

Motional Inc.

Represented by: Computer Vision Consulting

Utilizing Machine learning to enhance
"Pedestrian Detection" for autonomous
vehicles.



About me

Hometown:

- Austin Texas

Education:

- Flatiron School: Data science and ML
- Udacity: Python Program
- Udemy: Computer Vision

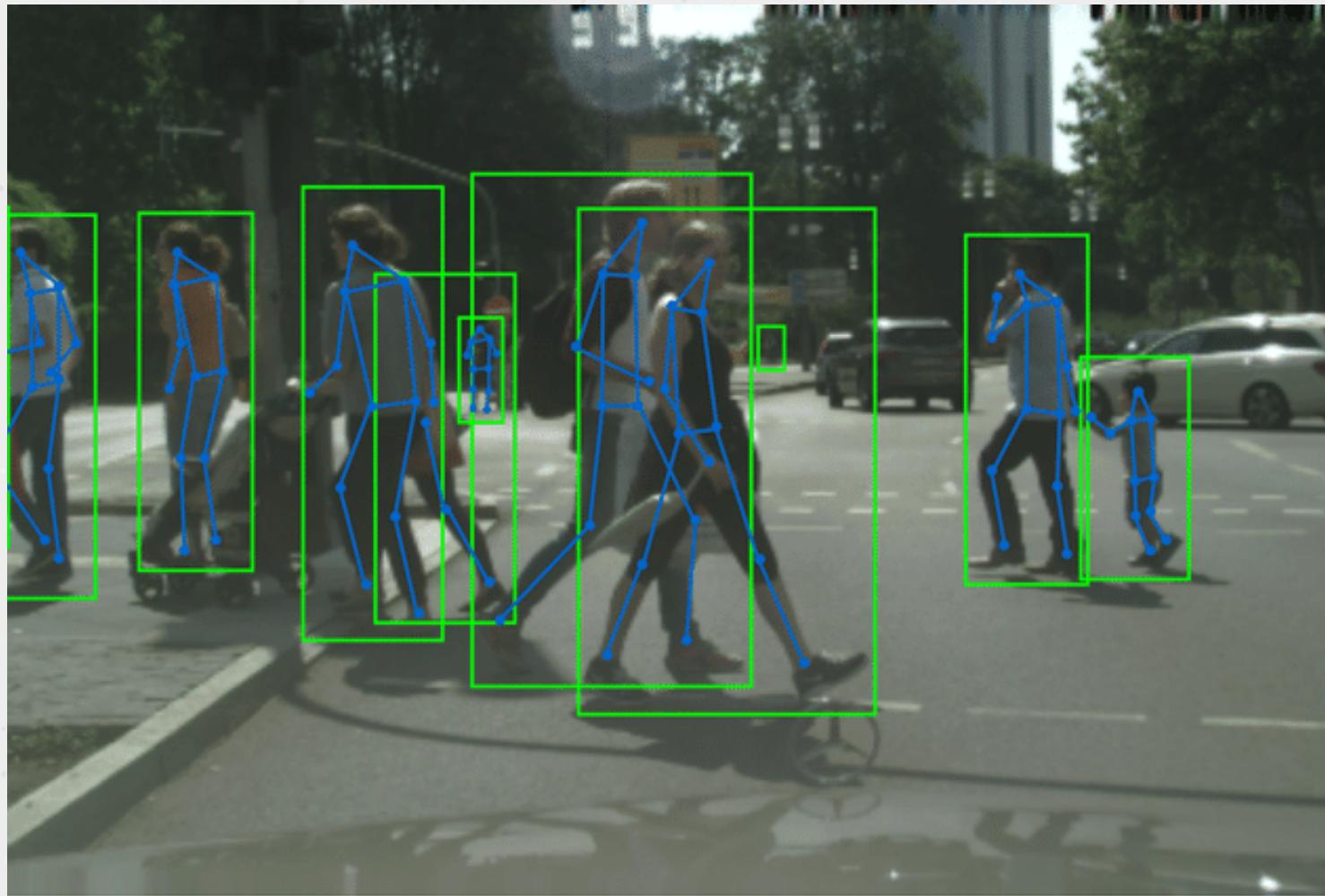
Interests:

- Culture
- Athletics
- Cooking
- Languages



Stefano Caruso: Data Scientist:

Agenda



Business Objective

Data Overview

Modeling

Conclusion

Future Insights

Motional Inc.

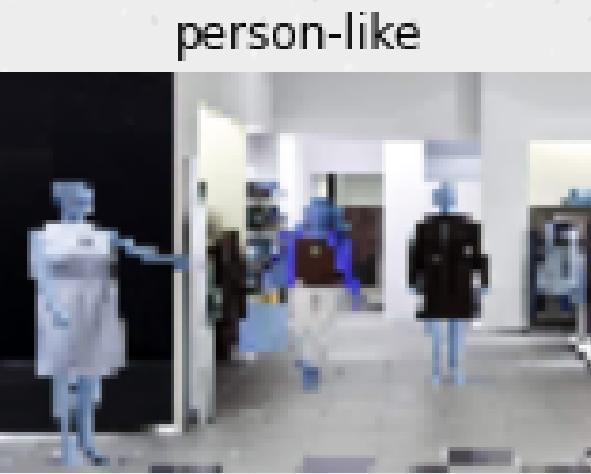
Mission is to make driverless vehicles a safe, reliable, and accessible reality.

Driven 1.5 million miles and completed 100,000 passenger trips on public roadways – without a single at-fault accident.



Business Objective

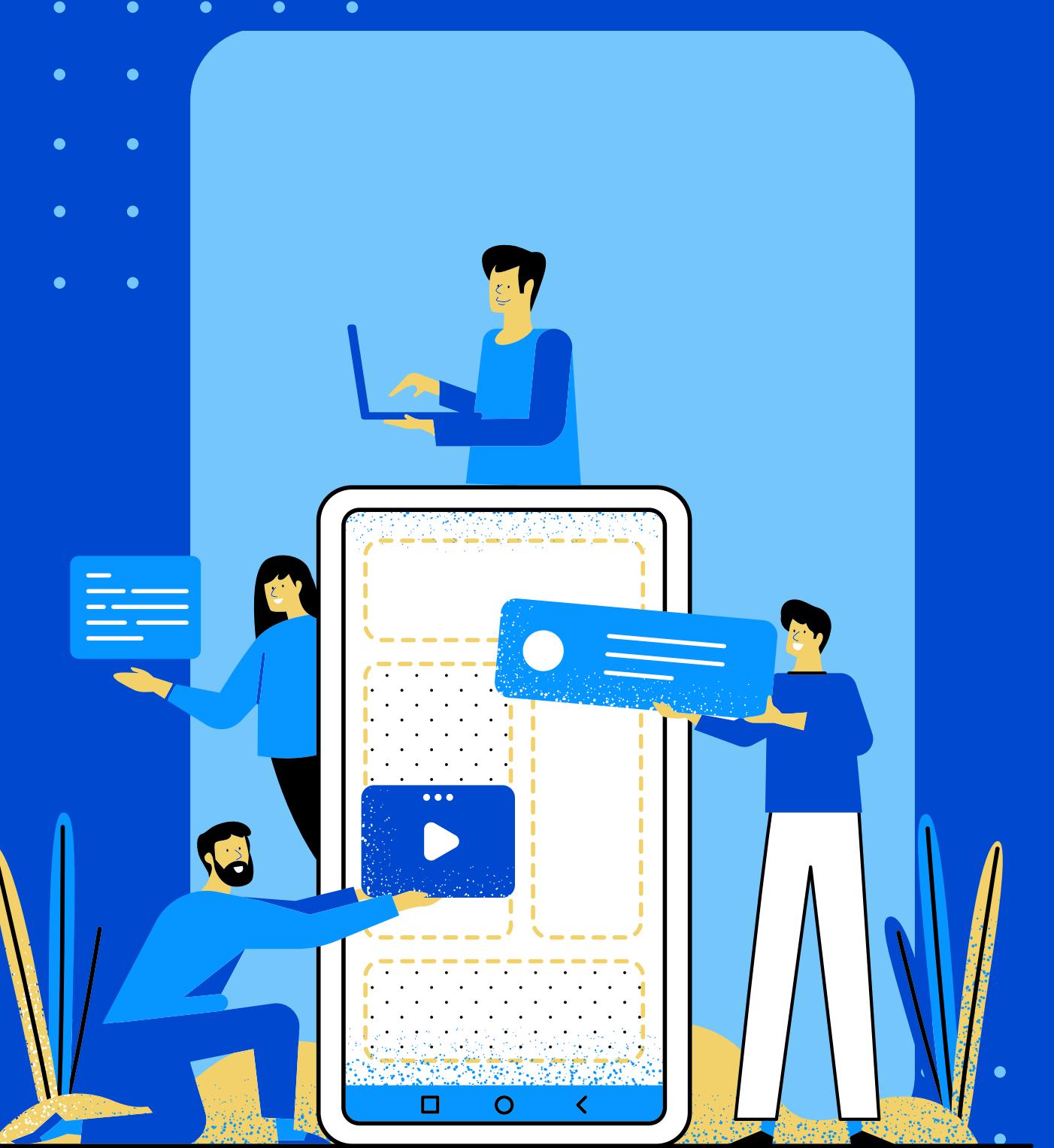
Image Classification: "Person / Person-Like"



Why " Person / Person Like" ?

Business Objective

- State Approval
 - Level 5 Autonomous
-
- The Federal Autonomous Vehicle Policy includes no new rules or regulations—only guidance—for states.



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Data Overview

- Data

Kaggle

- Image classes

Binary: Person / Person-like

- Data size

1,339

- Data importance

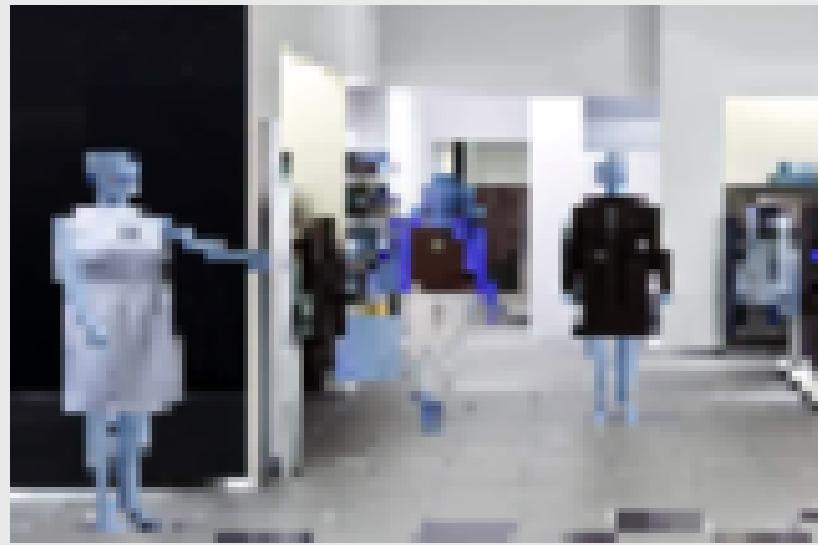
State Approval

- Limitations

Size, Diverse Data

Image Labeling

person-like



person-like



person



person



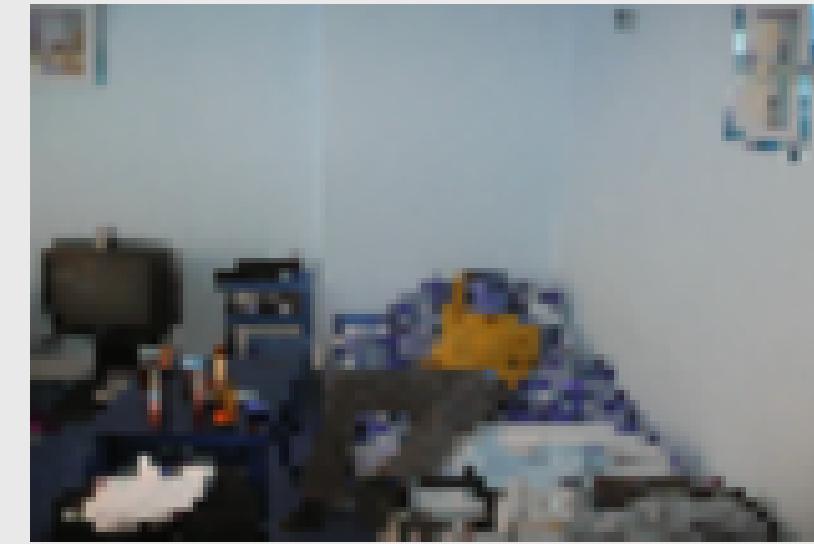
person-like



person-like



person



person



Model Methods

Model Complexity

- Layers
- Kernel Size
- Filters

Regularization

- Kernel Regularizer (L2)
- Dropout Layers



Model Analysis

- Model Scoring
- Model Evaluation
- Model Type
- Main Findings
- Model Limitations

Model Scoring: Classify Images Accurately



Accuracy Metric

Model Evaluation

Baseline Model

56%

First Model

61%

Final Model

72%

Final Model Performance

Increase: 16%

Overall: 72%

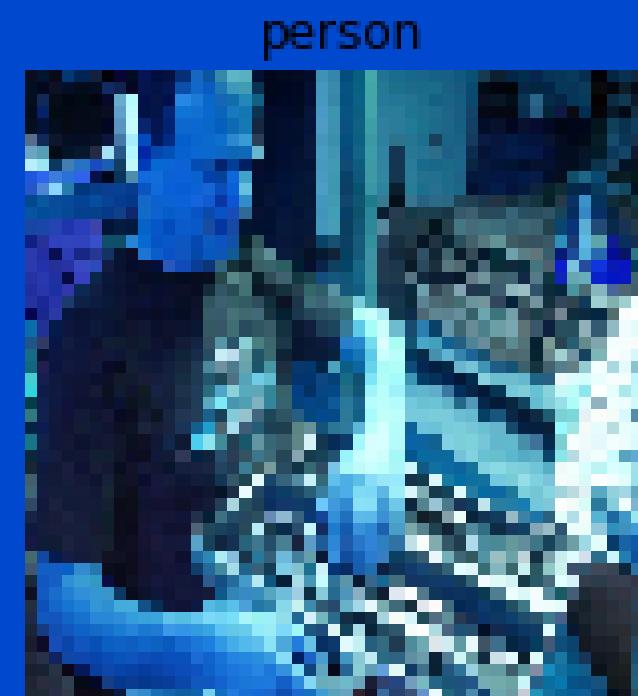
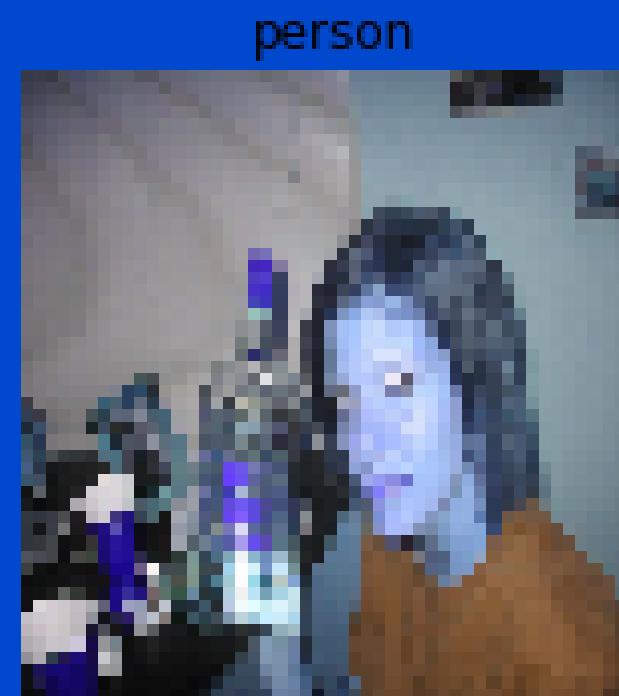
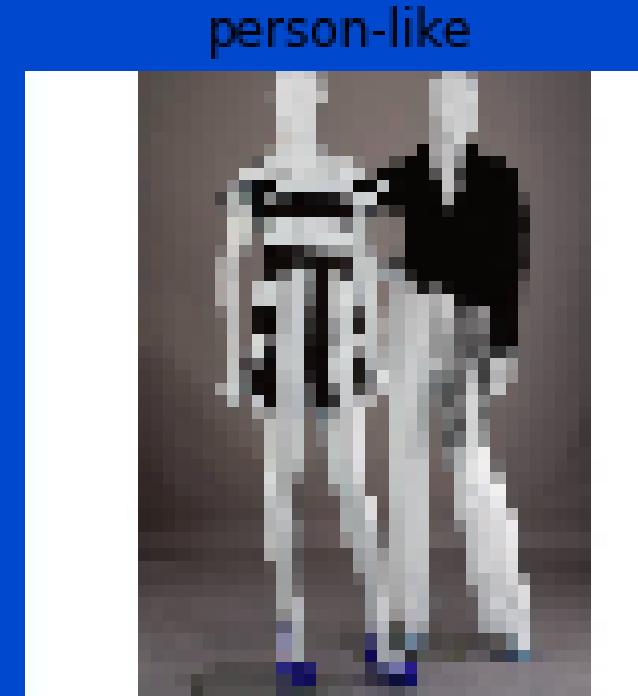
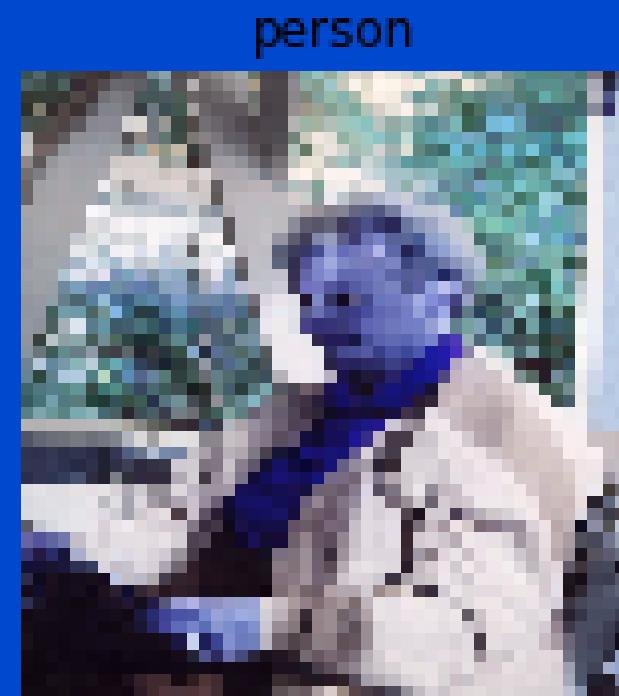
person-like



person



Prediction Evaluation



Main Findings

MODEL TYPE

CNN - Pedestrian Detection - Person / Person Like

MODEL PERFORMANCE

72 % State Approval

MODEL LIMITATIONS

Server, Image Complexity, Data size

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• • •
• • •
• • •

Distance



Movement



Weather



Size / Shape

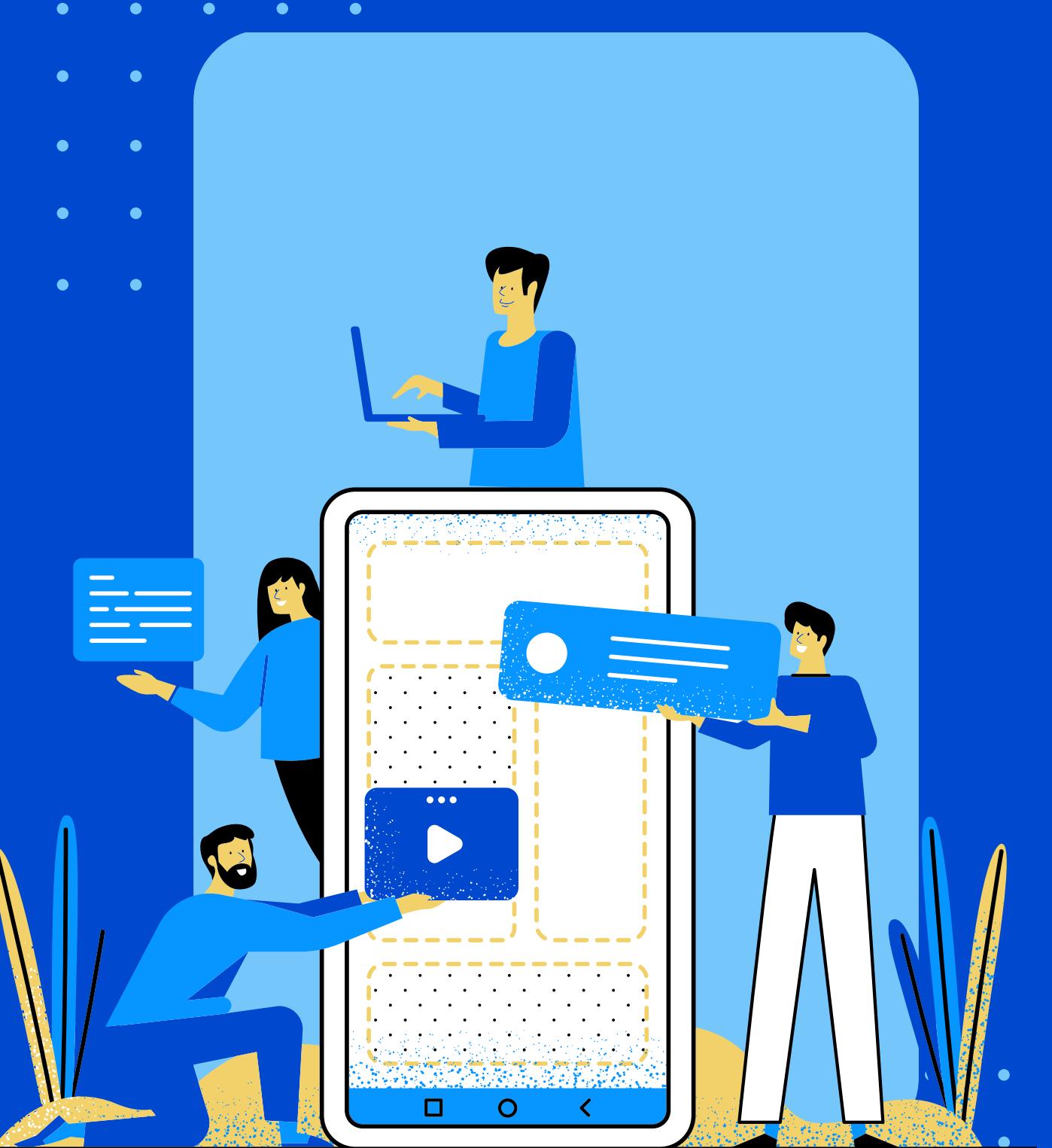


Model Improvements

98 % Trained Model

Size:

- Train 944 Images
- Validation 160 Images
- Test 235 Images



Conclusion

- CNN Model Person - Person Like

- Model Score 72%

- Model params 664,500

- State Approval

- Ability to Improve

Future Insights

- License Technology

- Robotic Delivery Application

- Live Video Classifier

- Worldwide Data

- Safety Awareness

Thank you Questions

Contact Information:

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