# MACHINE LEARNING METHOD FOR PROPERTY VALUE FORCASTING

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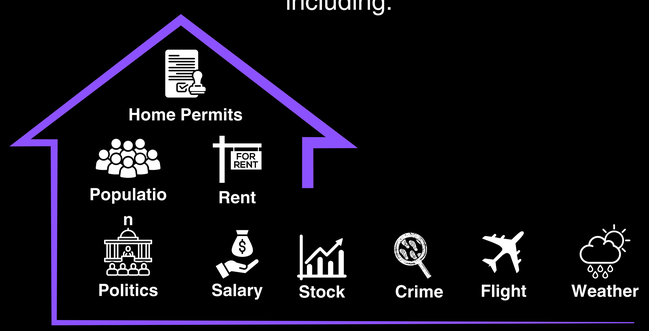
## Introduction:

Property investment is highly valued by realtors, investors, families, renters, and landlords, each seeking to maximize their financial outcomes. Our objective was to develop methods for forecasting home values, using Zillow's Home Value Index (ZHVI) as a proxy.

## Data:

To train a robust model for predicting home values, we gathered a wide range of relevant features, including:




## Methods:

We used multiple methods to forecast ZHVI, starting with baseline models and then training the following models to compare the nuances of each approach.

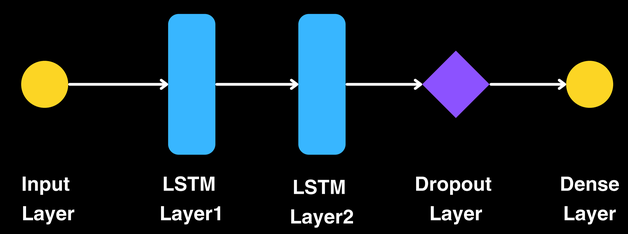
LSTM — LONG SHORT-TERM MEMORY

ARIMA — AUTOREGRESSIVE INTEGRATED MOVING AVERAGE

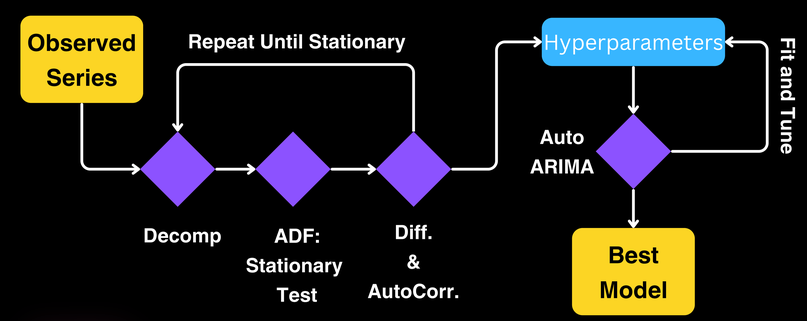
DQN — REINFORCEMENT LEARNING

## LSTM:

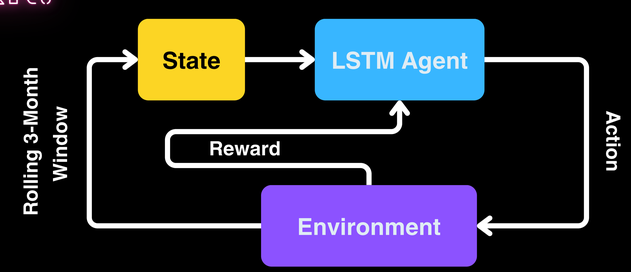
The LSTM network excels at capturing both long-term and short-term dependencies in data, making it particularly effective for predicting ZHVI. Below is the final LSTM architecture that was trained:




## ARIMA:




## DQN:




## Result:

For each method, we trained different models for various cities and compared the results with the baseline models. The performance varied across cities, and below are the best models for each approach :

| | | |
|---|---|---|
| LSTM | ↑ 82.28% | Compare to the Baseline Model |
| ARIMA | ≈ 10 | Months of Performant Forecasts |
| DQN | ≈ 0.9 | Within the Optimal Reward |

## Conclusion & Future Work:

The team successfully developed proxies for macroeconomic factors, contributing to a better understanding of property value fluctuations. However, the reliance on proprietary data and limited granularity highlighted the need for further exploration and refinement, including more comprehensive data collection and improved interpolation techniques. Future work could expand the model's applicability by incorporating additional cities and refining methods to enhance accuracy and generalizability.

## Link to the Report:

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