

Hurricane Impact on Florida Real Estate Value

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Business Problem

- Florida is constantly being struck by devastating hurricanes that destroy homes and affect real estate
- Our client, a real estate agency, wants to know how best to invest in hurricane stricken areas



The Solution

Data: Data from 2004 to 2022 from Zillow and the National Oceanic and Atmospheric Administration (NOAA) were used to look at home value and wind speed from six different hurricanes

Model: An XGBoost Classification Model was built and validated using recent hurricane data

Metric: Model accuracy, F1 score, and AUC value were used to assess model performance.

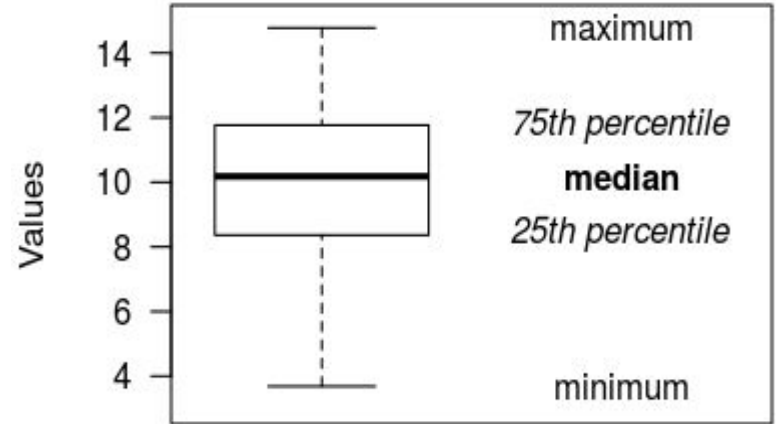
Data





Target Variable

If the percentage change in the value of a home was in the 75th percentile six months after a hurricane it was considered to be in the category 1, if not then 0.





Features and Correlation With Target Variable

Features:

AWND: Average daily wind speed (miles per hour)

WSF2: Fastest 2-minute wind speed (miles per hour)

SizeRank: Numerical rank of size of cities, ranked 0 through 30,132

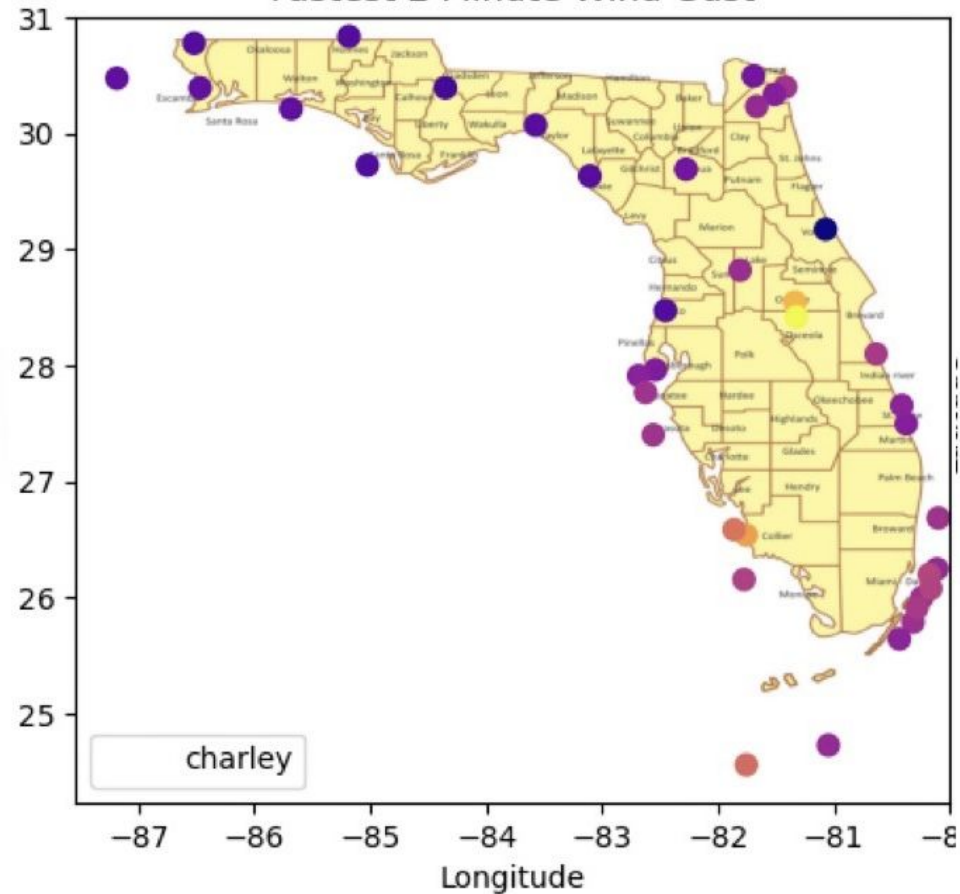
before: Home value six months before the hurricane

| Feature Correlation | |
|---------------------|------|
| Before | 0.2 |
| AWND | 0.19 |
| WSF2 | 0.14 |
| SizeRank | 0.11 |

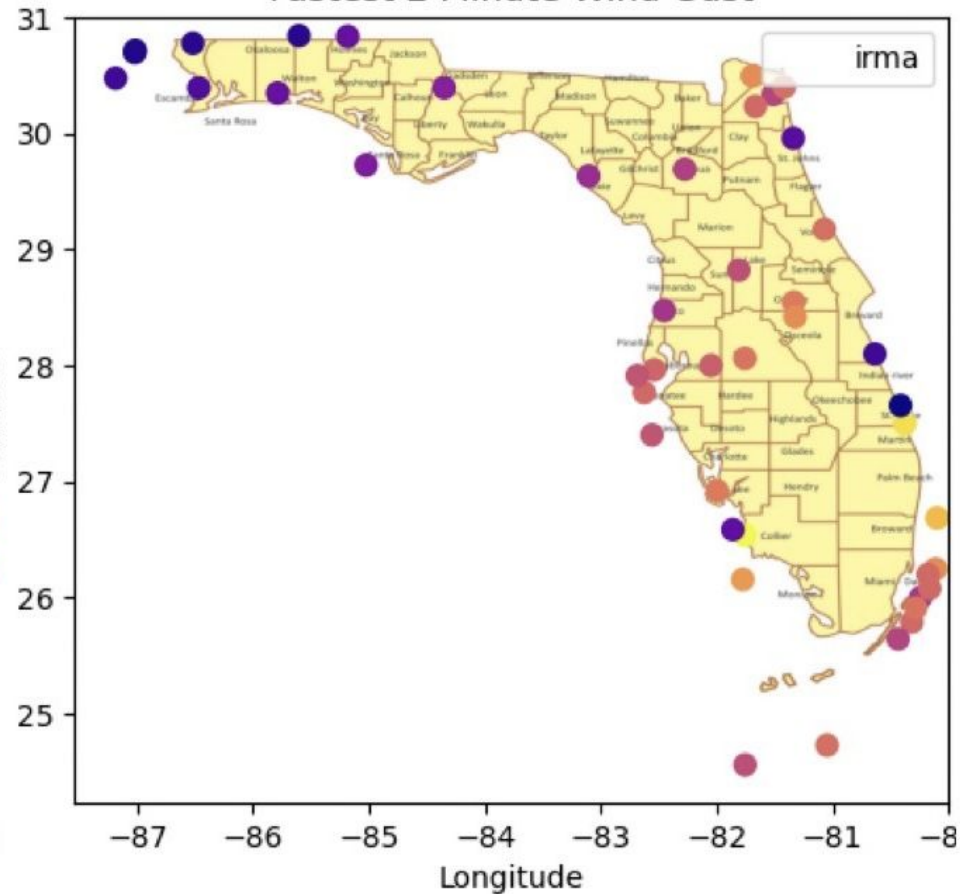
Hurricanes and Wind Speed



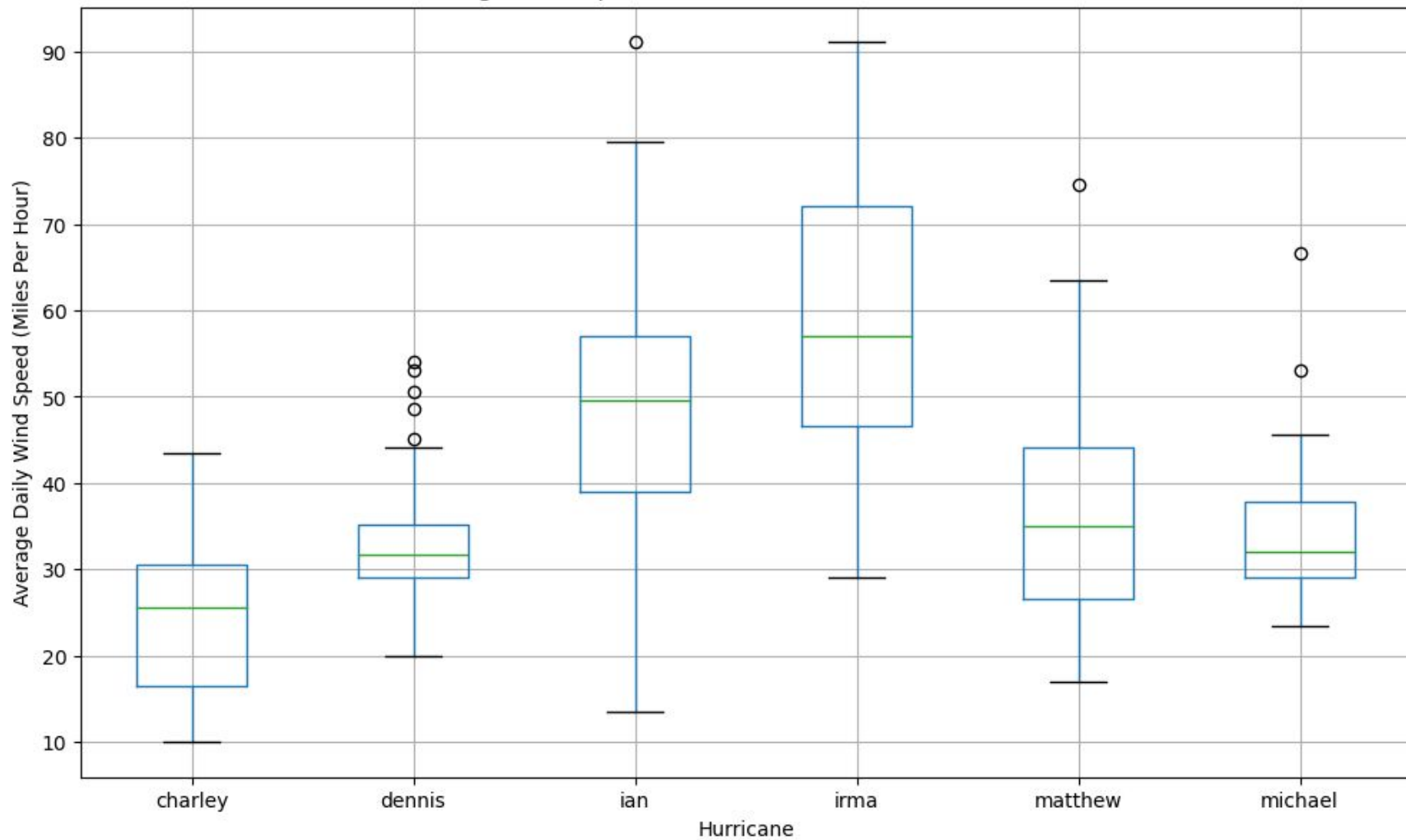
Fastest 2 Minute Wind Gust



Fastest 2 Minute Wind Gust



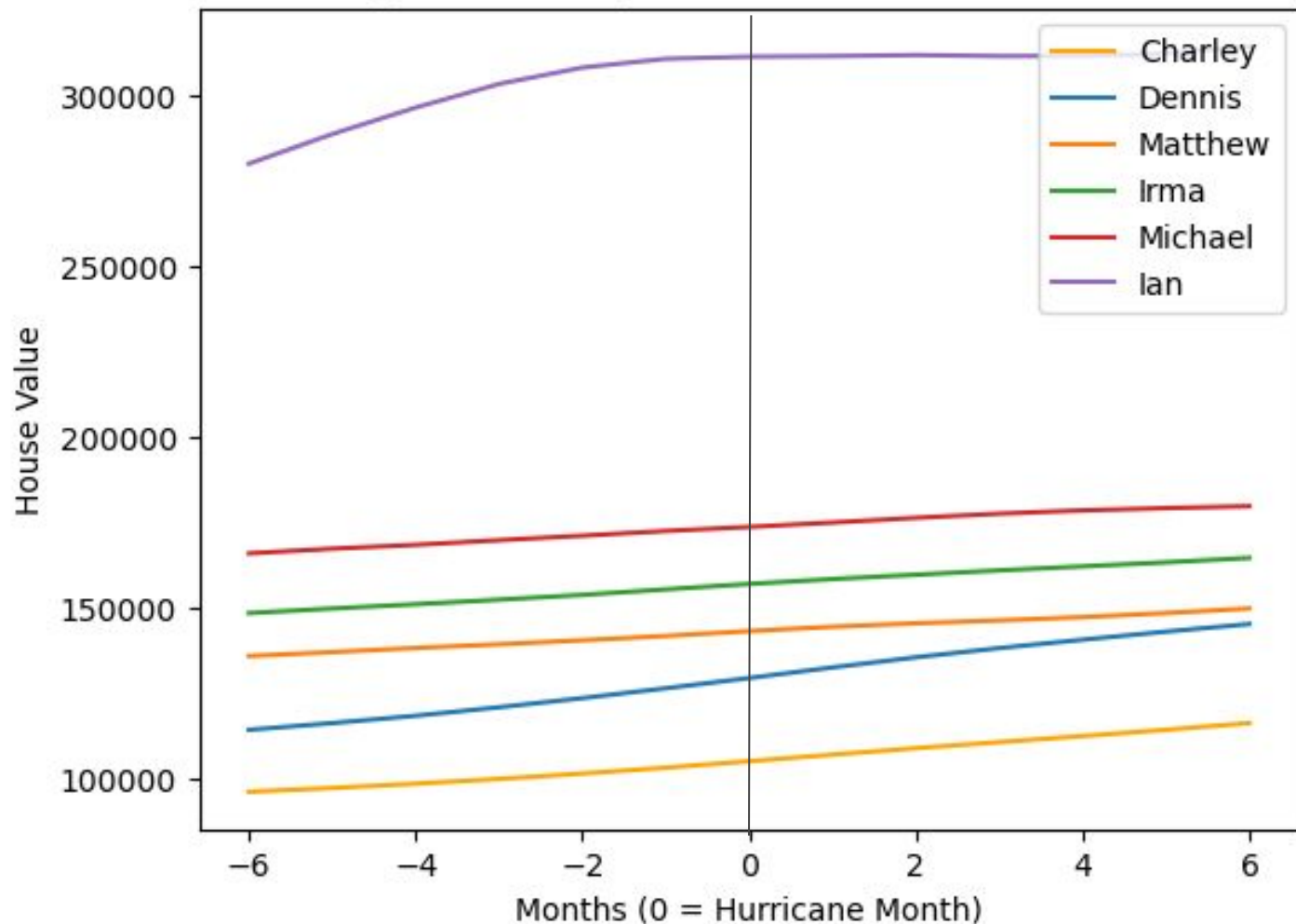
Average Wind Speed for Duration of Hurricane in Florida



Home Value



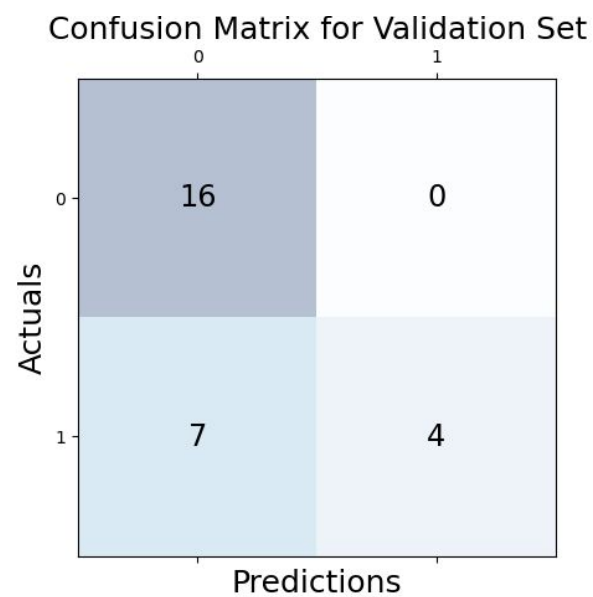
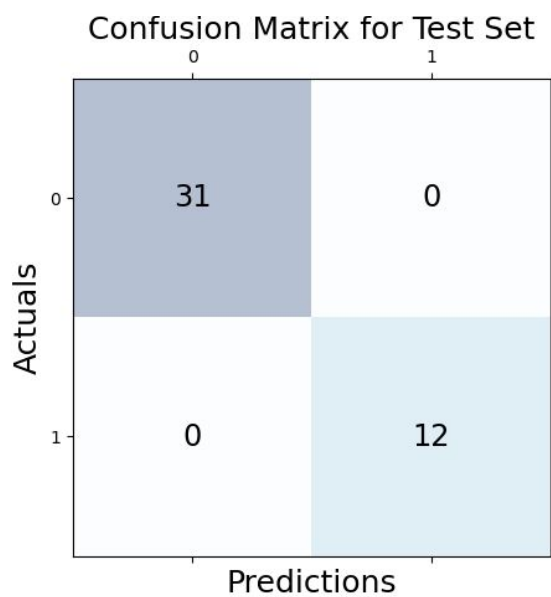
Bottom Tier Housing Value Change Six Months Before and After Each Hurricane



Results

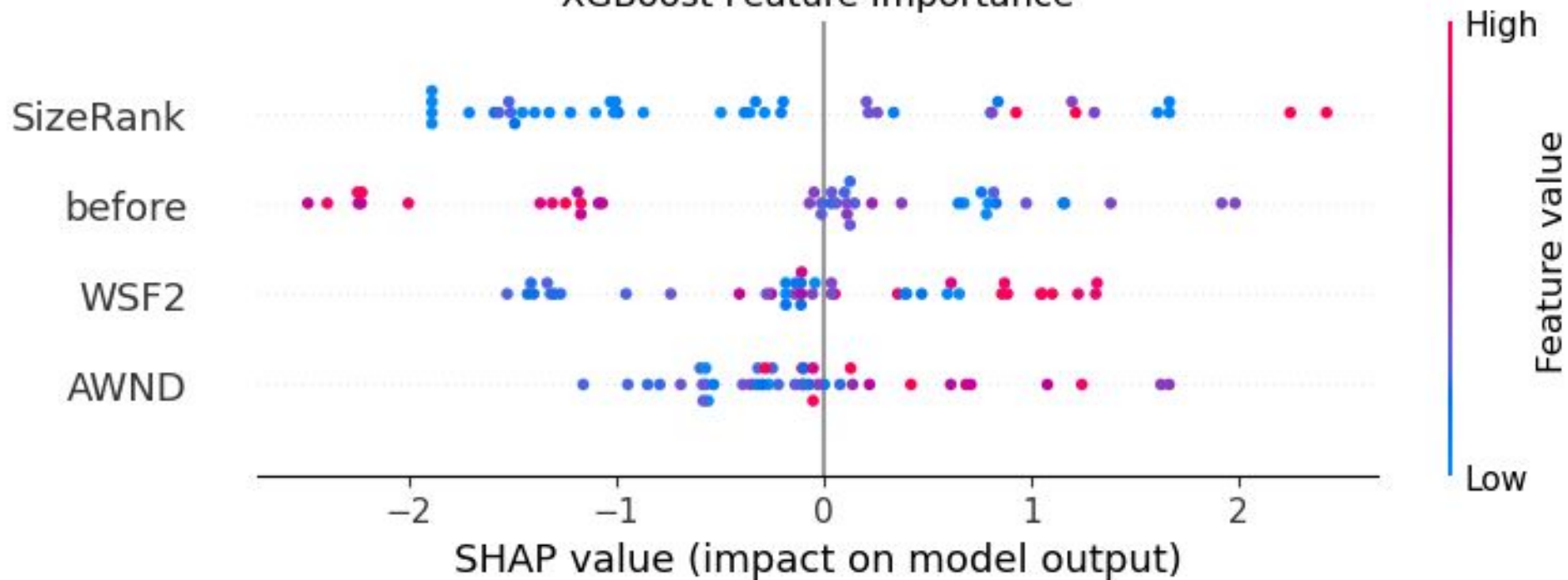


| | | | |
|--|---|--|---|
| Actuals | Home Value Did Not Increase More Than 75% | True Negative (TN): Home value predicted not to increase and home value did not increase | False Positive (FP): Home value predicted to increase and home value did not increase |
| | Home Value Increased More Than 75% | False Negative (FN): Home value predicted not to increase, but home value did increase | True Positive (TP): Home value predicted to increase and home value did increase |
| Hurricane Impact on Real Estate in Florida Confusion Matrix | | Home Value Did Not Increase More Than 75% | Home Value Increased More Than 75% |
| | | Predictions | |



| Metrics | Test Set | Validation Set |
|----------|----------|----------------|
| Accuracy | 1 | 0.741 |
| F1 | 1 | 0.533 |
| AUC | 1 | 0.92 |

XGBoost Feature Importance





Recommendations

- Looking into larger cities and regions with lower than average home prices
- Wind speed features do slightly improve model performance and have a correlation with the target variable that is similar to that of SizeRank and before prices
- Use the model to attempt to buy homes after the next hurricane to see if the model is effective in making business decisions



Further Improvements

- Continue collecting data as new hurricanes hit Florida
- Looking at a different region which is impacted by hurricanes, such as Texas, to see how flexible the model is

Thank You!
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