Hands-on: Comparing Different SHAP Explainers

1 Load Dataset → 2 Train Models → 3 Apply Explainers → 4 Compare Results

Explainer	Speed (Relative)	Accuracy	Best Use Case
TreeSHAP Tree models	Fast (1x)	Exact	Random Forest, XGBoost, LightGBM
DeepSHAP Neural nets	Moderate (5x)	High	Deep learning, CNN, RNN models
GradientSHAP Differentiable	Moderate (4x)	High	Neural networks with gradients
KernelSHAP Any model	Slow (20x)	Approx	Model-agnostic, black-box models

Implementation Examples with Timing

TreeSHAP (XGBoost)

```
# Fast and exact
explainer = shap.TreeExplainer(model)
shap_values = explainer.shap_values(X)
# Time: ~0.5s for 1000 samples
```

DeepSHAP (Neural Network)

```
# Optimized for deep learning
explainer = shap.DeepExplainer(model, X_bg)
shap_values = explainer.shap_values(X)
# Time: ~2.5s for 1000 samples
```

GradientSHAP

```
# Gradient-based approximation
explainer = shap.GradientExplainer(model, X_bg)
shap_values = explainer.shap_values(X)
# Time: ~2s for 1000 samples
```

KernelSHAP (Any Model)

```
# Most flexible, slowest
explainer = shap.KernelExplainer(model.predict, X_bg)
shap_values = explainer.shap_values(X)
# Time: ~10s for 1000 samples
```