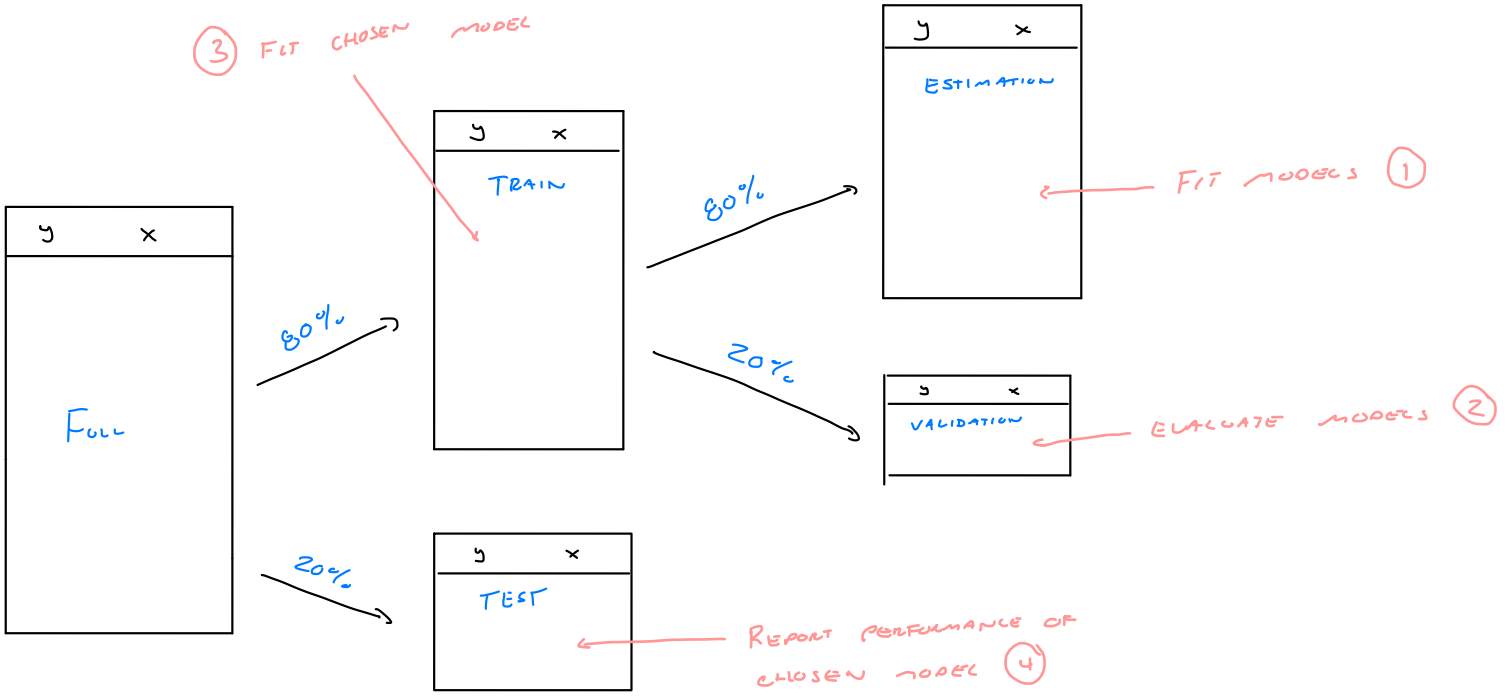
Cross-Validation



WHATS WRONG WITH THIS?

TOO VARIABLE!

A NOTE ABOUT VARIABILITY

$X_1, \ldots, X_n$ IID $\quad E[X] = \mu$

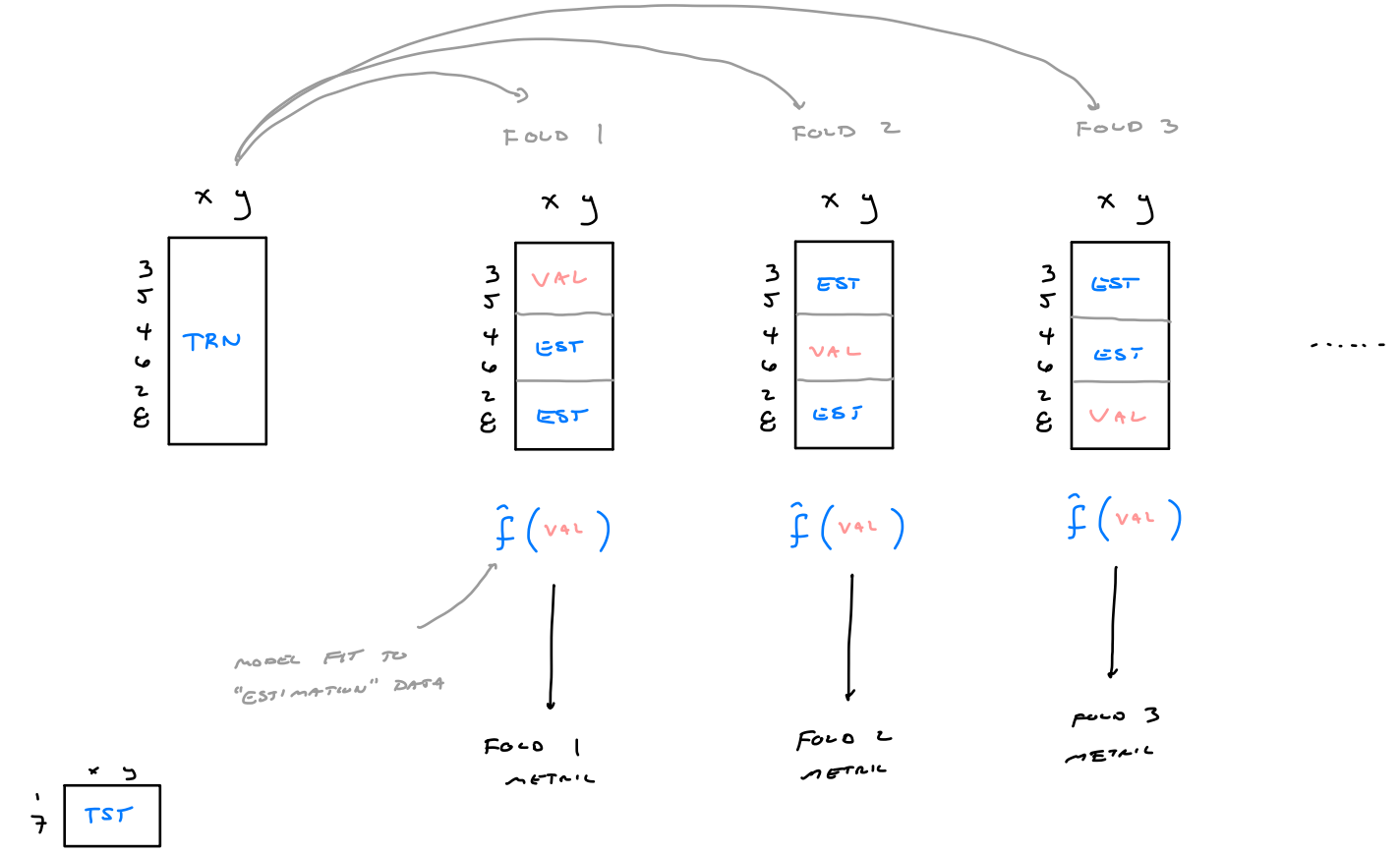
$V[X] = \sigma^2$

$$\bar{X} = \frac{1}{n} \sum_{i=1}^{n} X_i$$

$$E[\bar{X}] = \mu$$

$$V[\bar{X}] = \sigma^2 / n$$

K-FOLD CROSS-VALIDATION



Cross-Validated Metrics

RMSE
MAE
ACC
ETC

$$\text{METRIC-CV}_K = \frac{1}{K} \sum_{i=1}^{K} \text{METRIC}_i$$

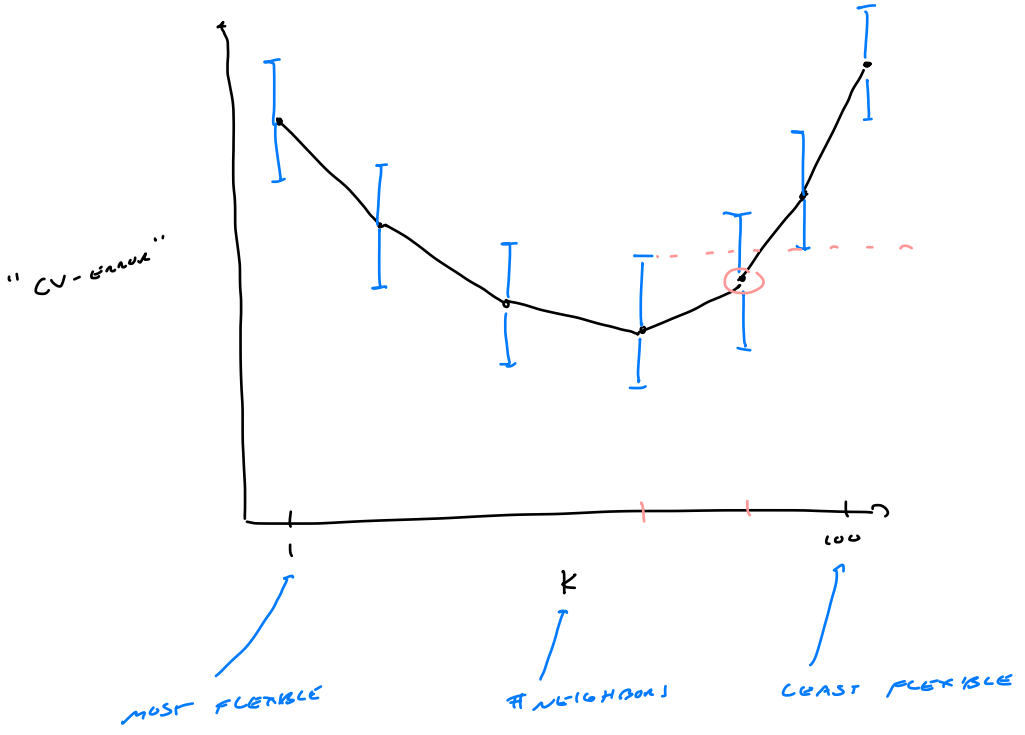
VALUE OF METRIC FOR FOLD i

K FOLDS

$$SE[\text{METRIC-CV}_K] = \sqrt{\frac{1}{K-1} \sum_{i=1}^{K} (\text{METRIC}_i - \text{METRIC-CV}_K)^2}$$

SAMPLE SD OF FOLD METRICS

ONE-SE RULE



WHICH K?

POPULAR $\begin{cases} k = 5 \\ k = 10 \end{cases}$ ← LESS COMPUTING

$k =$ "n" ← "LEAVE-ONE-OUT"