Automated Property Valuation Model

Commercial Real Estate Service Firm

Developed and deployed an Automated Property Valuation Model using Historical sales data and external attributes such as local economic & demographic indicators and places of interest data to predict price/sq. ft., Cap rates, expected rent etc..

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Automated property valuation model for real estate firm

Automated Property Valuation Model

Situation

- Client saw an opportunity to automate property valuations as manual process was considered time-consuming, subjective & expensive.
- Partnered with the client to develop an Automated Valuation Model (AVM) using Historical Property Sales and other Attributes such as local Economic & Demographic Indicators and Places of Interest data.

Accordion Value Add

- Developed a Customized Valuation Framework that delivers business interpretable outcomes following a comprehensive review of all existing manual valuation methods for different property types (Residential, Office, Industrial and Retail).
- Trained a Machine Learning Valuation Model that offers flexibility to appraisers to identify comparable properties in a certain geography such as county, city & state.
- Enriched the outcomes of valuation model through integrating various relevant third-party data sources for Geographical Location, Places of Interest near the property, Locally prevailing Demographics and Economics, Rental Data etc.
- Built Machine Learning models to estimate key property valuation drivers such as Capitalization rate, Rent, Expected Gross Income and Net Operating Income for each property.

Impact

- Client can now value properties at scale in less than one hour for a valuation compared to five days previously.
- Model is extended to the top-12 revenue generating States in the US producing consistent results.

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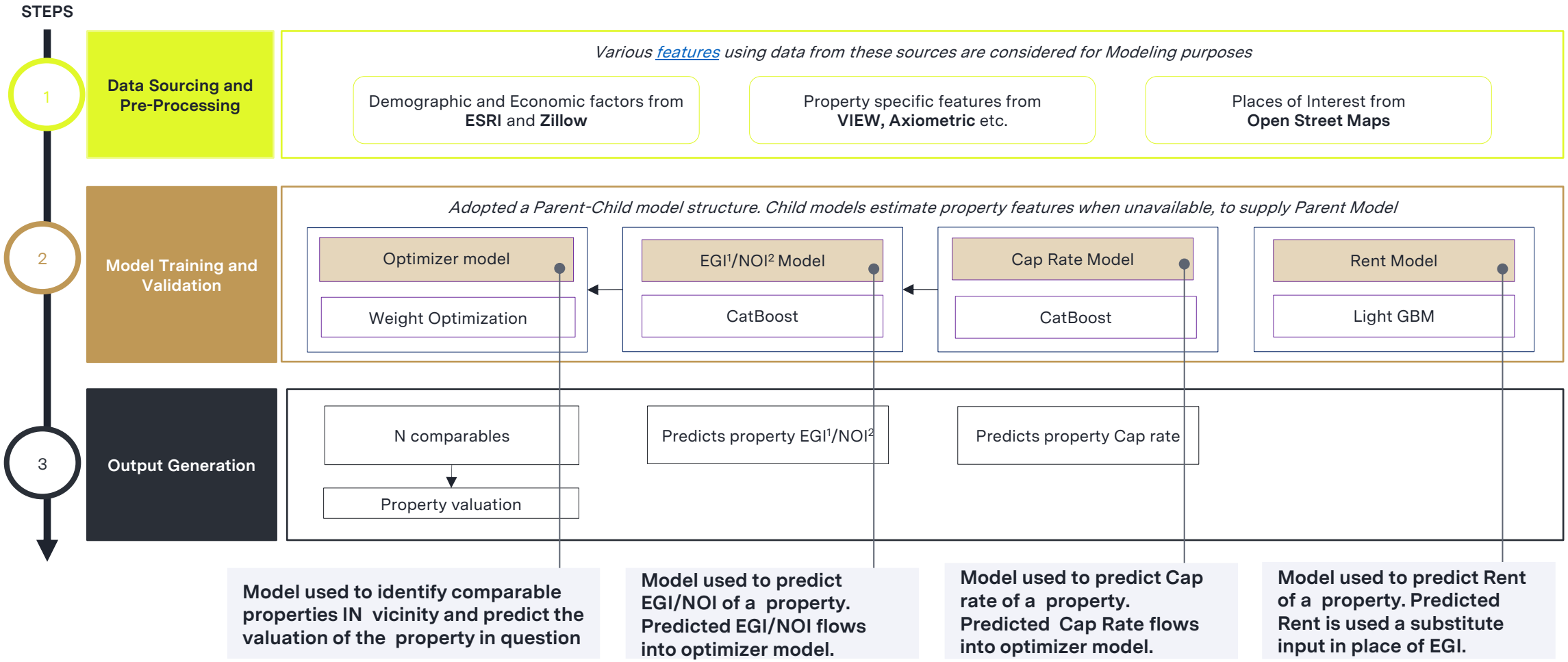
Model approach and methodology



1. Effective Gross Income generated from a property
2. Net Operating Income generated from a property
3. Model performance is evaluated by measuring **Median error** of the test set. Error is the absolute deviation in percentage of the predicted value from the actual value.
4 **MdAPE** (Median Absolute Percentage Error) accounts for the presence of outliers and provides realistic model performance

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Data sources used by the valuation model framework

PROPERTY- SPECIFIC FEATURES[1]

DEMOGRAPHIC/ECONOMIC INDICATORS[1]

LOCATION FACTORS[1]

Data Sources	VIEW data, Axiometric	ESRI, Zillow	Open Street Maps
	Key Features- • Year built • Primary building area • No. of units, bathrooms • Parking space • Building condition etc.	**Key Features-** • Per capita income(PCI) • PCI growth • Unemployment rate	**Key Features-** • Access to hospitals, schools and shopping malls • Access to transport network i.e. highways, docks, airports, rails

1- Specific features within these major categories can differ based on the type of property being evaluated. The list of features are indicative.

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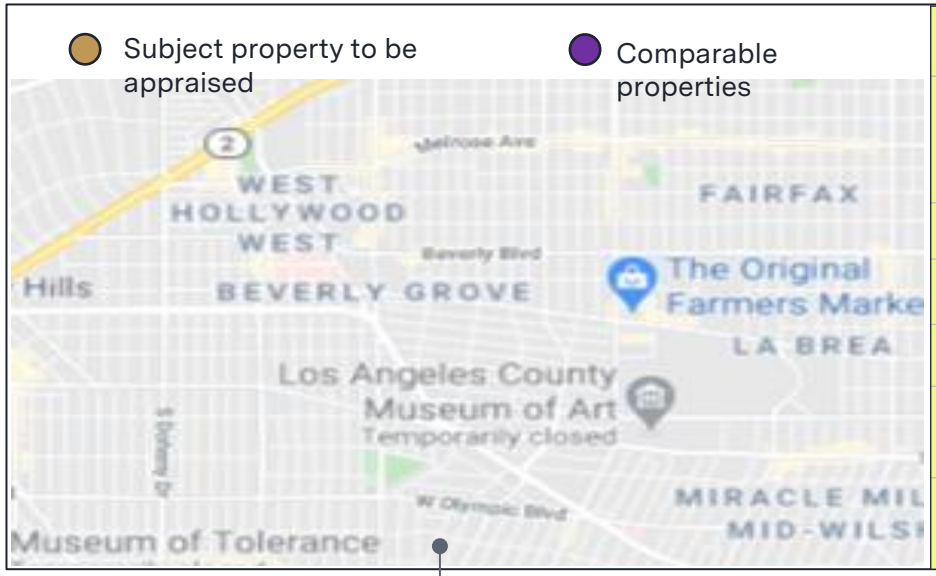
Output from optimizer model

Optimizer assigns weights to features to arrive at the best comparable set



Metric	Property	Comp-1	Comp-2	Comp-3	Comp-4	Comp-N
Property Street	5948 Tujunga Avenue	4015 West 129 Street	1527 South Beacon Street	1344 North Whitnall Highway	13637 Cordary Avenue	13629 Kornblum Avenue
Price/sq. ft.	450	346	463	483	371	319
Subtype	Walk up	Walk up	Walk up	Walk up	Walk up	Walk up
Sq. Footage	4,000	13,000	18,500	3,000	25,025	27,740
City	North Hollywood	Hawthorne	Los Angeles	Burbank	Hawthorne	Hawthorne
Property Condition	Average	Average	Average	Average	Average	Average

Geographical location of the Property vs comparables generated by the Optimizer

Predicted Price/sq. ft of the property using the prices of 'N' comparable properties using a weights-based approach

Features of one of the comparable selected by the optimizer

Feature	Weight	Feature	Weight	Feature	Weight
EGI	2.5	Square footage	2.4	Year Built	1.6
Condition	2.4	Zillow median value	1.8	Access to Highways	1.5

Feature weights used in the Optimizer to determine the best comparable based on feature Euclidean Distance

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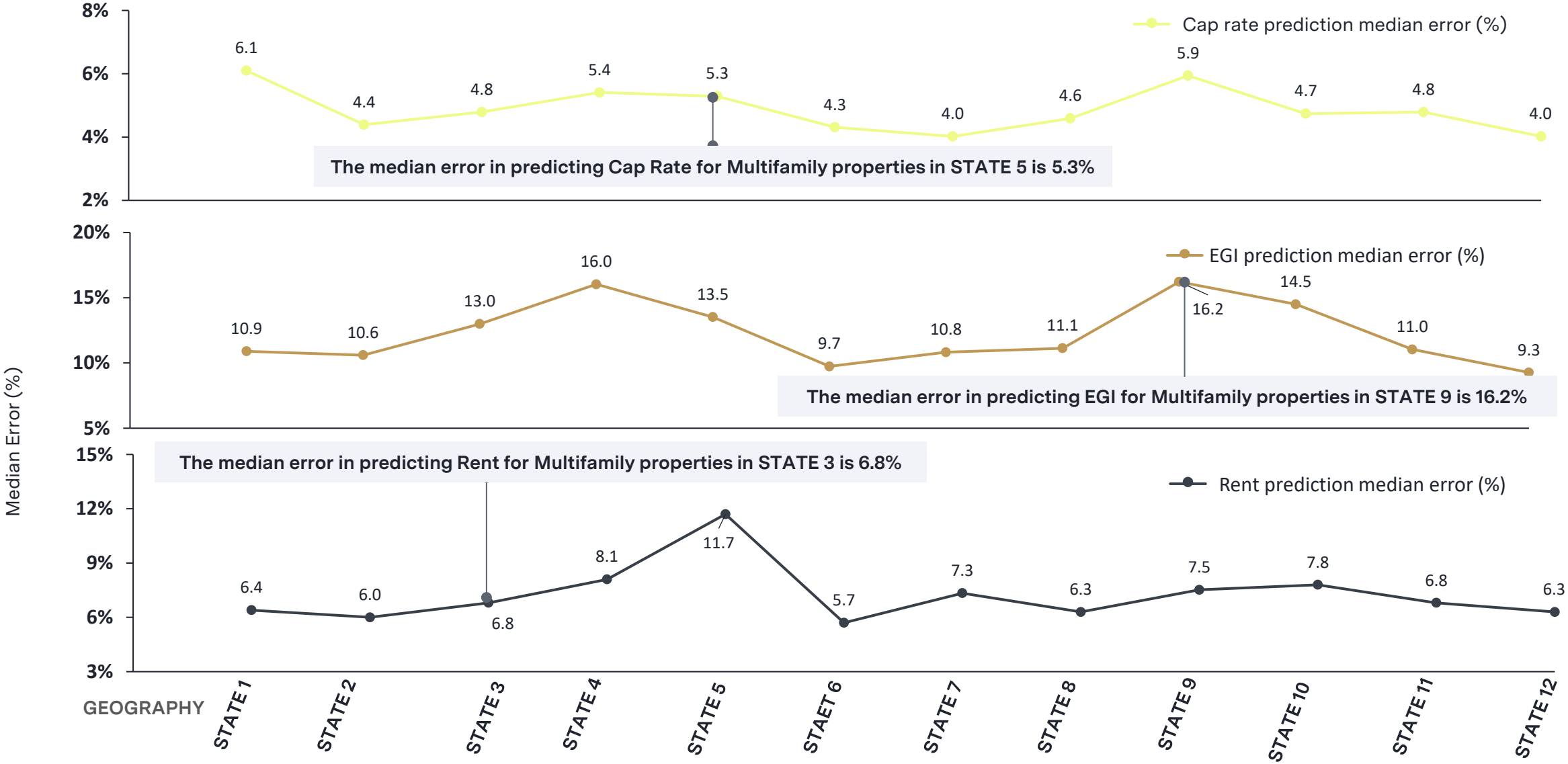
Model performance across states



1 Cap rate and EGI data from VIEW for the period 2015 – 2019 was used for training and testing the model.
2 EGI is the Effective Gross Income generated from a property
3 The rent for properties is Annual rent per sq. ft. as on 2019Q3 from the Axiometrics dataset
4 Model performance is evaluated by measuring median error of the test set of Multifamily properties

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