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# Rice Crop Yield Prediction

Empowering Indian Farmers with Data-Driven Insights

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# Revolutionizing Agriculture with Predictive Insights

## Objective:

Predict rice and wheat crop yields per acre in India.

## Why It Matters:

- Supports smallholder farmers to make informed decisions.
- Reduces poverty and malnutrition.
- Addresses food security challenges due to climate change.

# Understanding the Context and Data

## Business Context:

- 70% of Indian farmers are smallholders.
- Inconsistent yields lead to economic instability and malnutrition.

## Dataset Highlights:

- Year: 2022
- Variables: 43 features, including land preparation, fertilizer use, irrigation, and weather data.

# Building an Accurate Crop Yield Prediction Model

## Model Used: CatBoost Regression

- Handles non-linear relationships effectively.
- Works well with categorical and numerical data.

## Model Evaluation

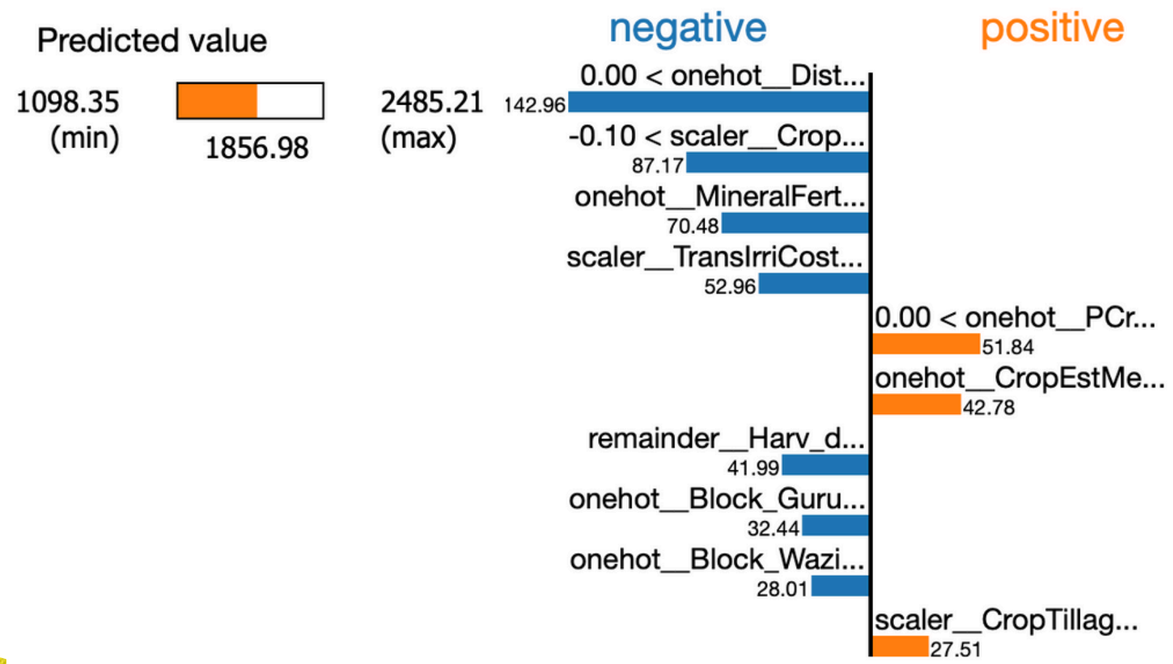
- Mean Absolute Error (MAE): 192.46
- R-squared ($R^2$): 0.67

# Interpretability Models:

- **LIME (Local Interpretable Model-Agnostic Explanations):**
- Explains predictions locally for individual cases, , answering "why this prediction?"

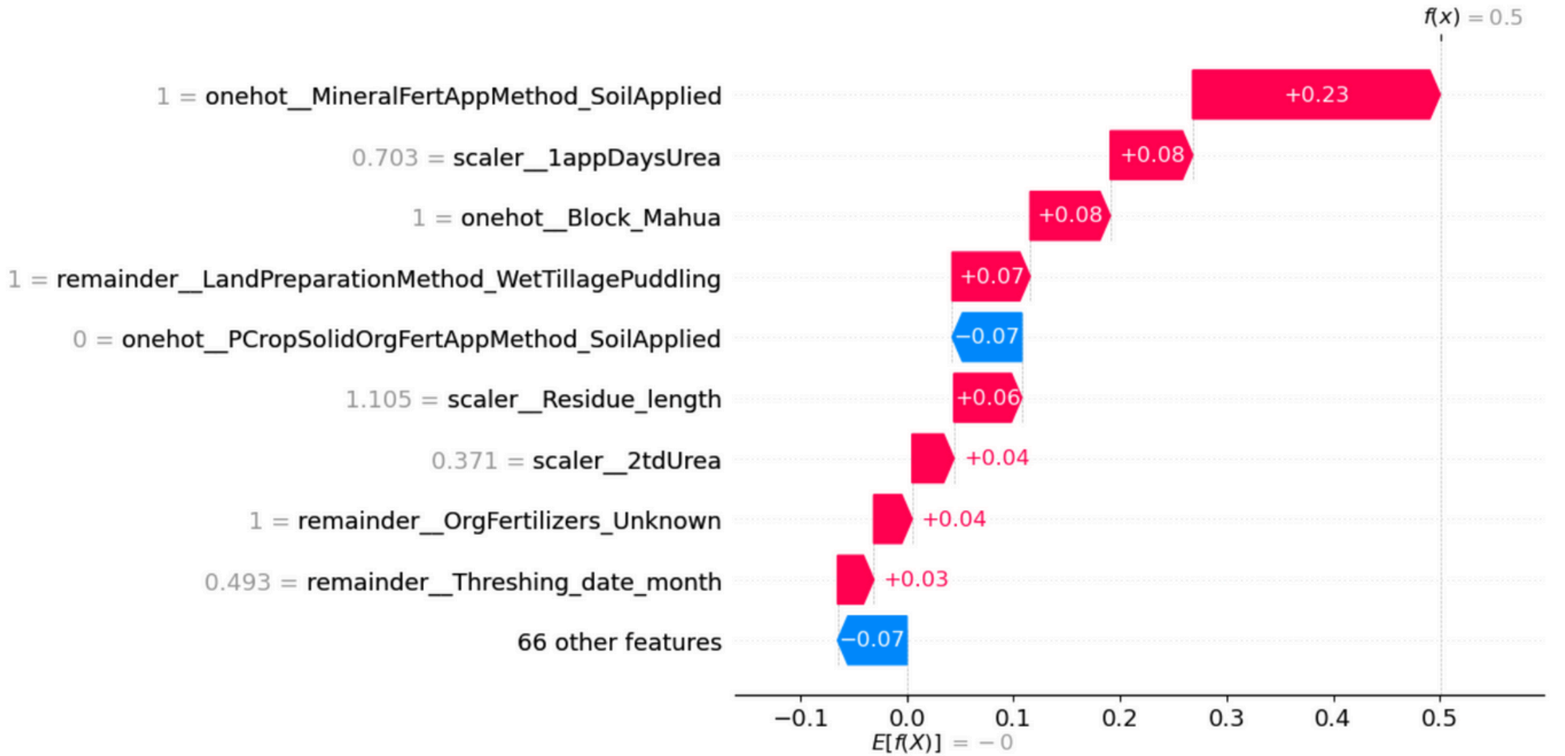
- **SHAP (SHapley Additive exPlanations):**
- Provides a broader view, showing which features have the most impact on predictions across all data.

# LIME




| Feature | Value |
|---|---|
| onehot__District_Vaishali | 1.00 |
| scaler__CropOrgFYM | -0.10 |
| onehot__MineralFertAppMethod_SoilApplied | 0.00 |
| scaler__TransIrriCost | 0.29 |
| onehot__PCropSolidOrgFertAppMethod_SoilApplied | 1.00 |
| onehot__CropEstMethod_Manual_PuddledLine | 0.00 |
| remainder__Harv_date_month | 0.12 |
| onehot__Block_Gurua | 0.00 |
| onehot__Block_Wazirganj | 0.00 |
| scaler__CropTillageDepth | -0.44 |

# SHAP


f(x) = 0.5
1 = onehot__MineralFertAppMethod_SoilApplied
0.703 = scaler__1appDaysUrea
1 = onehot__Block_Mahua
1 = remainder__LandPreparationMethod_WetTillagePuddling
0 = onehot__PCropSolidOrgFertAppMethod_SoilApplied
1.105 = scaler__Residue_length
0.371 = scaler__2tdUrea
1 = remainder__OrgFertilizers_Unknown
0.493 = remainder__Threshing_date_month
66 other features
+0.23
+0.08
+0.08
+0.07
−0.07
+0.06
+0.04
+0.04
+0.03
−0.07
−0.1
0.0
0.1
0.2
0.3
0.4
0.5
E[f(X)] = −0

# Recommendations

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.

# Thank You