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: Train and test several **classification models**.

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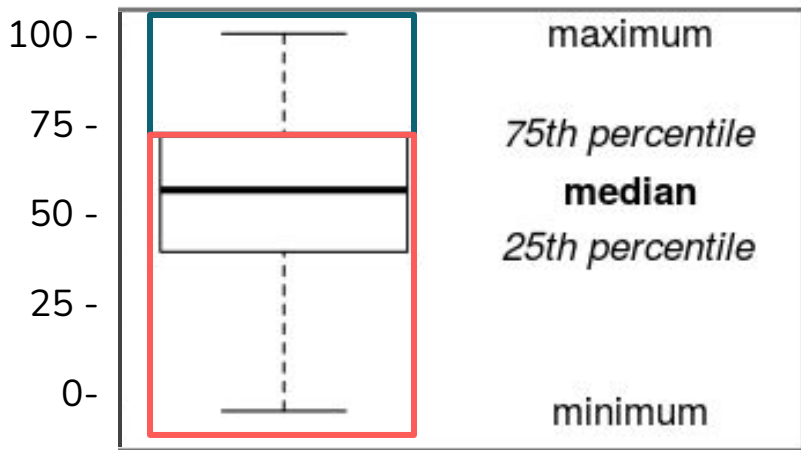
Data

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 **category 0**.

Features and Correlation With Target Variable

Features:

before: Home value six months before the hurricane

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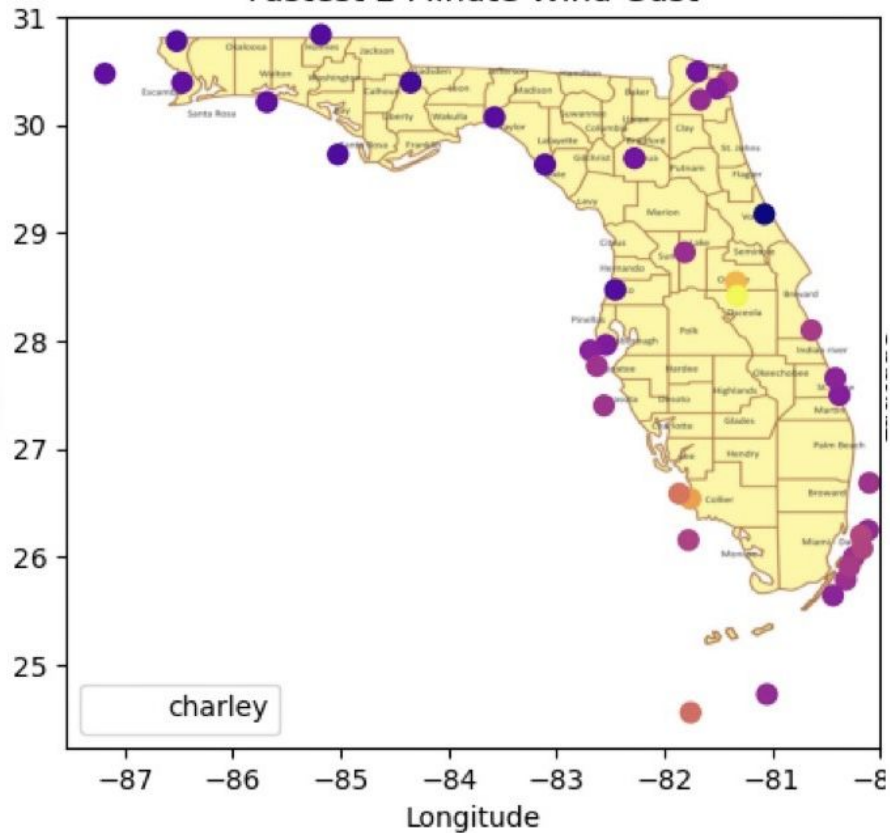
WSF2: Fastest 2-minute wind speed (miles per hour)

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

Feature Correlation	
Before	0.2
AWND	0.19
WSF2	0.14
SizeRank	0.11

Hurricanes and Wind Speed
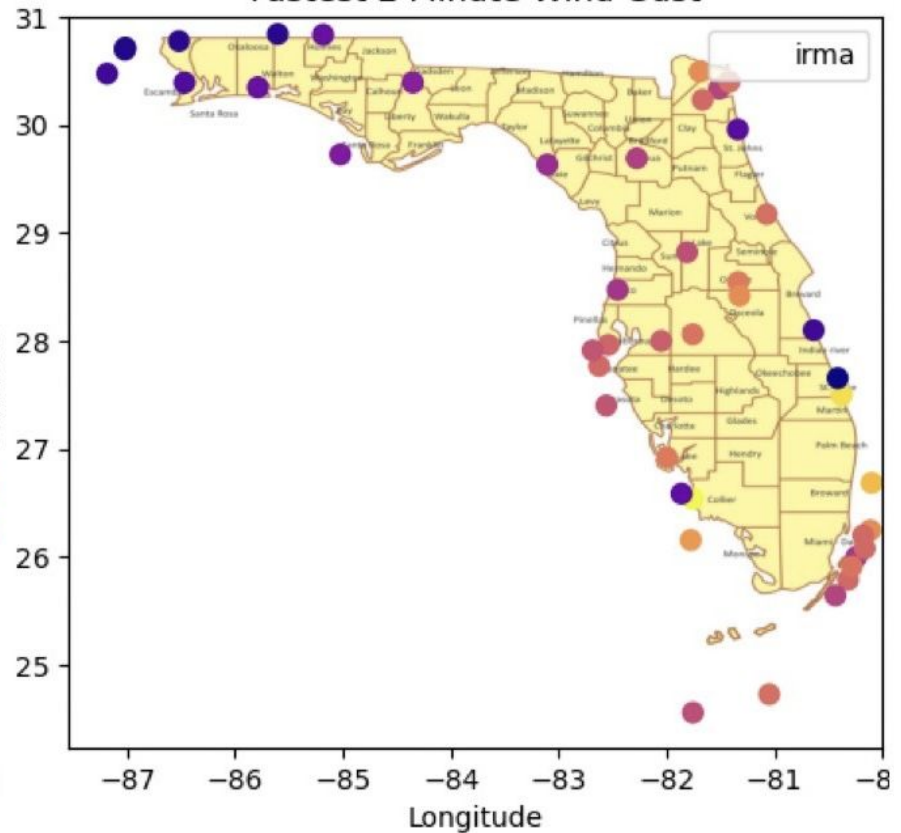
Hurricanes are unique in their path and damage.

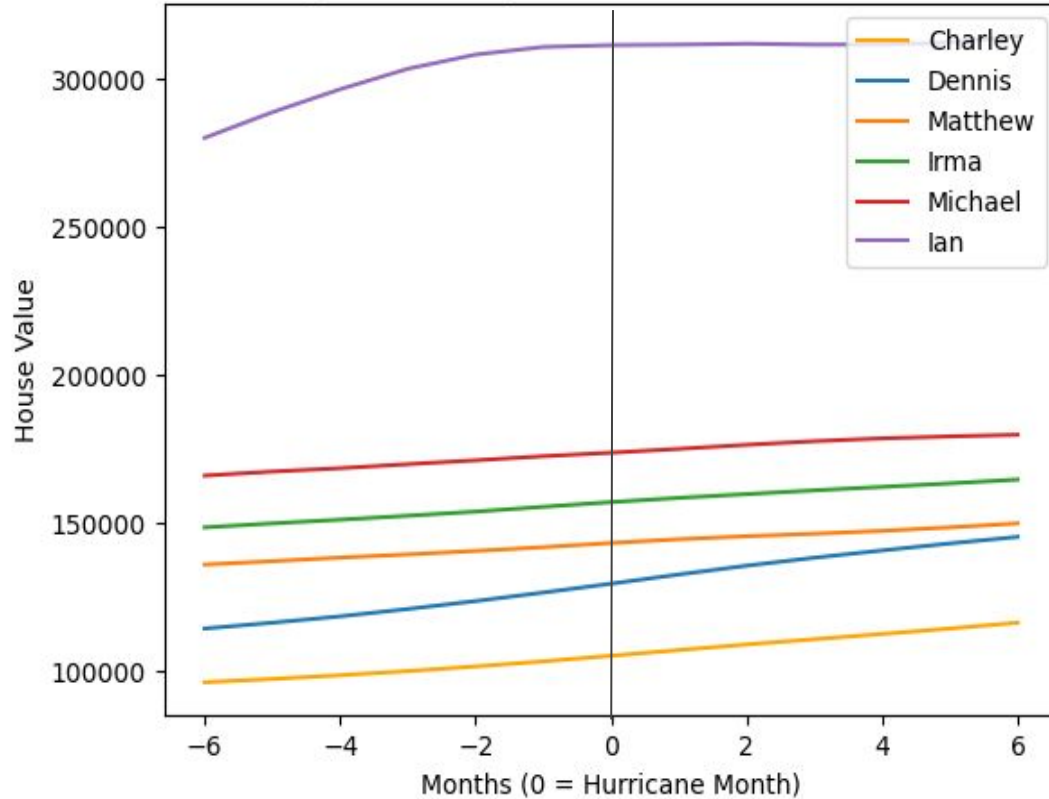Average Wind Speed for Duration of Hurricane in Florida
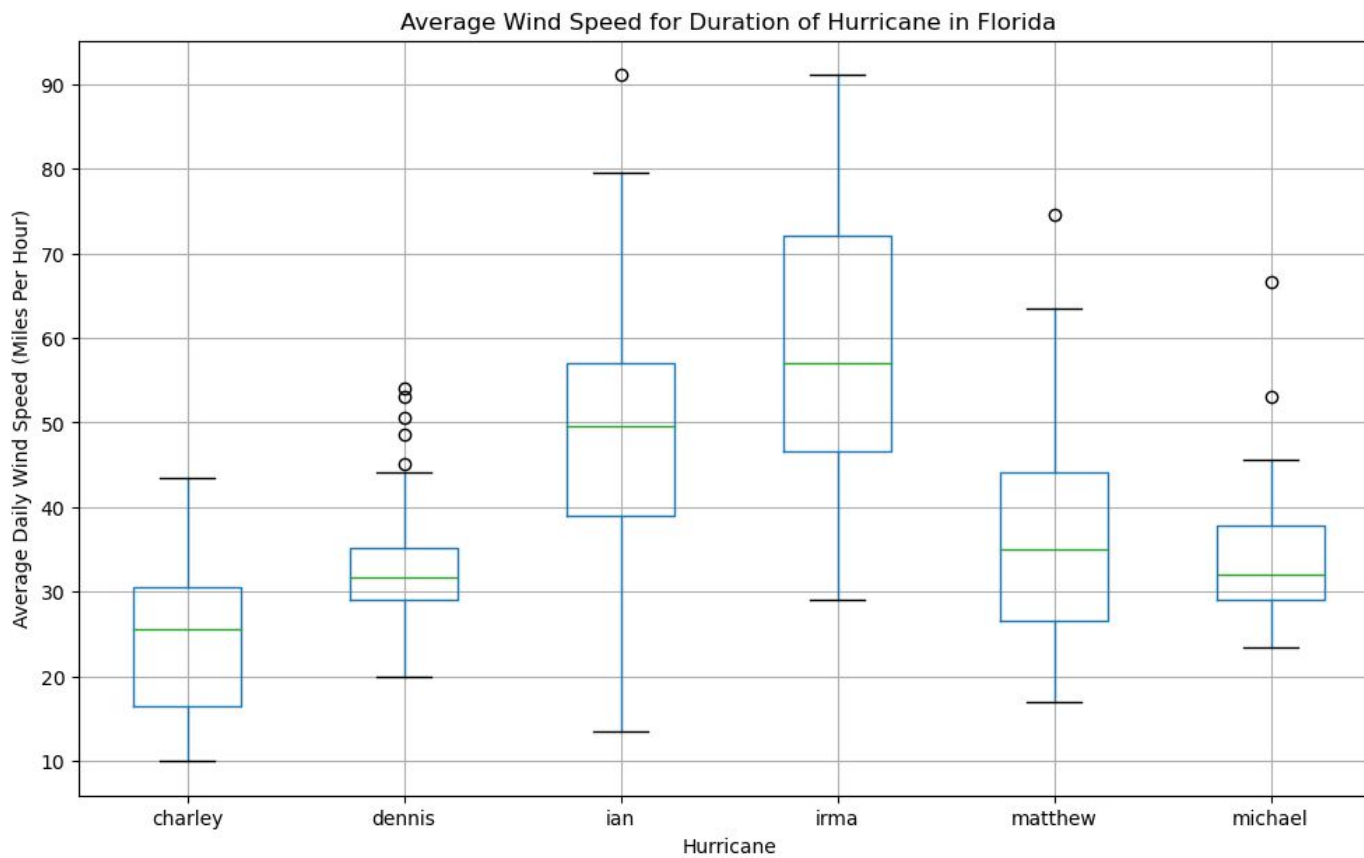
The largest and most devastating hurricane was Irma.

Home Value

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

Home value increased after all hurricanes.

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	

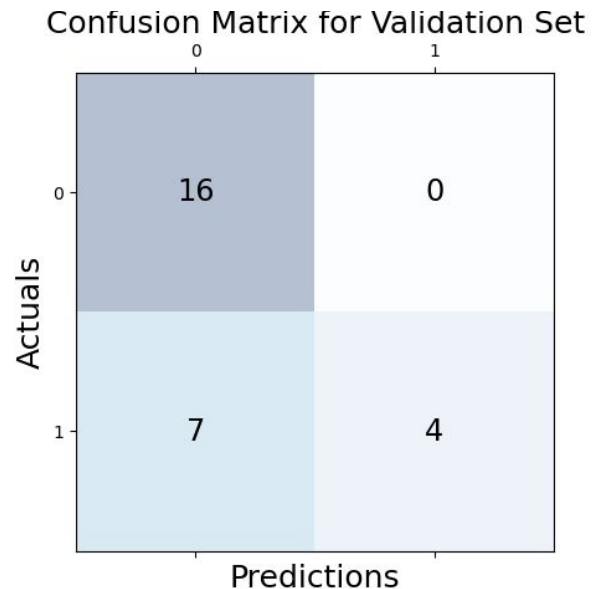**False Positives** and **False Negatives** are of equal importance.

Final Model: XG Boost

Confusion Matrix for Test Set

Metrics	Test Set
Accuracy	1
F1	1
AUC	1

The best model had **perfect predictions.**

Model Validation

Confusion Matrix for Validation Set

	Predictions 0	Predictions 1
Actuals 0	16	0
Actuals 1	7	4

Metrics	Validation Set
Accuracy	0.741
F1	0.533
AUC	0.92

7 out of **27** predictions were **False Negatives.**
0 out of **27** predictions were **False Positives.**
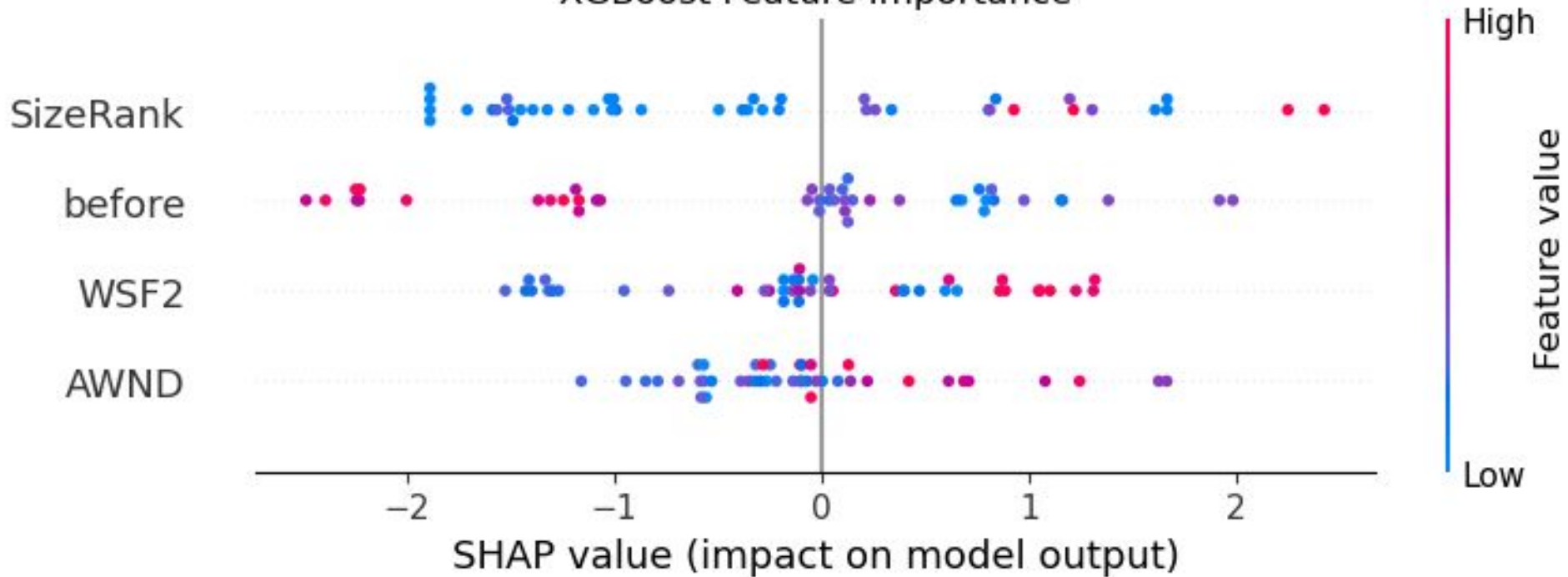
Pinker values have higher impact on model output

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 **XG Boost 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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