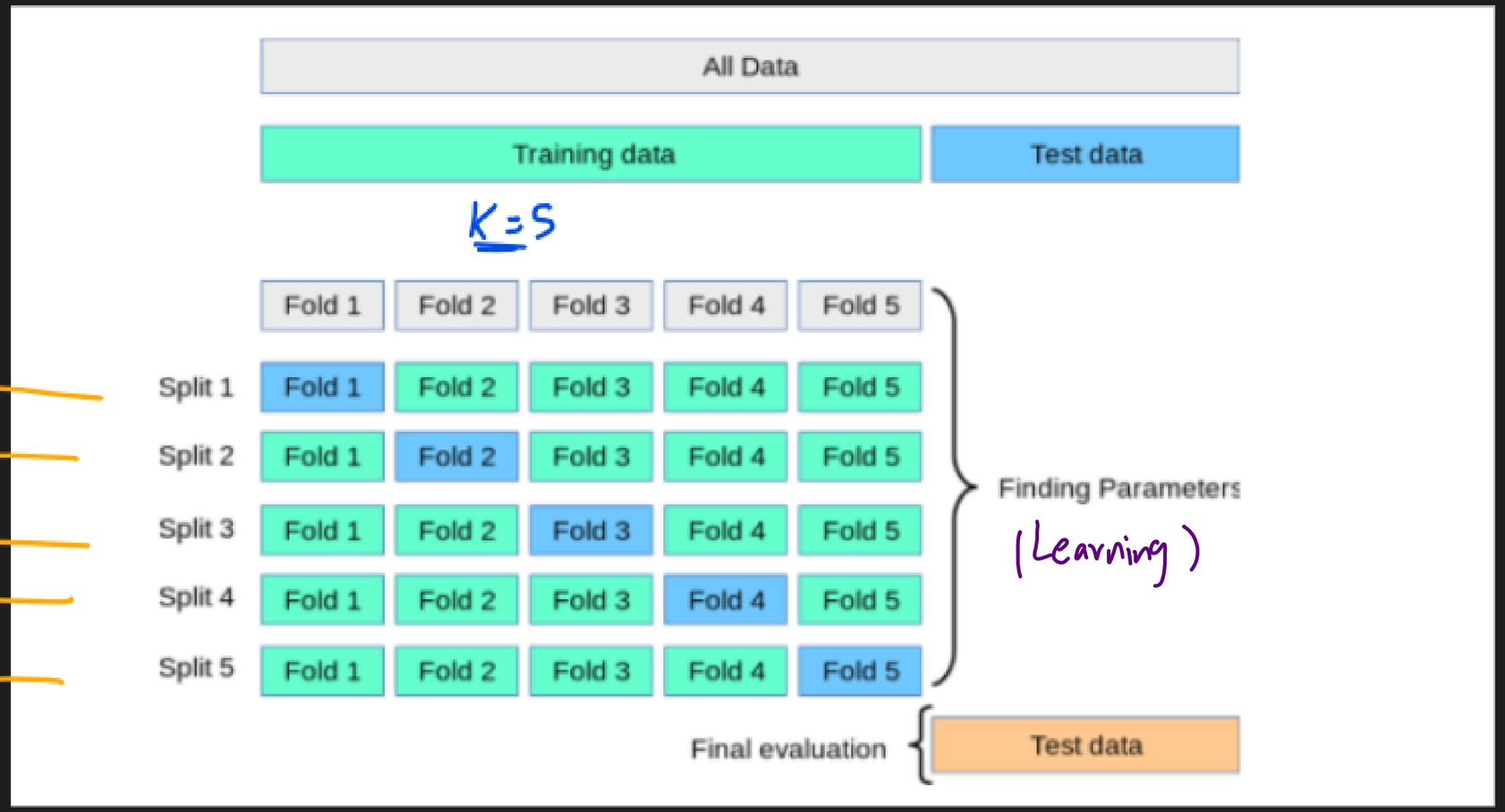
- K-fold — $k \rightarrow 3, 5, 10$
- Leave_one_out — K = No. of observations (very small Data)

K-fold Cross Validation

?

Score ① ② ③ ④ ⑤

Avg. Score



Parameter → What model learns (weight)

vs.

Hyperparameter

- What models use to learn (set by user)

□ Hyperparameter Tuning (Efficient Search for best hyperparameters)

- o poly_degree [2, 3, 4, 5]
- o alpha [0.01, 0.1, 1, 10]

} param_grid

□ Grid Search

- Trying all possible Combinations
  - using cross validation
  - using Suitable Metric (chosen by user)

□ Random Search

- Trying Random Combinations
  - using CV
  - using Suitable Metric