Gradient Boosting – Single-Slide Summary

What is Gradient Boosting?

- An **ensemble learning** technique that builds a strong model by combining many **weak learners** (typically decision trees).
- Learns by **sequentially minimizing errors** of previous models.

How It Works

1. **Initialize** model with a constant prediction (e.g., mean for regression).
2. **Iterate**:
- Compute **residuals** (errors) from the current model.
- Train a new decision tree to predict these residuals.
- Add the new tree to the model with a learning rate:

Key Features

- Uses **gradient descent** to minimize a loss function.
- Supports **regression**, **classification**, and **ranking** tasks.
- Controls overfitting via **shrinkage (learning rate)** and **tree depth**.

Pros & Cons

✅ High accuracy
✅ Works with diverse data
❌ Slower to train
❌ Sensitive to overfitting without tuning