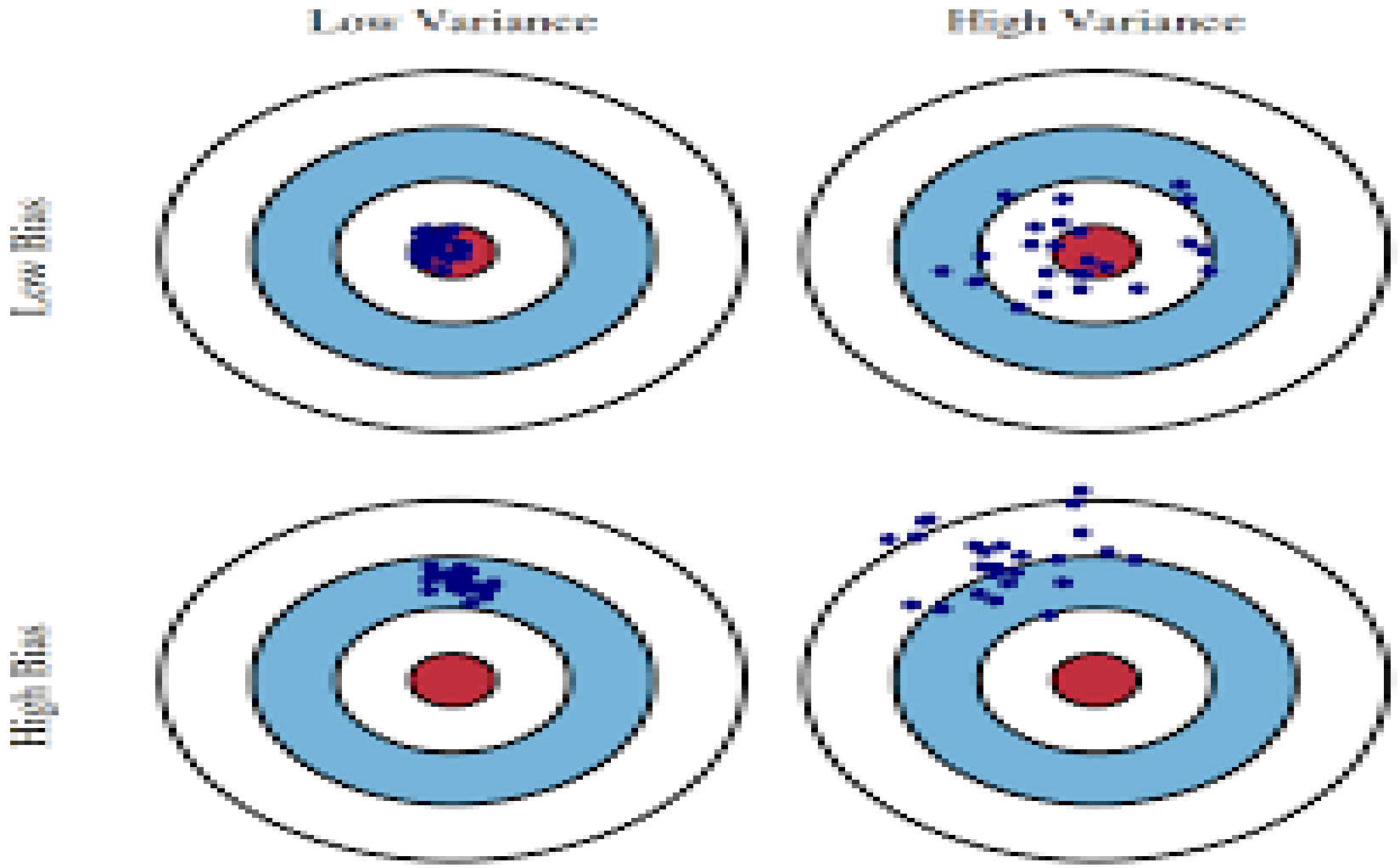
AGENDA – DAY 3 – 22-NOV-2025 (SAT)

- **REACP – DAY 2 + DOUBT CLEARING – MAX 10 MINUTES**

- **DAY 3**
  - **Supervised Learning – Regression (Contd…)**
  - **Non-linear Regression**
    - **Polynomial Regression**
  - **Model Performance Metrics**
  - **Regularisation**
    - **Lasso, Ridge, Elastic-Net**
  - **Model Optimisation**
  - **Hands-On Demo**
- **Q & A**
- **SUMMARY, HEADS-UP FOR DAY 4 & CLOSURE**

REACP – DAY 2 + DOUBT CLEARING – MAX 10 MINUTES

- Difference between Correlation and Regression
- Parameter and hyperparameter
- Data type and regression model
- SSR, SSE, SST
- Regression model applicability based on data
- Explained & unexplained variance
- Concept of what is linear in linear equation.
- Slope, Intercept, Hypothesis
- Hidden variables



SOURCE : INTERNET

POLYNOMIAL REGRESSION:

↳ EXT OF LIN REGRN → X & Y MODELLED AS n^{TH} DEGREE POLYNOMIAL.

REGULARISATION.

ACT y PRED $\hat{y}$

$$SSE_{EN} = \sum_i (y-\hat{y})^2 + \lambda\left[(1-\alpha)\sum_i \beta^2 + \alpha\sum_i |\beta|\right] \sum_i (y-\hat{y})^2$$

ELASTIC NET.

↳ <1> 1-100

EQN <1> $\rightarrow \alpha = 0$.

$$= \sum_i (y-\hat{y})^2 + \lambda\left[(1-0)\sum_i \beta^2 + 0 * \underbrace{\sum_i |\beta|}_{0}\right]$$

$$SSE_{RIDGE} = \sum_i (y-\hat{y})^2 + \lambda \sum_i \beta^2 \rightarrow L_2 \text{ PENALTY}$$

EQN <1> BUT $\alpha = 1$

$$= \sum_i (y-\hat{y})^2 + \lambda\left[0\sum_i \beta^2 + 1\sum_i |\beta|\right]$$

$$SSE_{LASSO} = \sum_i (y-\hat{y})^2 + \lambda \sum_i |\beta| \rightarrow L_1 \text{ PENALTY}$$

1) ELASTIC NET REGRN
↳ COMBINATION/MIX OF RIDGE & LASSO

2) RIDGE REGN: SHRINK CO-EF TO NON-ZERO
TO PREVENT OVERFIT.
✗ → RETAINS ALL VARIABLES.

3) LASSO REGN: → SHRINK REG CO-EF
WITH SOME CO-EFF SHRUNK TO 0.
→ FEATURE SELECTION.

$\beta_1 \neq 0$
$\beta_2 = 0$ ✓
$\beta_3 = 0$

$y = f(x)$
OR $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3^2 + \beta_4 x_4 + C$
$\beta_1 = 0$ $\beta_3 = 0$