ASSIGNMENT 1

1. Variance and Bias (Diagram, Overfit, Underfit)

Best Fit Model :

• A well-performing model maintains minimal bias while controlling variance.

1. Bias

Bias is the error caused by overly simple assumptions in a model.

• High Bias - When bias is high, the model becomes too simple and underfits.

• Low Bias - When bias is low, the model captures patterns well and fits the data accurately.

2. Variance

Variance is the error caused by sensitivity to fluctuations in training data.

• High Variance - When variance is high, the model becomes overly complex and overfits.

• Low Variance - When variance is low, the model is stable and predictions do not fluctuate much across different datasets.

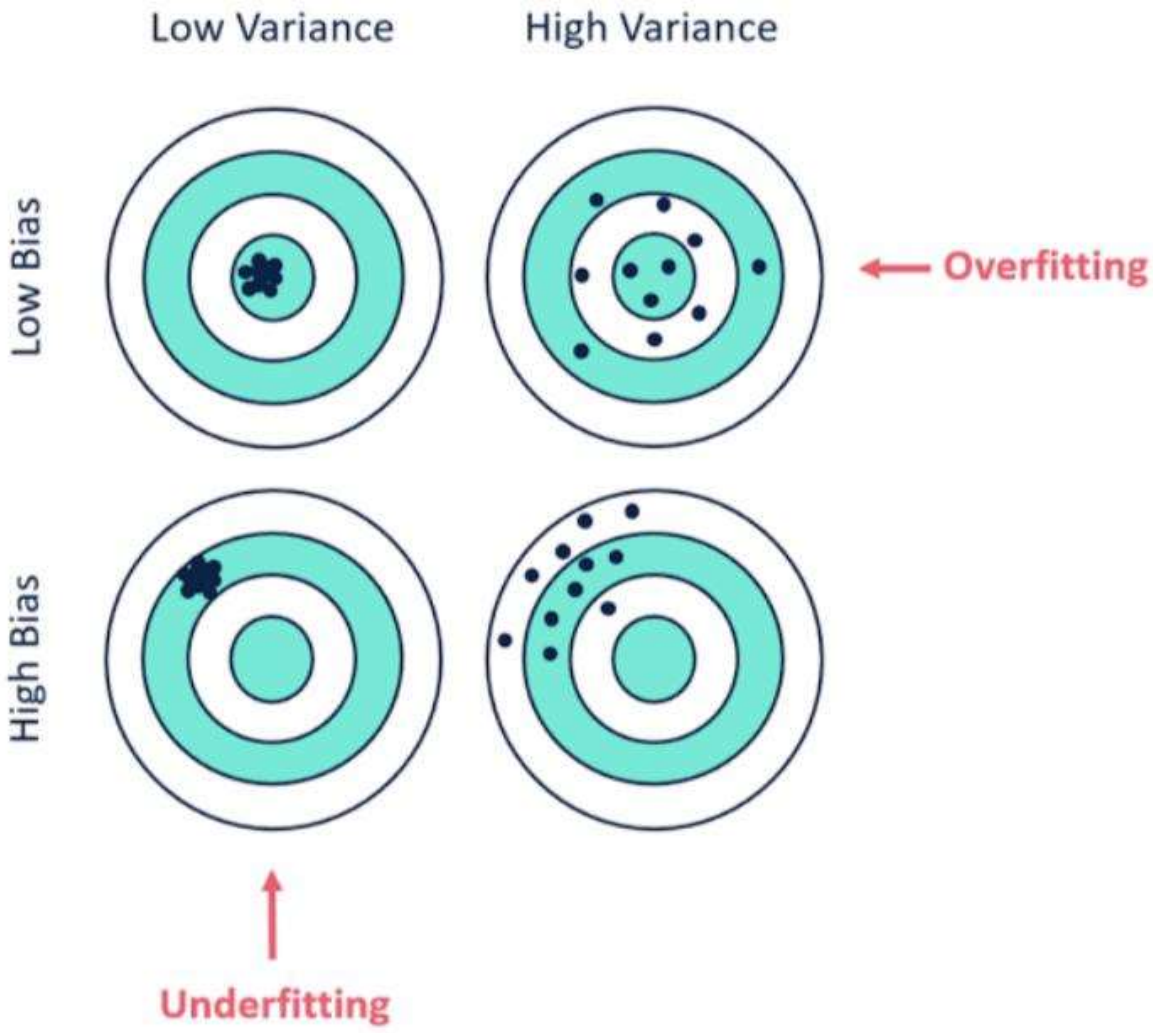
3. Underfitting

• Underfitting occurs when the model is overly simple and performs poorly.

• Model has high bias and low variance.

Both training and testing accuracy are low.

Example: Fitting a straight line to nonlinear curved data.



4. Overfitting

• Overfitting happens when the model memorizes data and fails to generalize.

• Model has low bias and high variance.

Training accuracy is very high but testing accuracy is low.

5. Optimal Model

An ideal model achieves low bias and low variance simultaneously.

• Training and testing accuracy are both high.

• Performance is stable and well balanced across datasets.