

Machine Learning Fundamentals — AI Engineer Notes

1. Machine Learning Overview

Machine learning enables systems to learn patterns from data and make predictions without explicit rules.

2. Supervised Learning

Uses labeled data to learn input-output mappings. Common tasks include regression and classification.

3. Unsupervised Learning

Uses unlabeled data to discover hidden patterns such as clusters or latent structure.

4. Regression

Predicts continuous numerical values such as cost, demand, or workload.

5. Classification

Predicts discrete class labels such as yes/no or categories.

6. Bias–Variance Tradeoff

Bias is error from overly simple models; variance is error from sensitivity to noise. Good models balance both.

7. Regression Metrics

MAE, MSE, RMSE, and R^2 measure prediction error magnitude and consistency.

8. Classification Metrics

Accuracy, Precision, Recall, F1-score, and ROC-AUC measure classification quality.

9. scikit-learn

A Python library providing tools for preprocessing, modeling, evaluation, and ML pipelines.

10. MLflow

An ML lifecycle platform for experiment tracking, model versioning, and deployment.

11. Why These Matter

These fundamentals underpin nearly all applied ML systems in production.

12. Interview Summary

Supervised vs unsupervised learning, regression vs classification, bias–variance, metrics, scikit-learn, and MLflow form the core of ML engineering.

13. Key Takeaway

Strong fundamentals matter more than complex algorithms.