

# Automating License Plate Detection with Convolutional Neural Networks and Bounding Box Regression

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# Business Problem:

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**Area of Concern:** Can license plates be automatically detected at toll areas?

**Goal of Model:** Automate plate detection to reduce human error and improve pipeline efficiency



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# The Data

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## Contains

- 1,695 vehicle pictures
- Different vehicle angles and distances
- Previously defined plate locations

**Source:** "License Plate Dataset" by Ronak Gohil, Kaggle,  
<https://www.kaggle.com/datasets/ronakgohil/license-plate-dataset>





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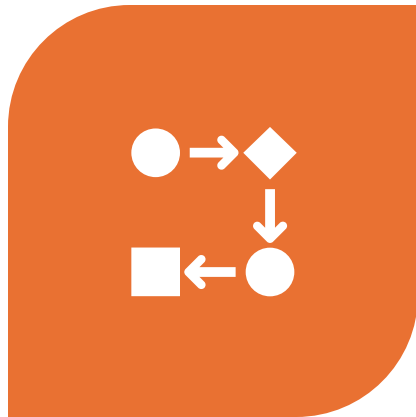
# The Data

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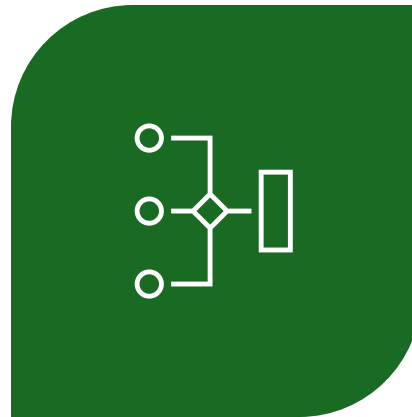
## Limitations

- One plate per image
- Well-lit plates
- Lack of vehicle type variety
- Plate format bias
- Smaller dataset

# Data and Model Manipulation Methodology



**STEP 1: DATA PREPROCESSING**



**STEP 2: MODEL ARCHITECTURE  
AND PARAMETER TUNING**



**STEP 3: RUN MODEL AND  
EVALUATE**



## Baseline Model:

### Simple CNN with MSE Loss

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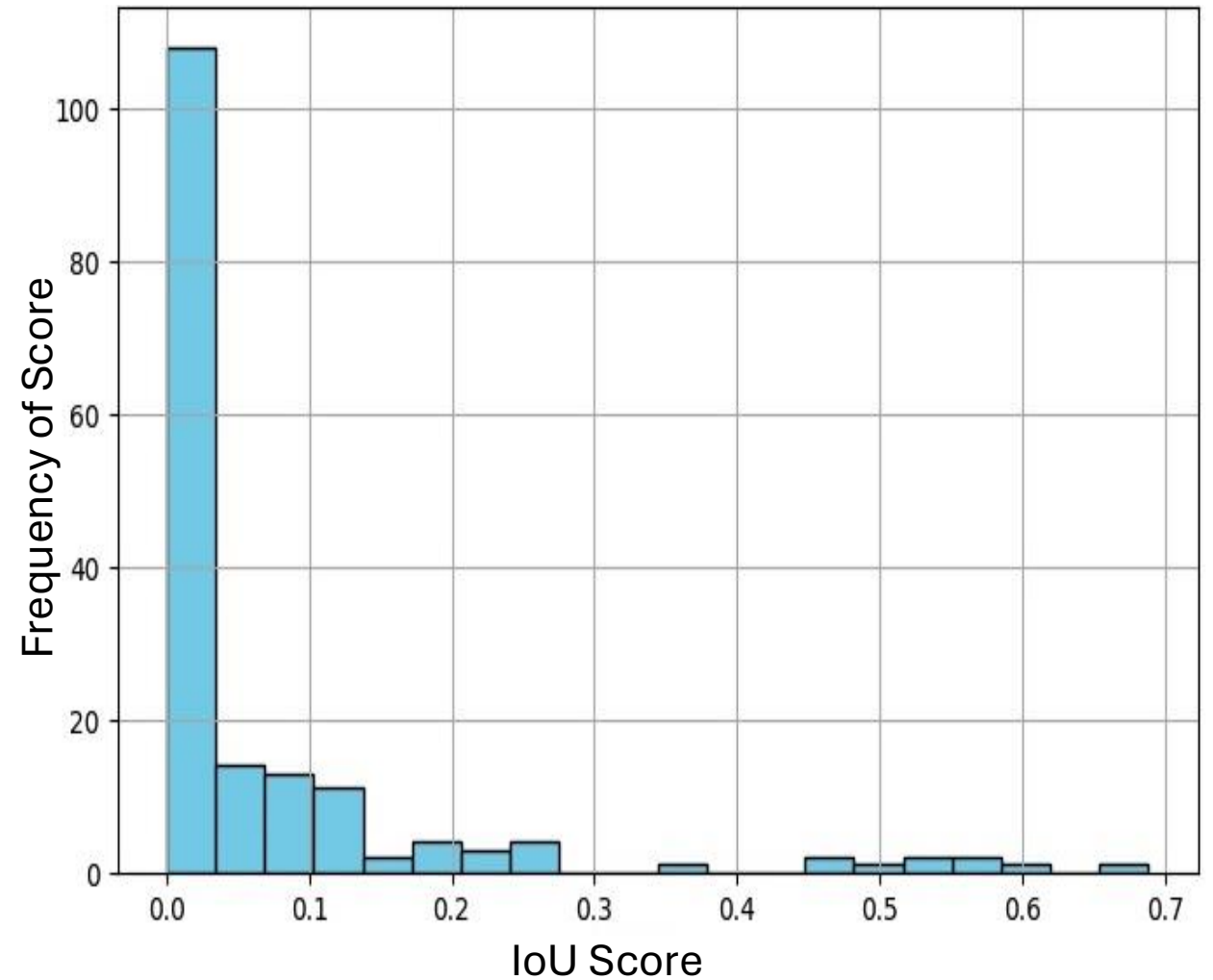
### Results on validation set

- Mean IoU Score: 0.0698

Prediction Example



Distribution of IoU scores on Validation set



## Final Tuned Model: ResNet Backbone with DIoU Loss

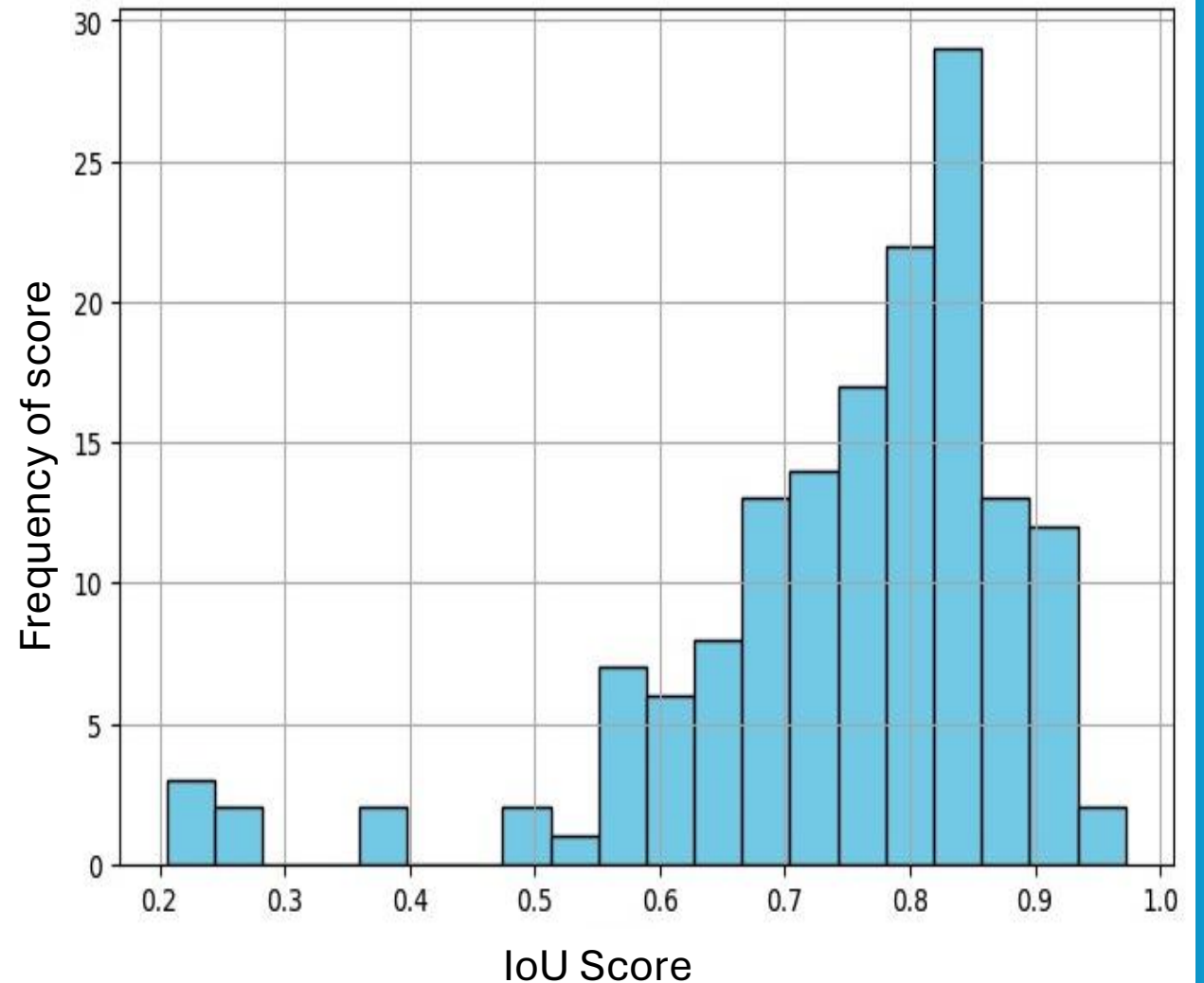
### Results on test holdout set

- Mean IoU Score: 0.7475

Prediction Example



Distribution of IoU scores on Test set



# Conclusions

- 1) High mean IoU score
- 2) Consistent predicted box placement
- 3) Deployability options

## **Business Implications**

Plate detection could be fully automated, eliminating the need for human input, driving down overhead costs, and opening potential for scope growth.



# Next Steps?

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- Region specific plates and vehicle types
- Plate tracking for multi-frame inputs
- Multi-plate capturing





# Thank you

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