AWS ML Associate — Section 2.4: Tune Models

This section covers hyperparameter optimization (HPO) to improve model performance. It explains different tuning methods, AWS tools for automation, and best practices to avoid overfitting.

# Hyperparameter Tuning Concepts

• Hyperparameters are set before training (e.g., learning rate, max depth, batch size)

• Grid search — exhaustive but expensive

• Random search — more efficient than grid

• Bayesian optimization — learns from past runs, most efficient

# AWS Tools

• SageMaker Automatic Model Tuning (HPO) — manages multiple training jobs automatically

• SageMaker Autopilot — includes automated hyperparameter search as part of AutoML

# Best Practices

• Define an objective metric (e.g., validation accuracy, RMSE) before tuning

• Avoid overfitting by monitoring validation sets, not training sets

• Use early stopping to save compute cost and time

• Track experiments to compare hyperparameter configurations

# Exam Tips

• Hyperparameters ≠ learned parameters (weights, biases)

• Bayesian optimization is most efficient for HPO

• SageMaker Automatic Model Tuning is the go-to service for HPO

• Always use validation metrics, not training metrics, for tuning decisions