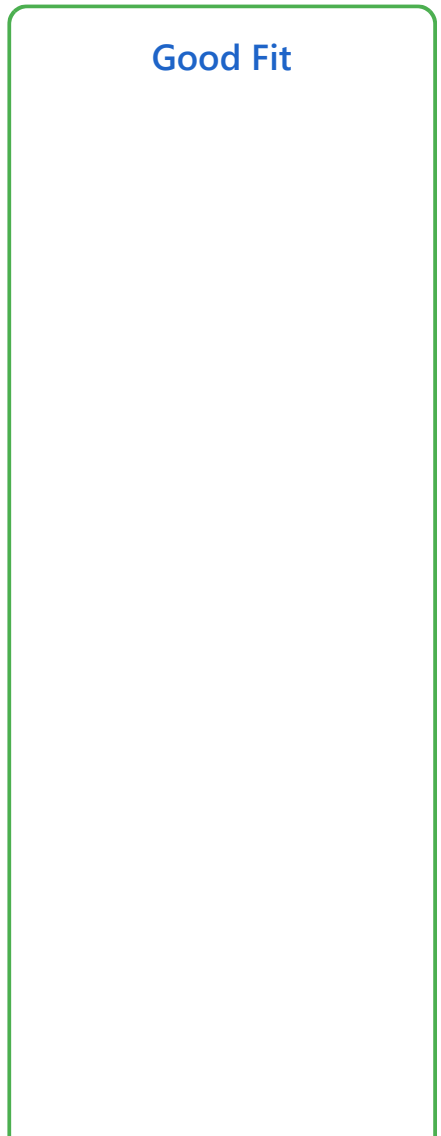
Model Performance: Learning Curves

Diagnosing Bias-Variance Tradeoff

Underfitting

Overfitting

Good Fit



Diagnosis

Underfitting

- Model too simple
- Add complexity/features

Overfitting

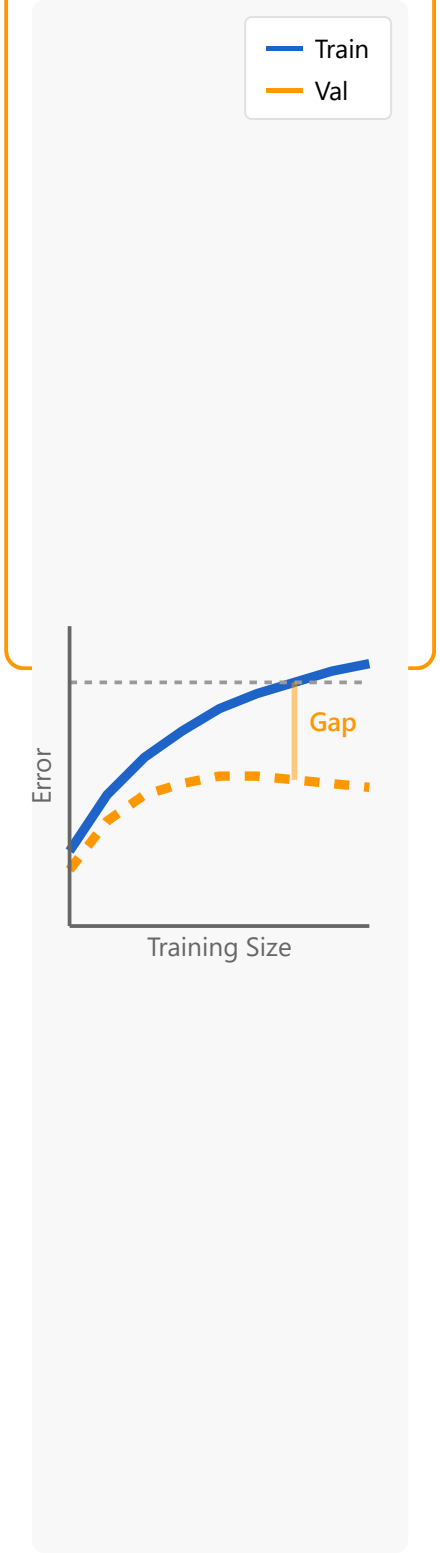
- More data helps
- Add regularization

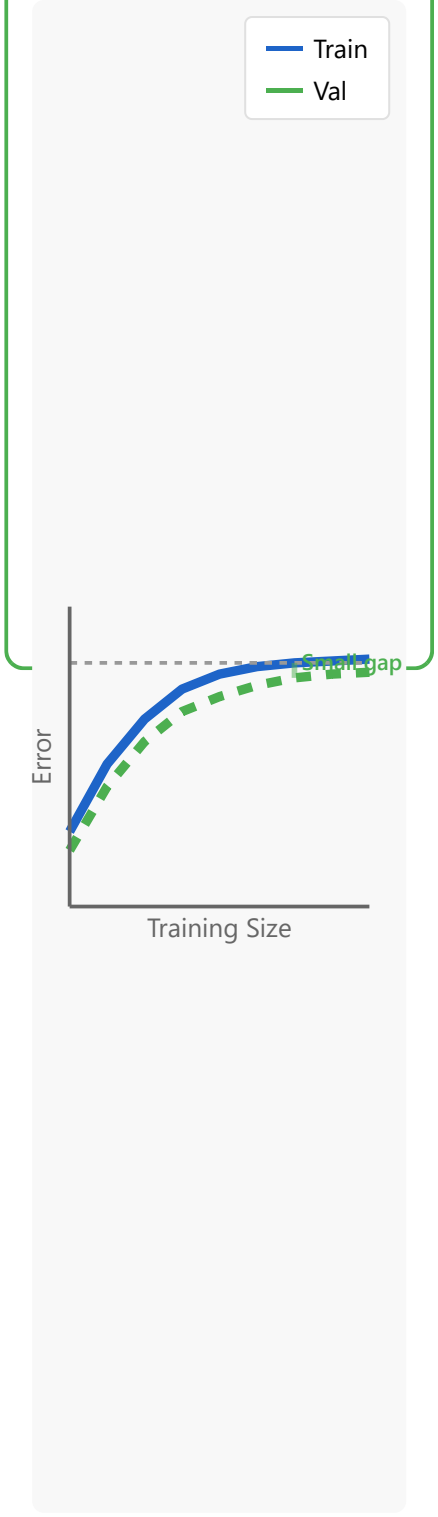
Good Fit

- Balanced complexity
- Near optimal performance

What to Plot

- Loss curves





- Accuracy / F1
- Confidence intervals
- Convergence monitoring

✓ Best Practices

- ✓ Use cross-validation
- ✓ Plot multiple metrics
- ✓ Monitor early stopping
- ✓ Compare train/val gap

High Bias	High Variance	Well-Balanced
Both plateau at poor performance	Large gap between curves	Curves converge near optimal