



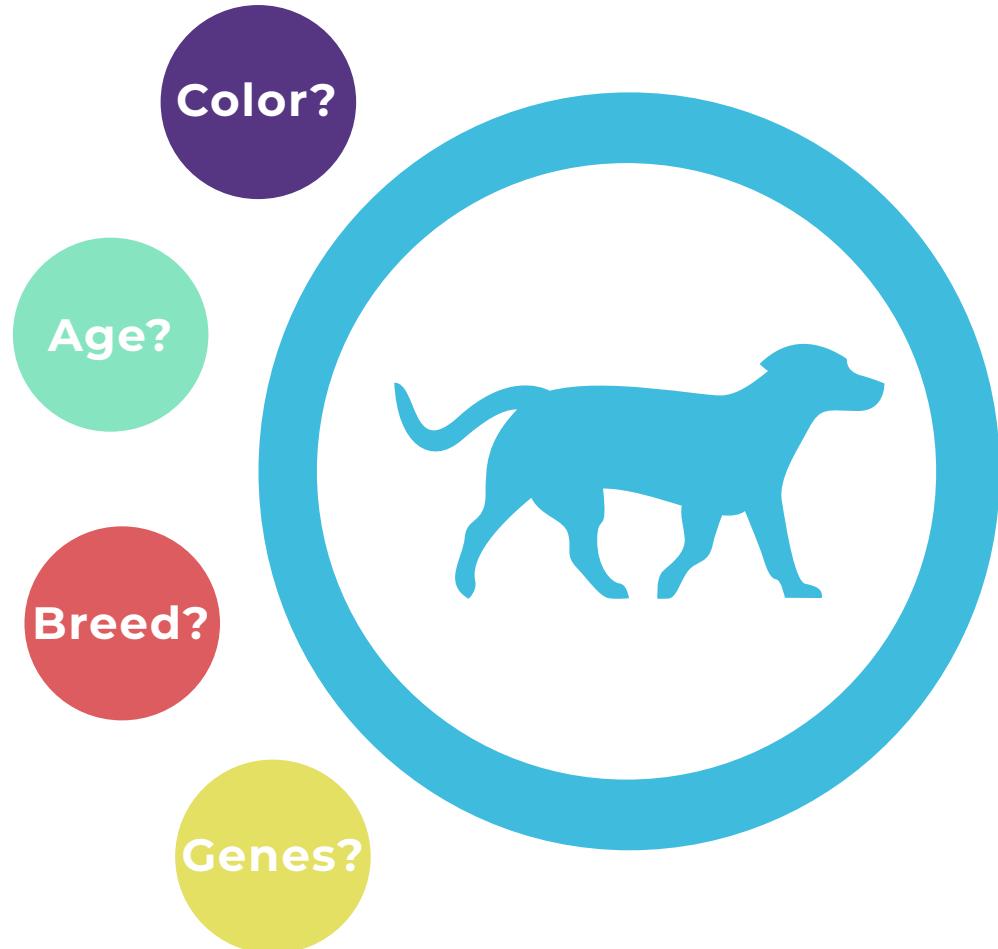
# Pricing Your Pooch

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**EE500 Fall 2017**

# How are dogs priced?

We spoke with 10 breeders across the US to determine what traits contribute most to their price.





## Listings

Collected over 3,000 dog listings to ensure sufficient training and testing.



## Breeds

Analyzed 20 dog breeds to diversify the pricing and important characteristics.



## Features

Considered 12 different features including heritage, breed, gender, age, and more.



## Parsing

Utilized html/CSS scripting for efficient data collection.





Akita



Beagle



Bernese



Boxer



Chihuahua



Chow Chow



Dachshund



French Bulldog



German Shepherd



Golden Retriever



Great Dane



Irish Wolfhound



Labrador Retriever



Poodle



Rottweiler



Samoyed



Shih Tzu



Siberian Husky



Tibetan Mastiff



Yorkshire Terrier

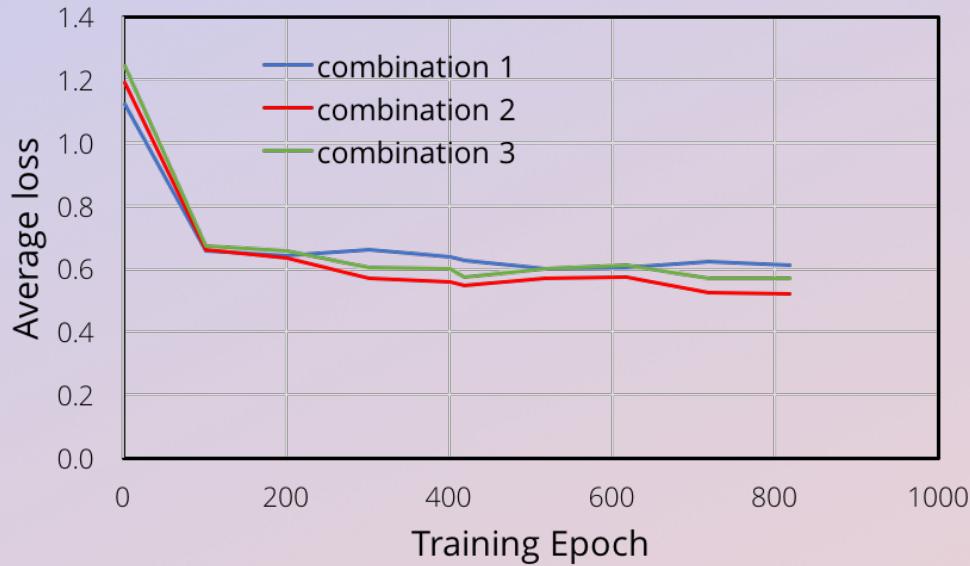
# Implementation

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Deep Neural Network Regressor  
&  
ASAM Fuzzy System

## Data Dependent Variation

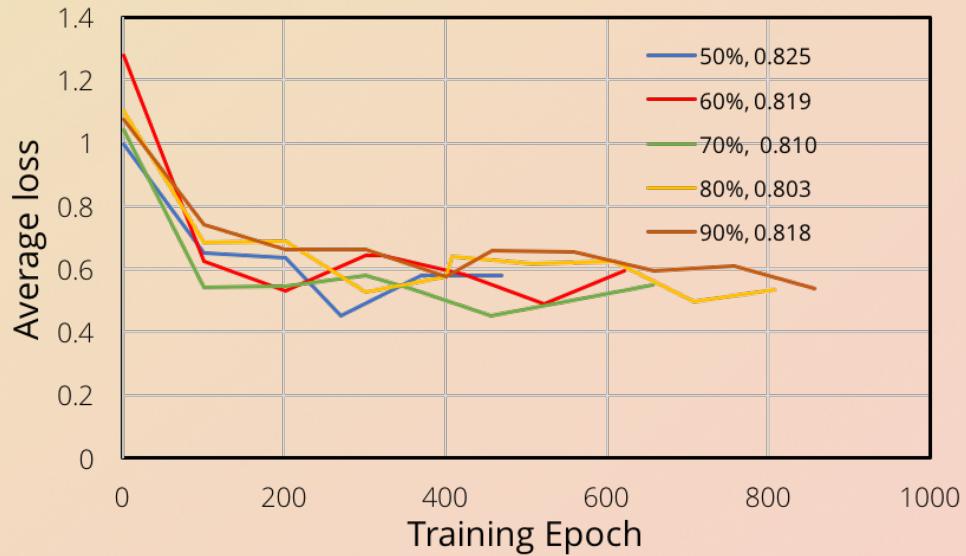
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Variation in average loss is negligible for different training and testing data.

## Training/Testing Ratio

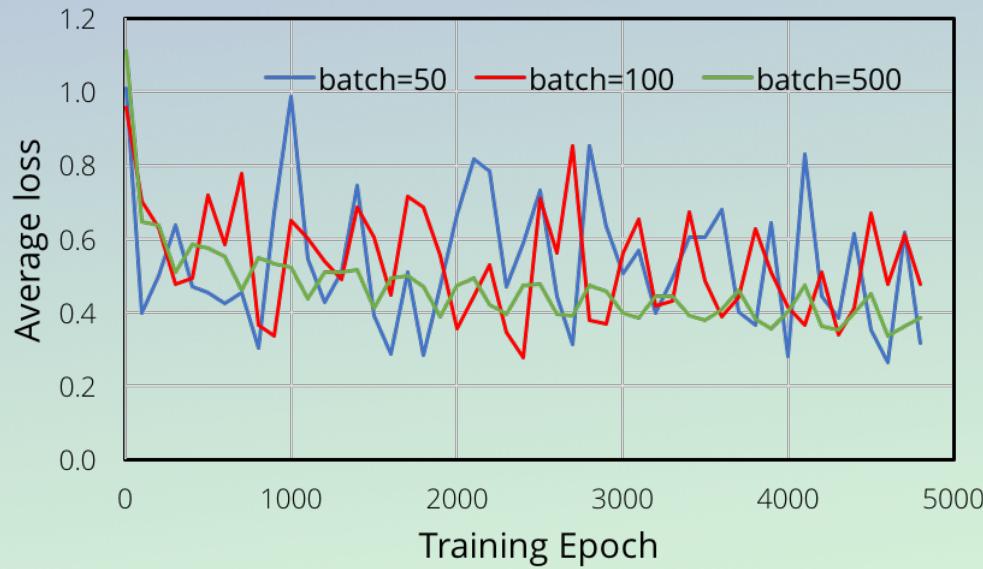
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80:20 data ratio for training and testing resulted in optimal RMS error.

## Batch Size & Epochs

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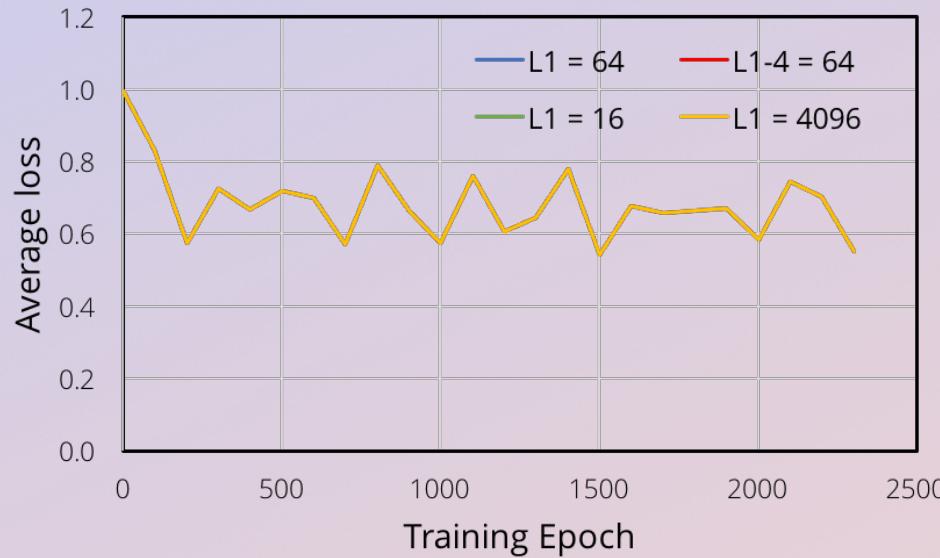


Batch size of 500 with 2500 epochs minimizes RMS error and simulation time.

Ave. Loss ↑   Batch Size ↓

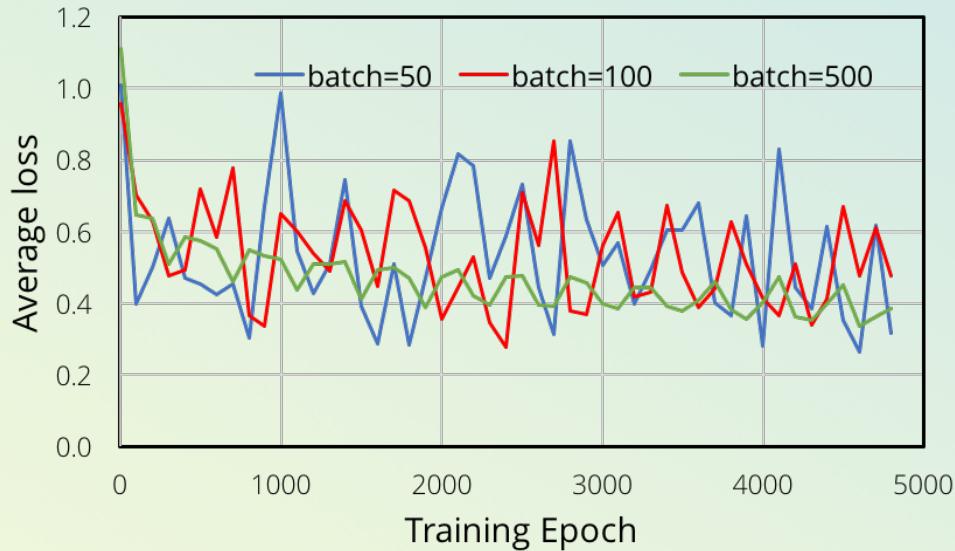
# Impact of Network Parameter

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Hidden layers, neurons per layer, learning rate, and regression type did not have considerable impact on ave. loss or error.

# Impact of Features

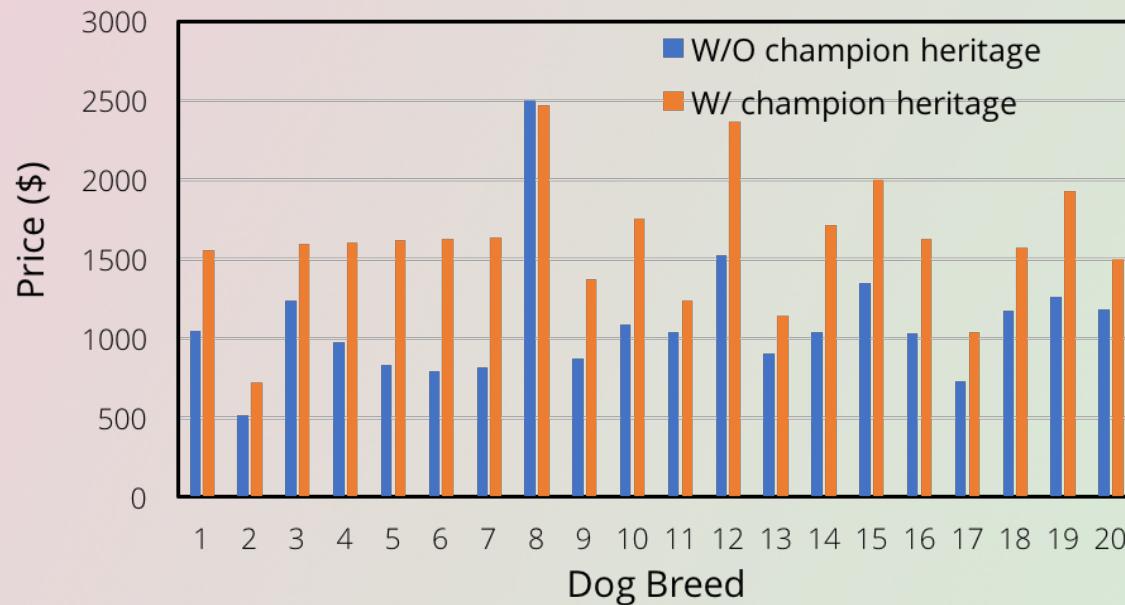


Feature	Explanation	rms error (in $\sigma$ )
f1	full feature space	0.78
f2	breed, sired, heritage, age, gender	0.85
f3	f1 - f2	0.88
f4	breed, sired, heritage	0.86
f5	health certificate, health guarantee, vaccination	0.90

Breed, parents, and lineage are the 3 most important factors in pricing.

# Fuzzy Approximation

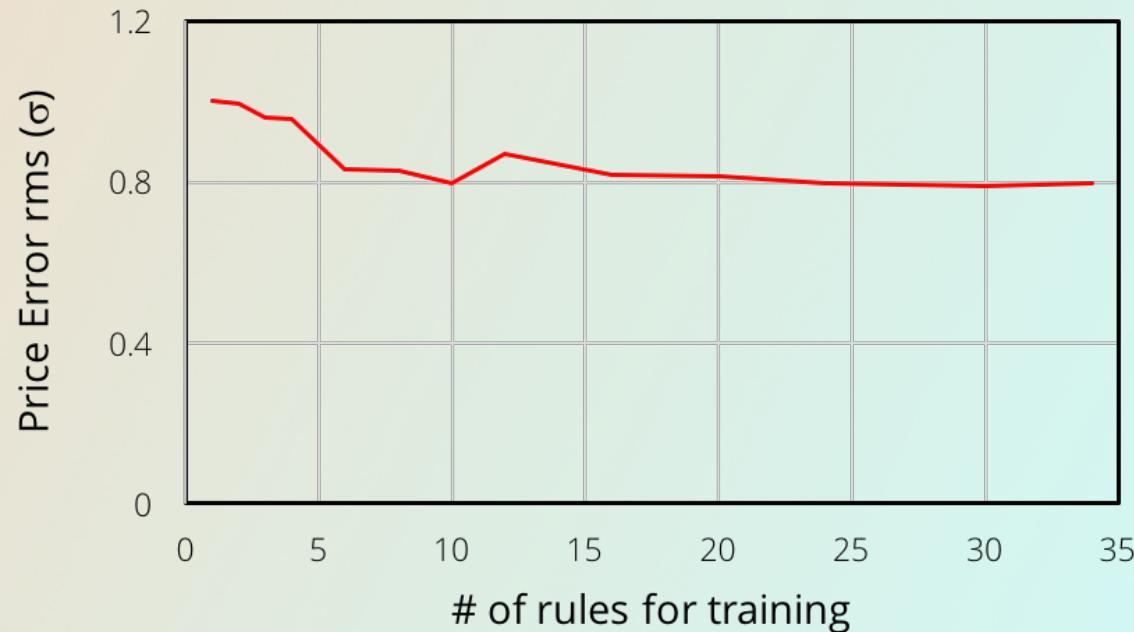
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Strong pricing correlation between differing breeds and heritage.

## Training with Variable Rule Count

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Increasing rule count improved RMS error while increasing training time.

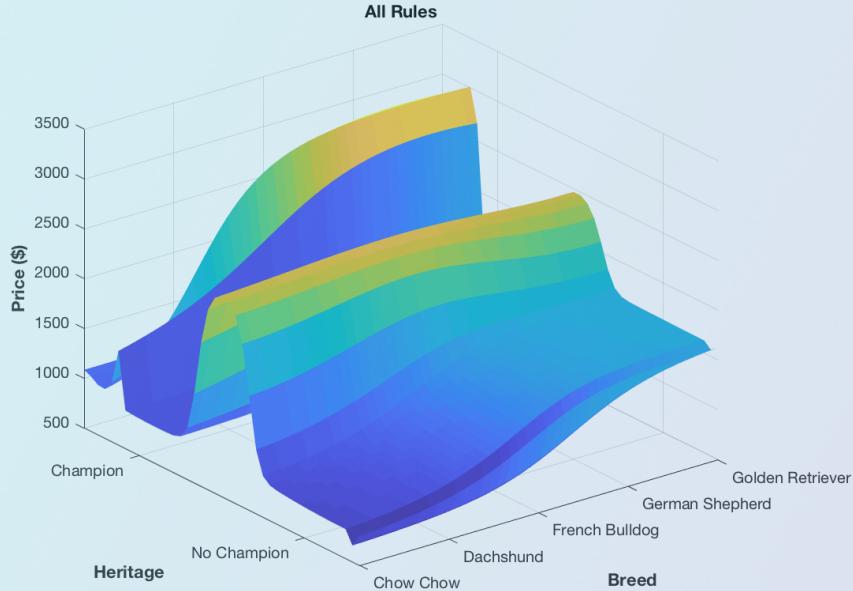
## Effects of Rule Removal

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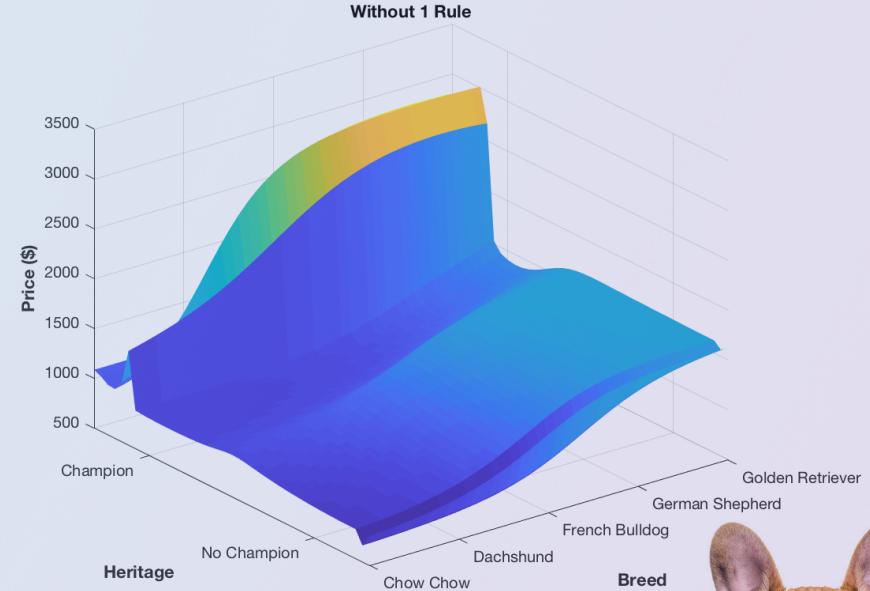


Averaged RMS error has a pos. linear correlation with rules removed.

# Breaking The System



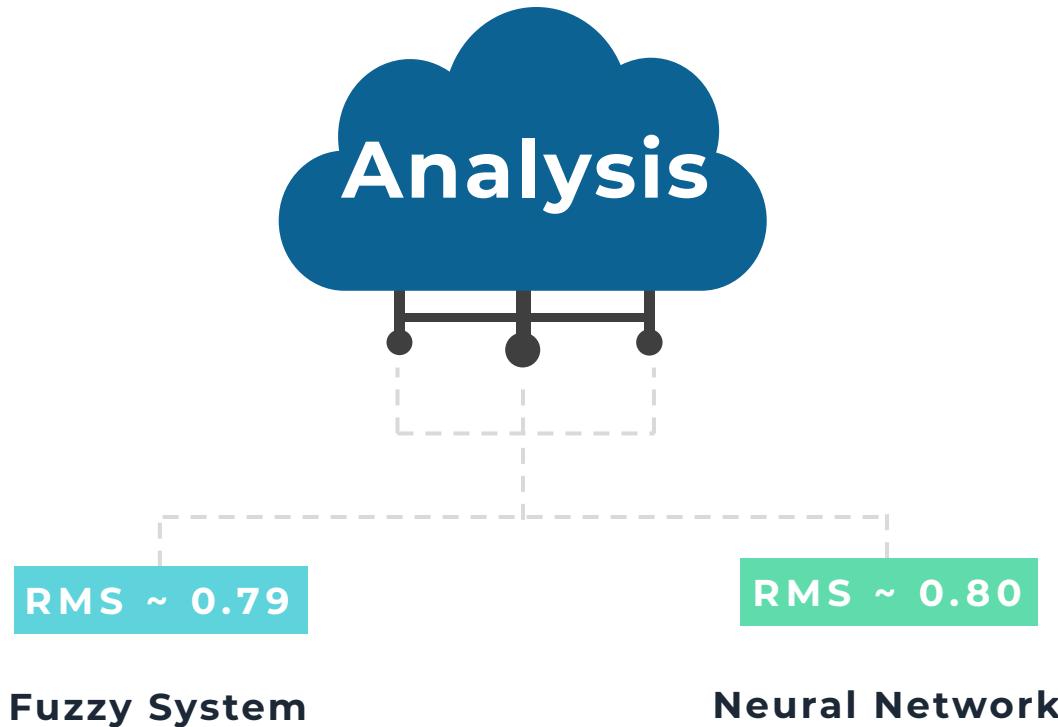
French Bulldog: ~\$2,460



French Bulldog: ~\$1,640

Targeted rule removal can result in a complete failure of cost estimation.





Approx. \$300 in error across both models

Conclusion: Inherent variability in dog pricing due to industry tendencies.

Thank you.