



CA ZIP Premium Predictor

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California's Home Insurance Crisis

The 2025 LA wildfires caused \$250 billion in damages and \$40 billion in insurance claims, prompting insurers to retreat and largely stop issuing home policies in California

WHO, WHAT, WHY



WHO

Insurance Companies

Determining ZIP Code premiums and whether its underpriced, overpriced or adequately priced based on historical risk

WHAT



WHY

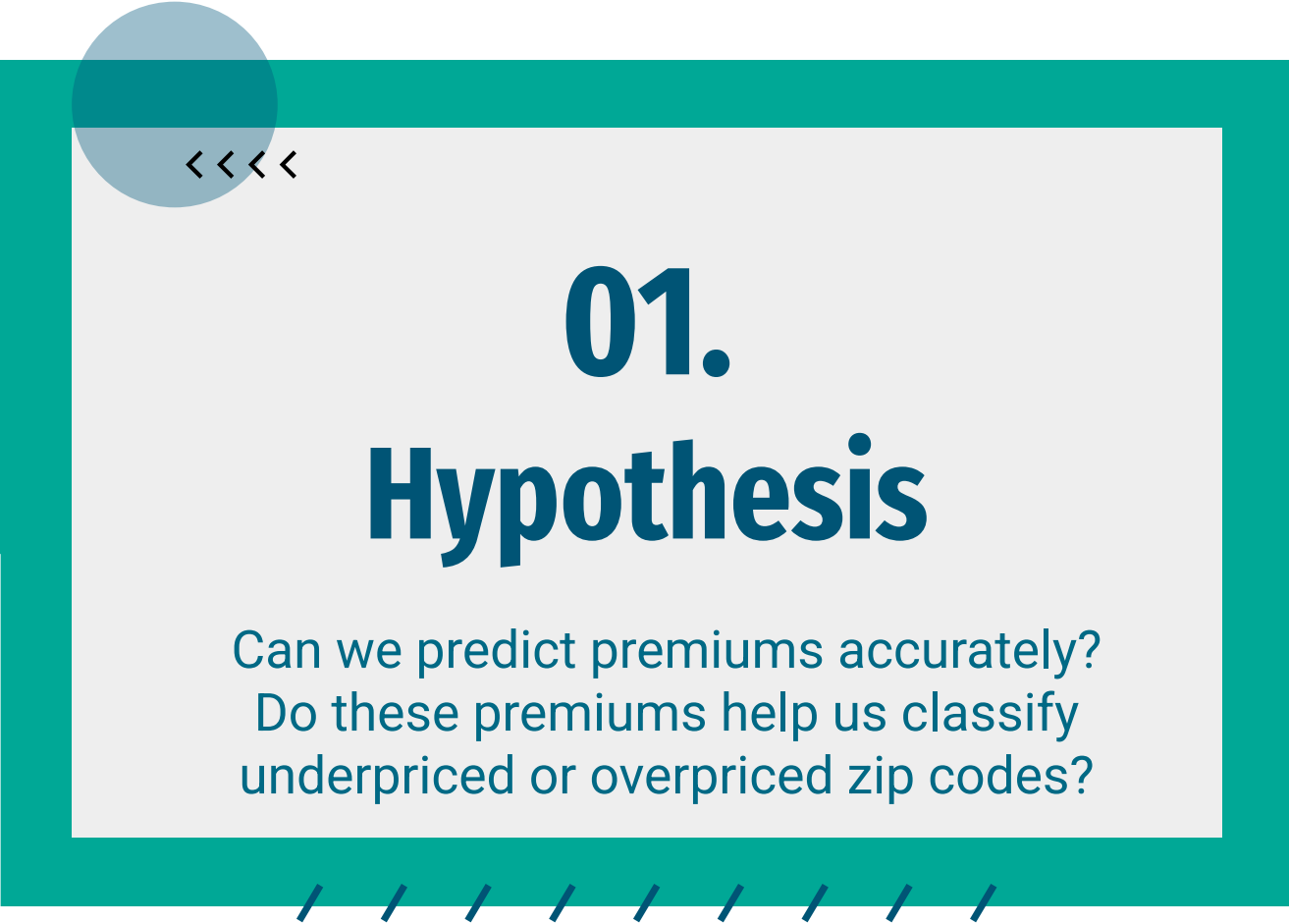
To aid in future adequate pricing and reduce losses



<<<<

01. Hypothesis

Can we predict premiums accurately?
Do these premiums help us classify
underpriced or overpriced zip codes?



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Understanding premiums



Premium

The amount charged to insure a home for one year
Example: covers wildfire damage



Exposure

The amount of risk the insurer is covering.
Usually: 1 home = 1 exposure



Why these terms matter?

We are determining if the insurer earns the equivalent amount of premium for each unit of risk



What factors do insurers typically use?



Property

Home value - age - prices



Location

Wildfire risk - fire protection



Experience

Loss history - severity trends



Census

Housing age, pop density,
median income



Public Hazard

CALFire, fault line locations



Premiums

Revenue per exposure,
ZHVI scores

Data Collection

WildFire Data

- GIS Fire.CA.gov mapping data
- Convert from geo latitude/ longitude to numerical factors

Census Data

- Yearly data from census bureau, needed to be filtered to state and compatible zip-codes

Earthquake Data

- USGS fault activity map
- Convert latitude/longitude to zipcode data



ZHVI Score

- Zillow databases filtered by country, further filtration required to convert location to zip-codes

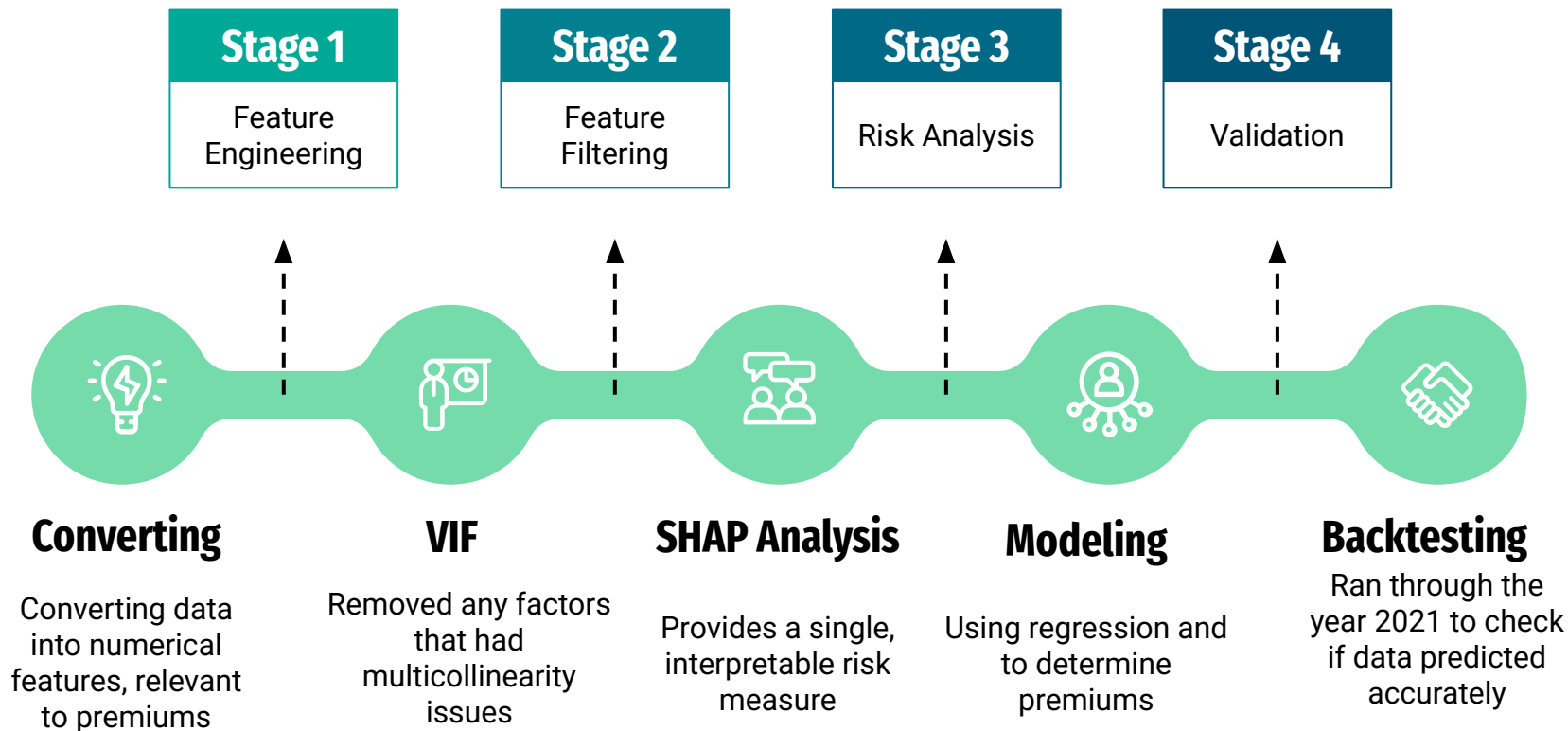
Fire Station Mapping

- Convert wildfire first responder data to their zip-code locations for more accurate localization

Premiums / Exposures







- Found clean, well-formatted California insurance data on Kaggle

Processing Data



Models Comparison

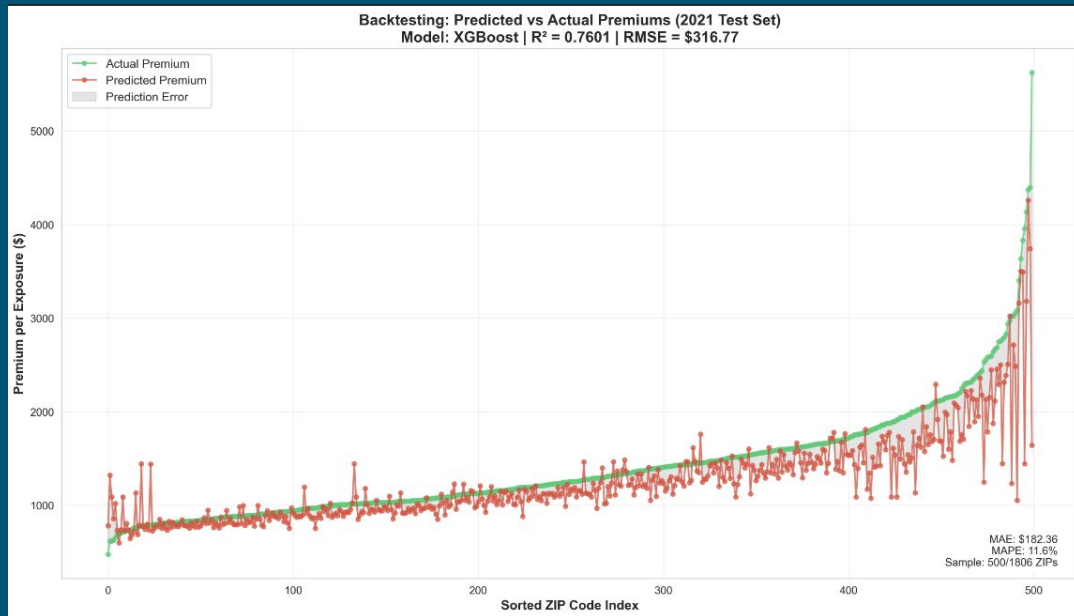


		Models	MAE	RMSE	R2
 Random Forest Naturally robust to noise	RF		\$194.54	\$326.27	0.7454
	XGB		\$182.36	\$316.77	0.7602
	SVR		\$341.93	\$519.24	0.1643
 XGBoost Excels at capturing complex patterns					
 SVR Can capture complex patterns					

Which is the best model?

XGBoost, it combines gradient boosting with regularization so its the best at handling nonlinearity and feature interactions

How Do We Verify?



Predicted vs
actual
premium trend
closely
matched



02.

PRODUCT DEMO

California zip premium predictor

Limitations & Future Improvements



Data Limitations

Public data only (no homeowners level features)

Why? California privacy laws limit how much data is publicly available especially to the individual scale



Model Assumptions

Predicts expected premium per exposure rather than losses

Similarly, finding loss data was limited due to privacy restrictions



Next Steps

If given, add internal insurer loss and policy data

Along with extending and including recent year data



03.

BUSINESS

APPLICATIONS

What insurers can do?



SUPPORT RATE FILINGS

Use zip-level mispricing data for regulatory filings or rate changes

OPTIMIZE PORTFOLIO

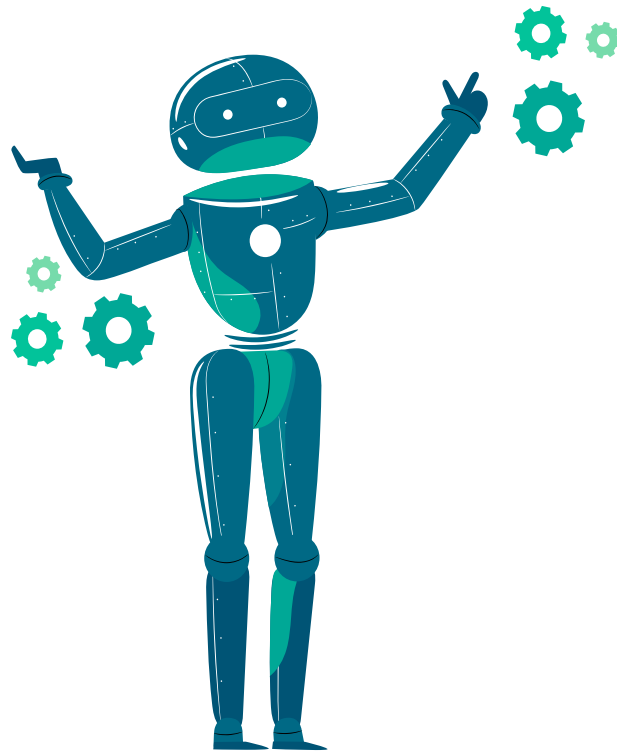
Grow in fairly pricing ZIPs, reprice or exit underpriced high-risk ZIPs

MONITOR RISK PROACTIVELY

Update as hazard and economic data change to stay ahead of losses

GAIN COMPETITIVE EDGE

Offer better risk-aligning pricing, before competitors



Thank you!!

Any questions!

Project Github: <https://github.com/sandrasri/CaliforniaHousingPremiums.git>

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