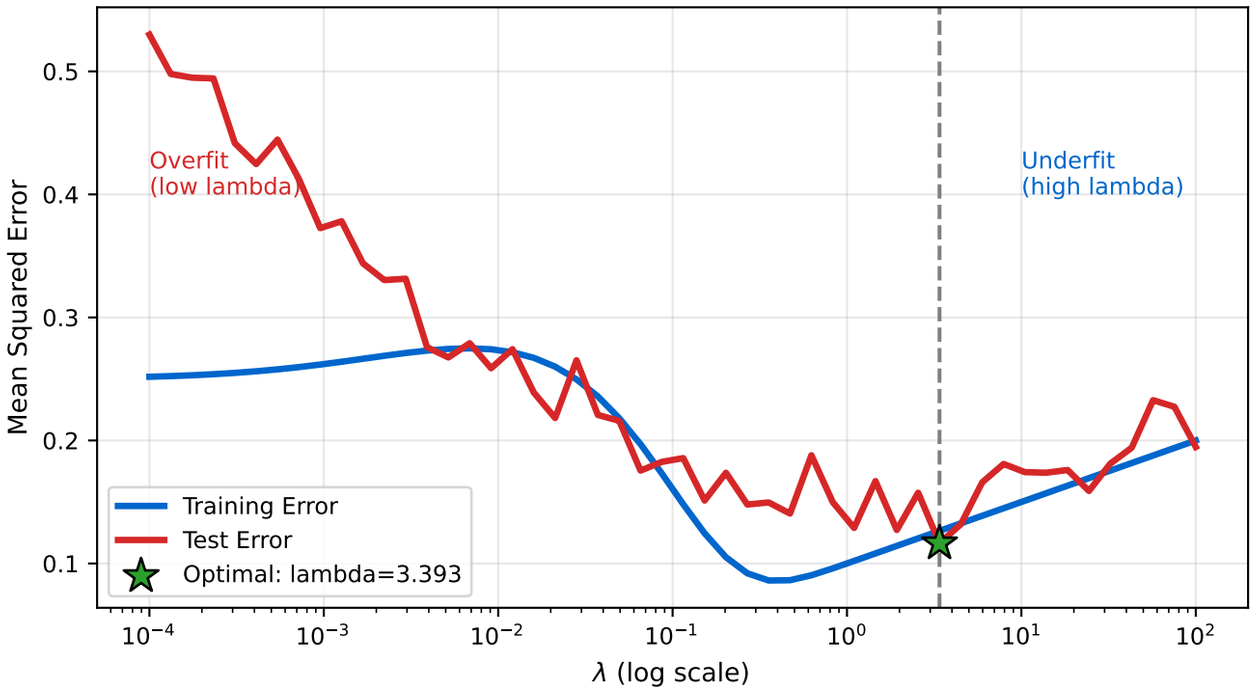
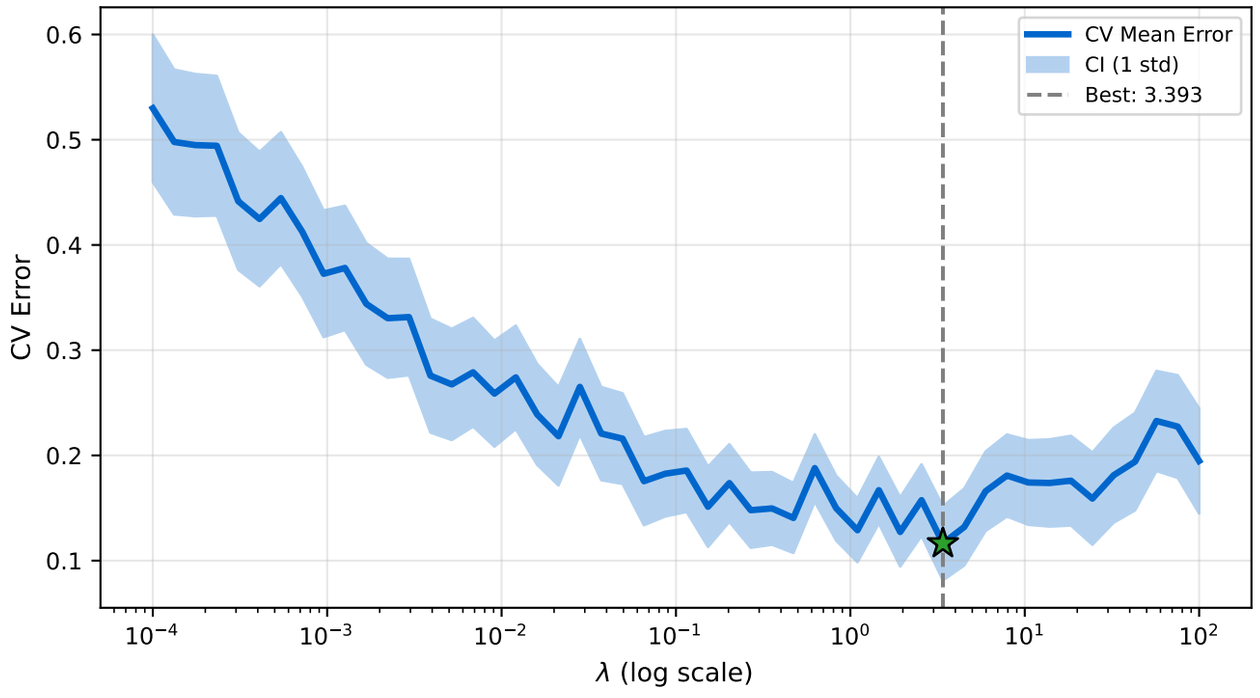
Tuning Lambda: Finding Optimal Regularization

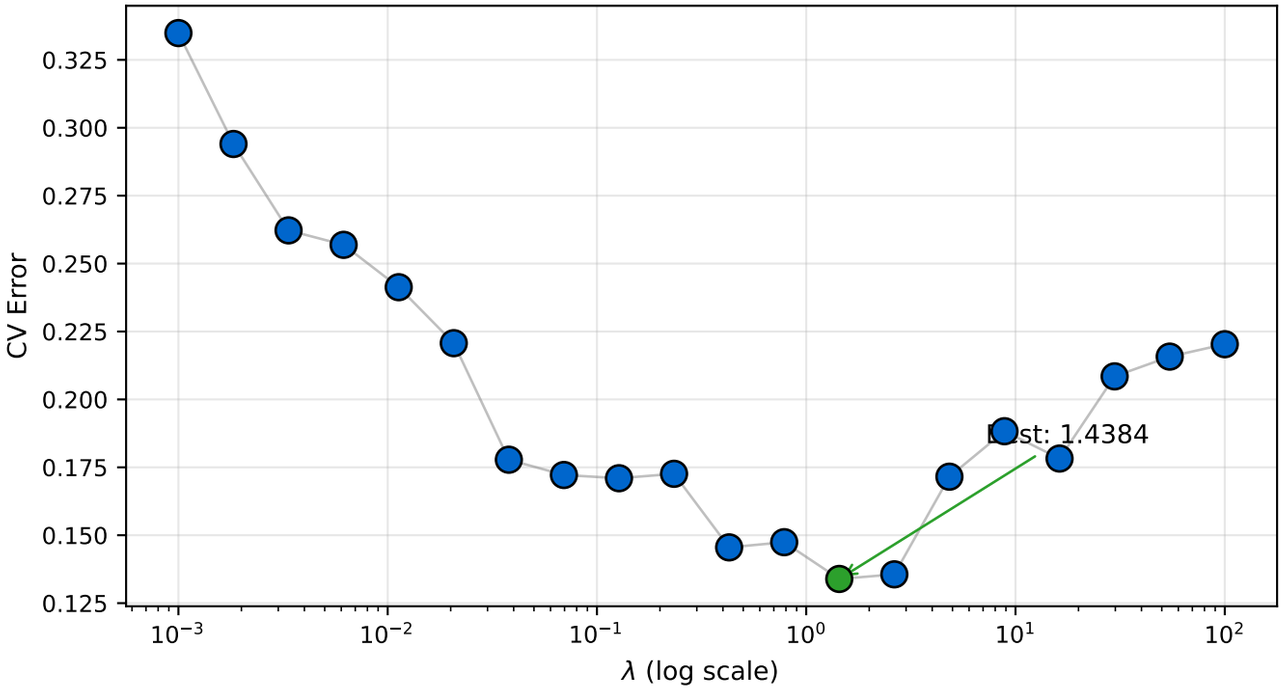
Train vs Test Error



Cross-Validation Error with Confidence



Grid Search: Evaluate Each Lambda



sklearn Code

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Lambda Tuning with sklearn

# Method 1: RidgeCV / LassoCV (auto tune)
from sklearn.linear_model import RidgeCV, LassoCV

# Define lambda values to try
alphas = np.logspace(-4, 2, 50)

# Ridge with built-in CV
model = RidgeCV(alphas=alphas, cv=5)
model.fit(X_train, y_train)
print(f"Best alpha: {model.alpha_}")

# Lasso with built-in CV
model = LassoCV(alphas=alphas, cv=5)
model.fit(X_train, y_train)
print(f"Best alpha: {model.alpha_}")

# Method 2: GridSearchCV (more control)
from sklearn.model_selection import GridSearchCV
from sklearn.linear_model import Ridge

param_grid = {'alpha': alphas}
grid = GridSearchCV(
    Ridge(),
    param_grid,
    cv=5,
    scoring='neg_mean_squared_error'
)
grid.fit(X_train, y_train)

print(f"Best alpha: {grid.best_params_['alpha']}")
print(f"Best score: {-grid.best_score_:.4f}")
```