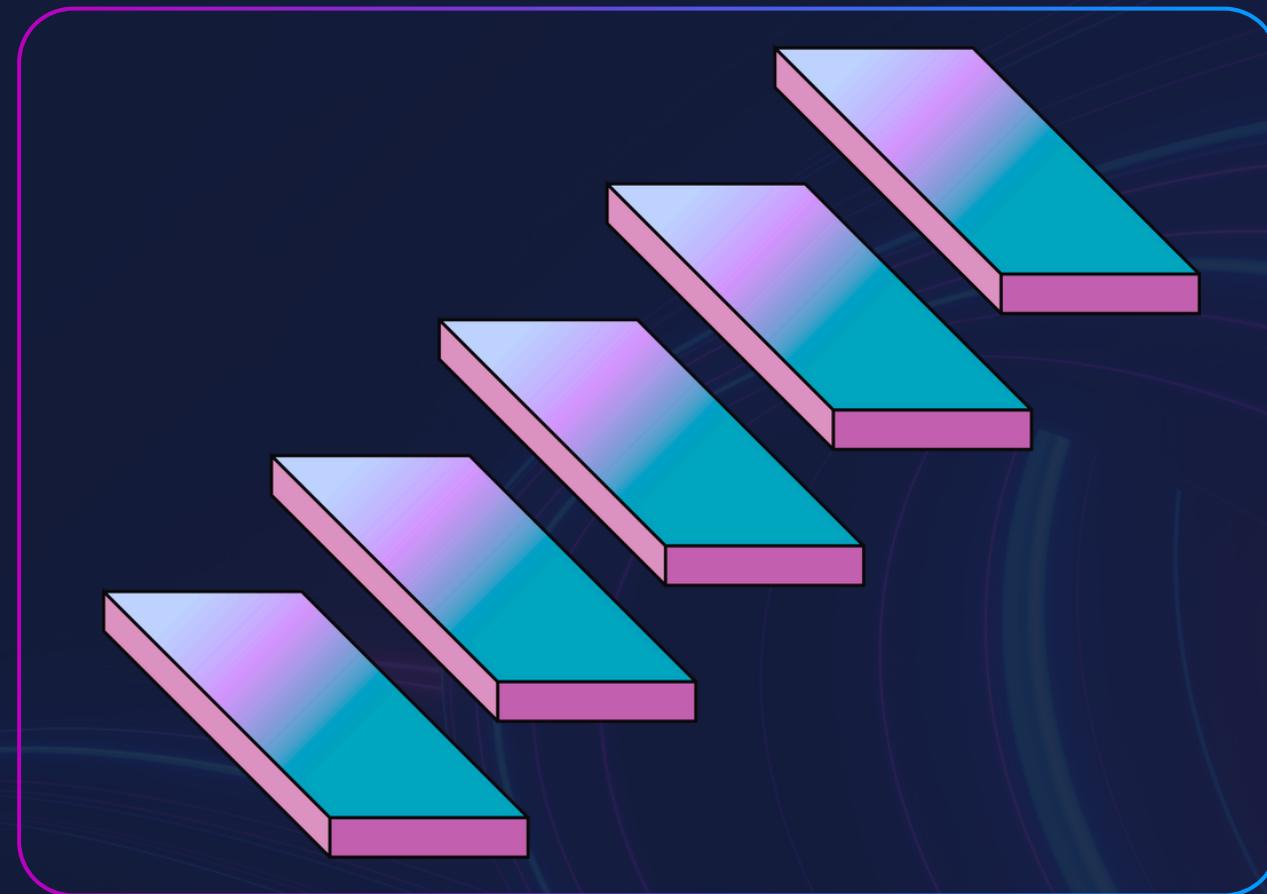


# Stairs Counting project

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- Hadia Amjad
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Introduction

Our Approach

Evaluation

Conclusion

# Introduction

A Computer Vision Approach To Detect and Count the  
number of stairs.

Why does Stair Count Matters?

Accessibility

Accident prevention

Robotics



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## RoadMap of our computer vision approach





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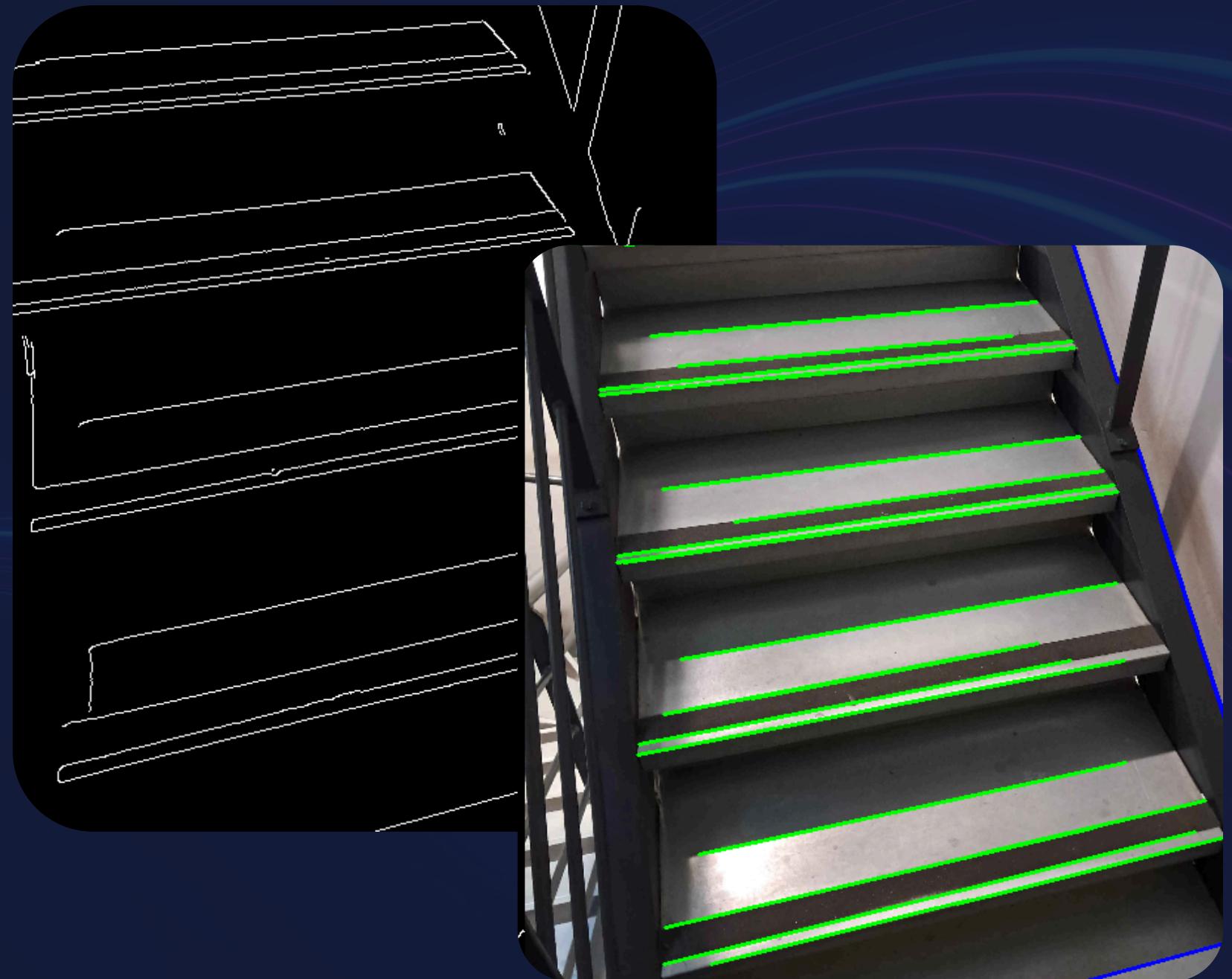
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# Our Approach 1/3

Pre - Processing :

- Resize image
- Convert to grey scale
- Edge detection using Canny algorithme





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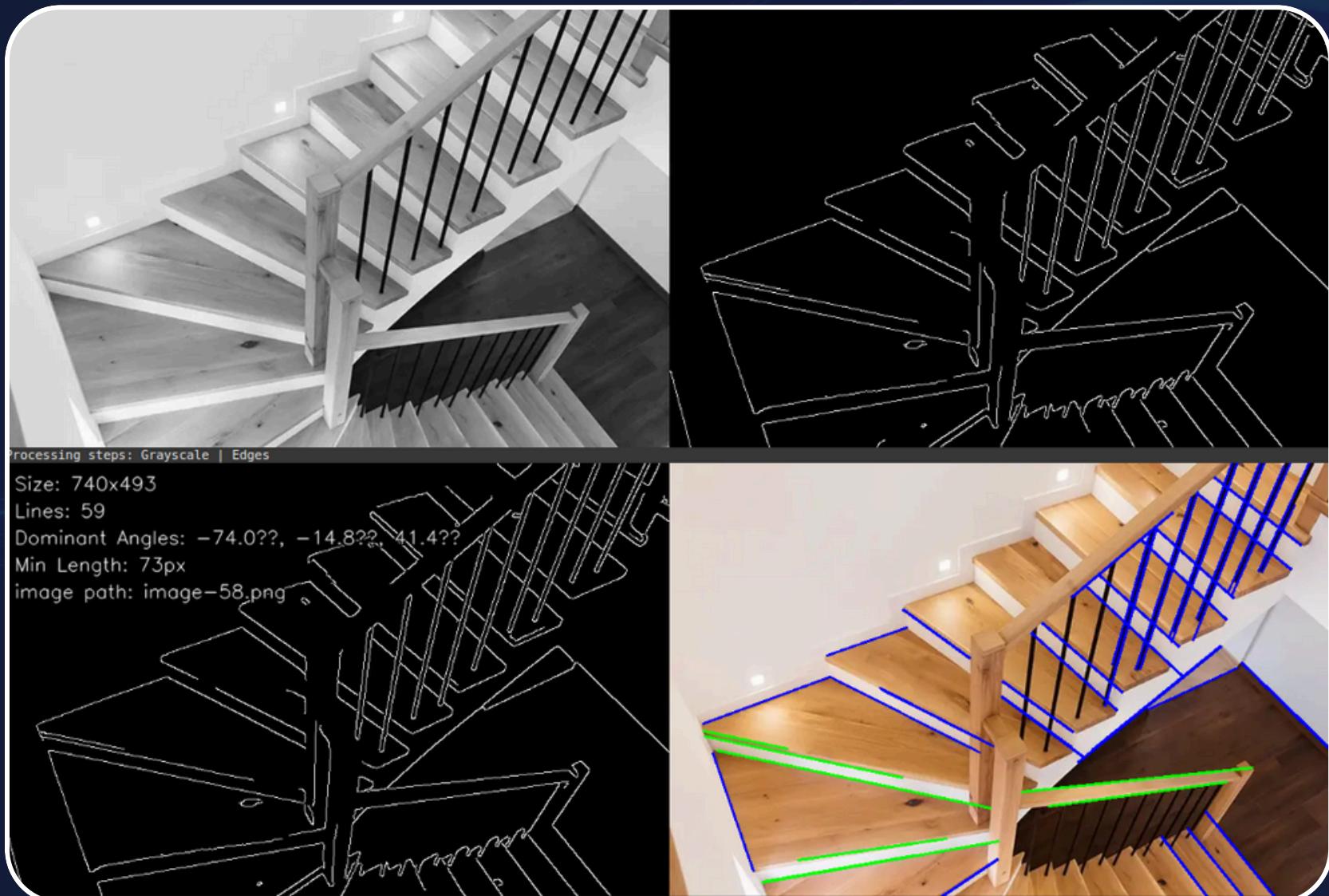
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# Our Approach 2/3

Core Strategy :

1. Detect lines using Hough transform
2. Analyze & Cluster Dominant Angles
3. Filter out the outliers
4. Visualize the results





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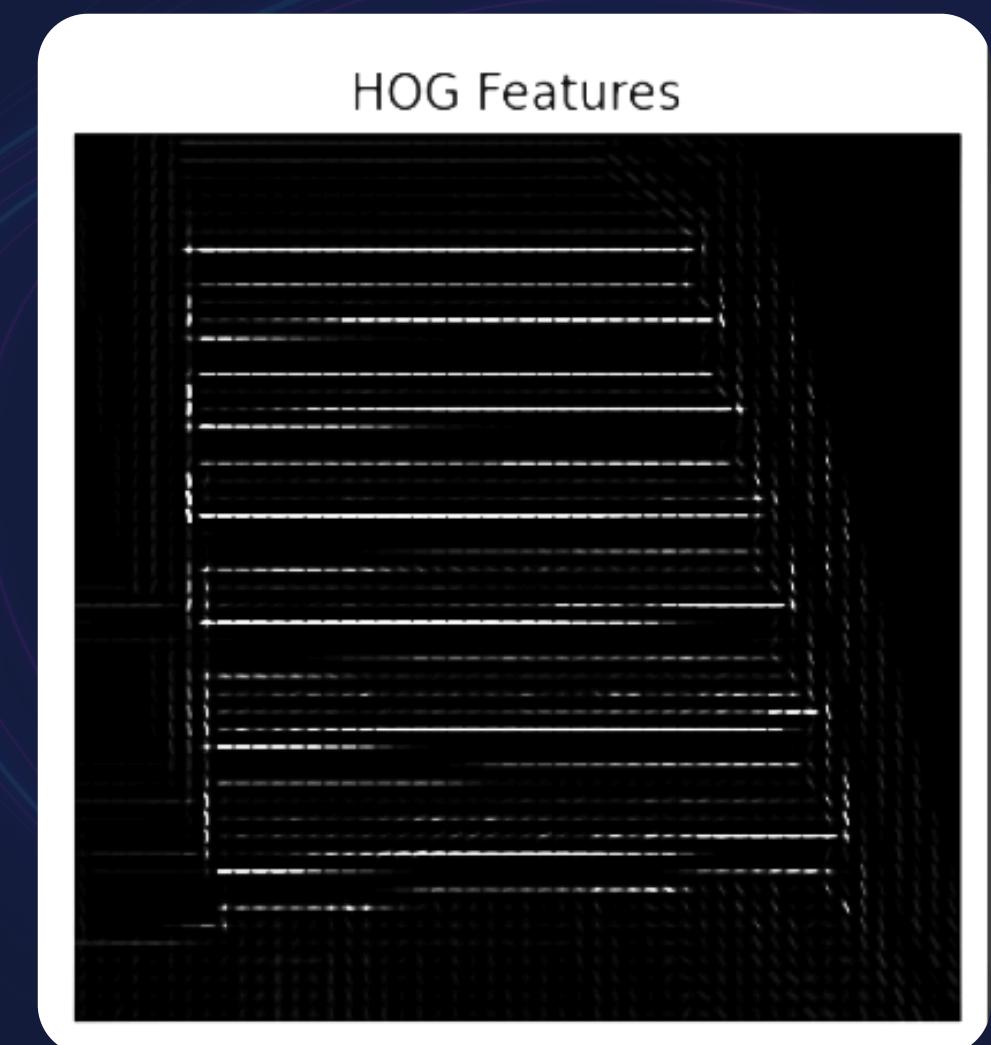
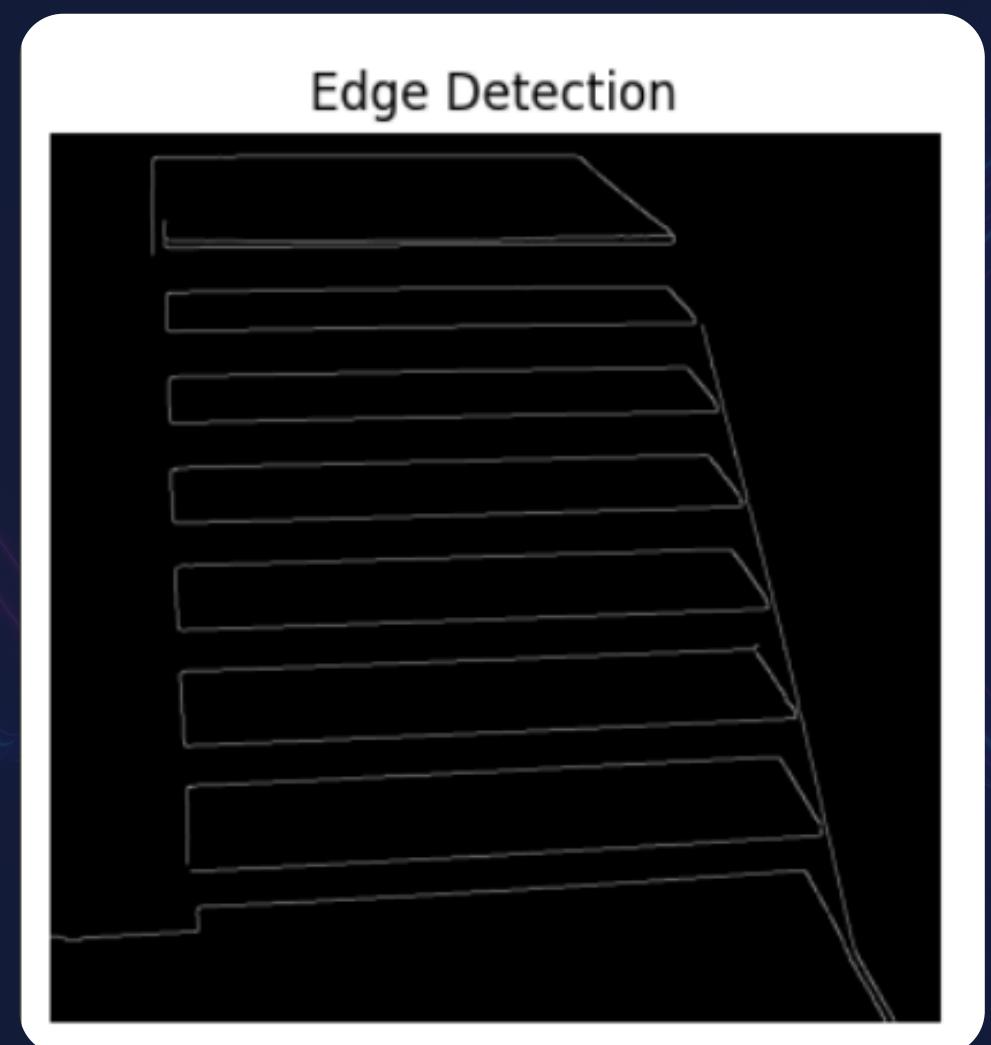
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# Our Approach 3/3

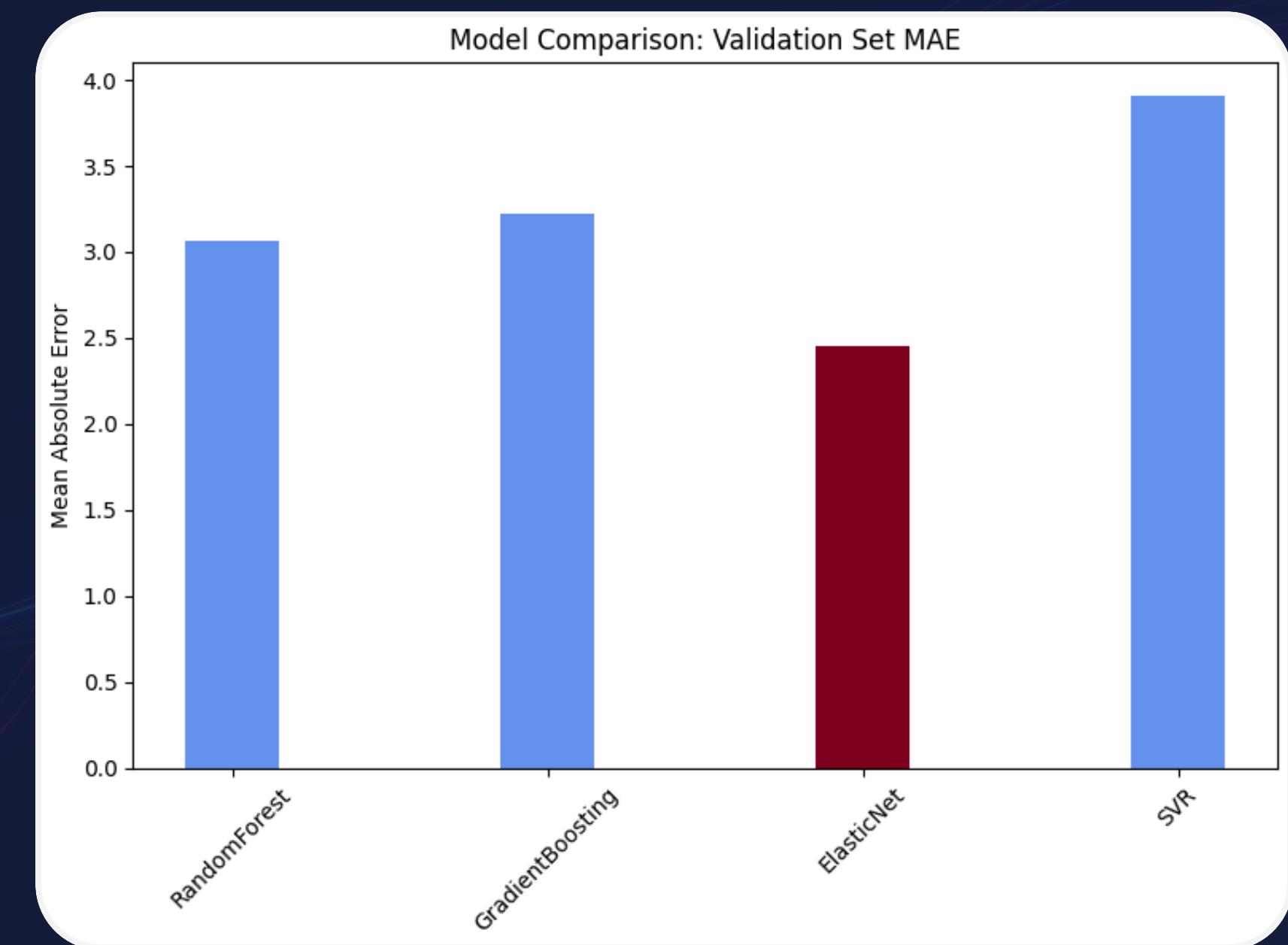
## Integration With Machine Learning

- Feature Extraction Using HOG feature
- ElasticNet ML
- Train / Validate / Test
- Score Results using MAE



# Evaluation 1/3

- Effective pre processing
- Testing different ML models : RandomForest, Gradient boosting, SVR, ElasticNet.
- Calculating and comparing the MAE results with the splitted dataset on the best ML model





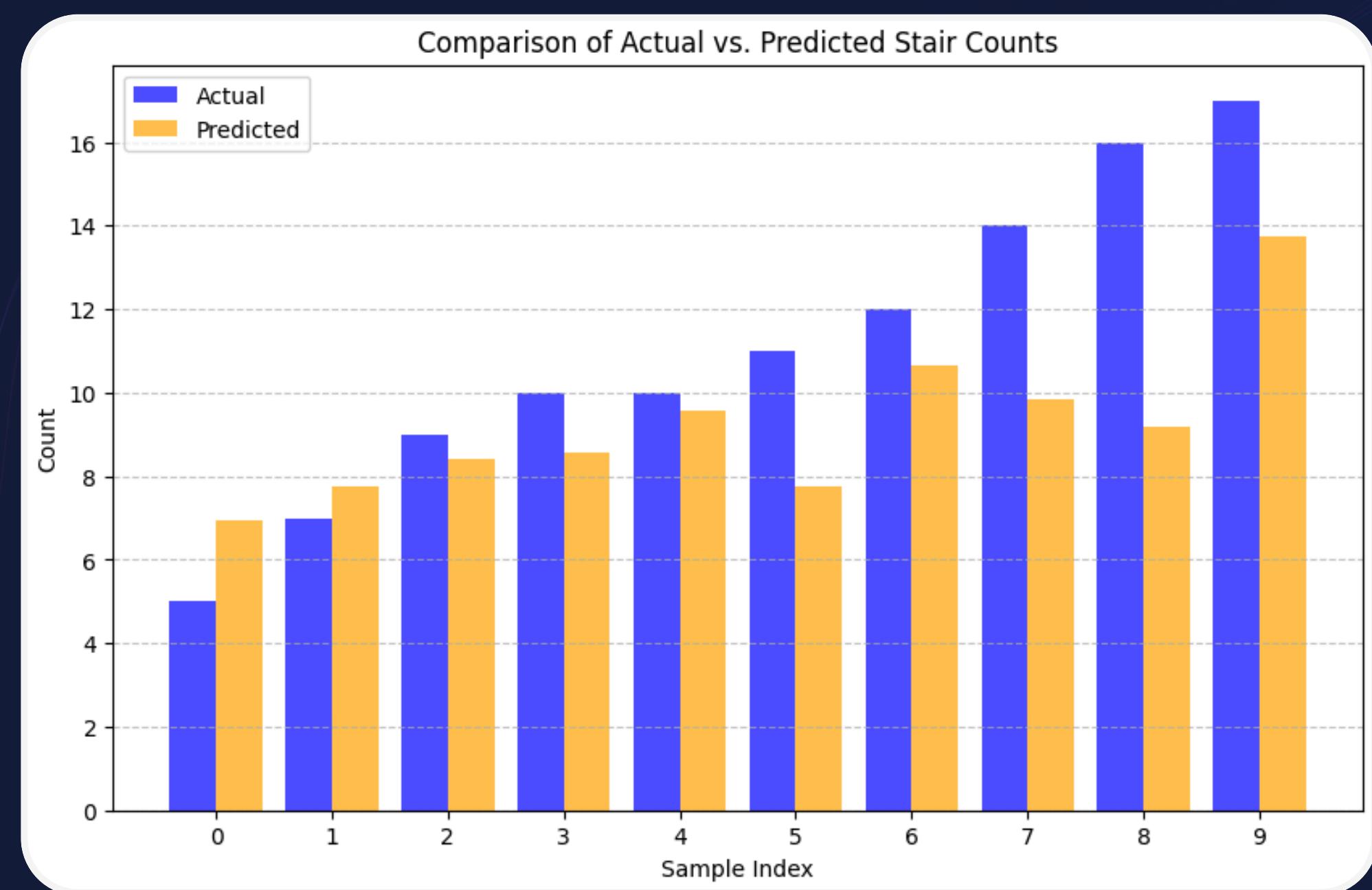
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# Evaluation 2/3





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# Evaluation 3/3

The goal is to predict the number of steps in a staircase (numerical value not a categorical), which is a quantitative value, this makes it a regression problem.

Hence the reason behind “Mean Absolute Error (MAE) evaluation, to measure how far off the predictions are from the ground truth.



Evaluating models on validation set...

Model: RandomForest, Validation MAE: 3.0641

Model: GradientBoosting, Validation MAE: 3.2215

Model: ElasticNet, Validation MAE: 2.4508

Model: SVR, Validation MAE: 3.9046

Best model: ElasticNet with Validation MAE: 2.4508

Test Set MAE with ElasticNet: 2.3943

Our Best MAE Score Is : **2.39**



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# Conclusion

In this project we were able to get promising results using the ElasticNet model that provided the lowest MAE values

Faced challenges:

- Fine tuning the hyper parameters
- Feature extraction algorithms
- Machine learning model choice

Future Work:

- Rotation Invariance
- Ensemble Models
- CNNs
- More Data



# Thank You

FOR YOUR ATTENTION

ANY QUESTIONS?