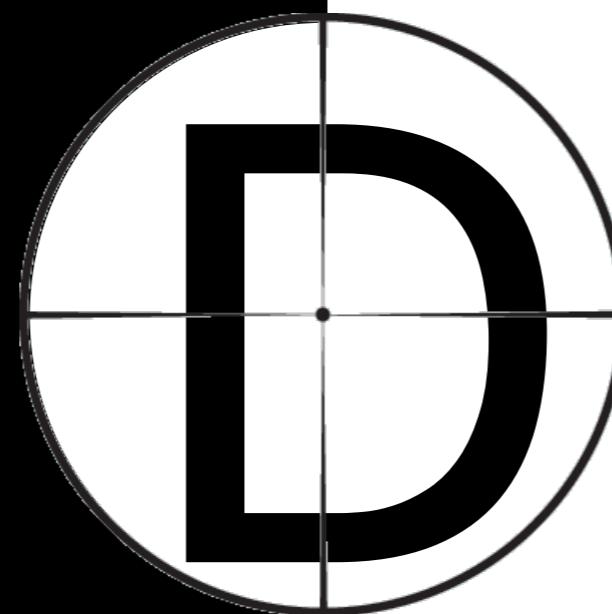


OBJECT



DETECTION

GROUP



BACKGROUND

-
-
-

Potential of self-driving car

Need robust perception systems

Deep learning (specifically CNNs) advances



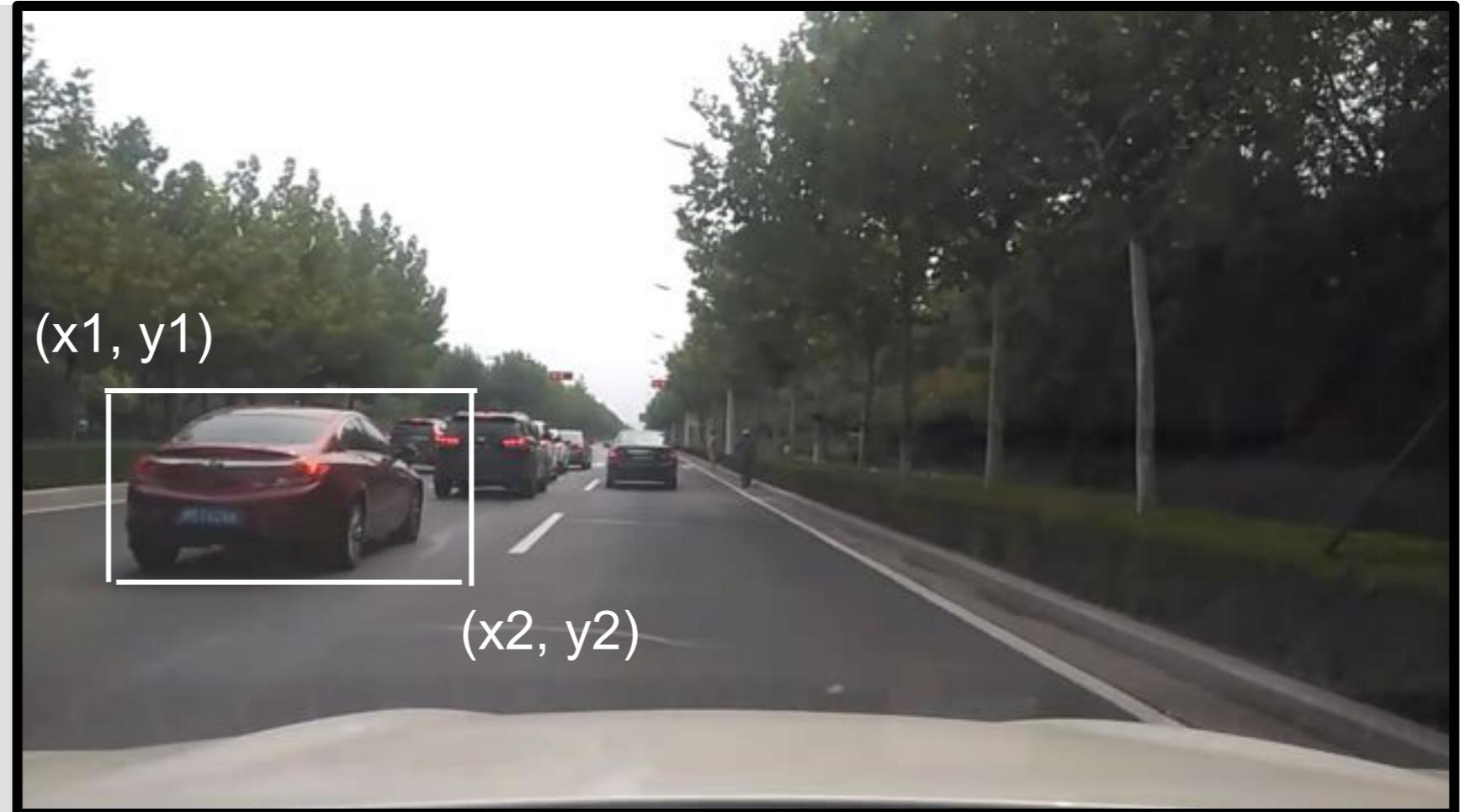
DATA

Dataset	Source	Object	Quantity
Train	UCar Technology Inc.	car, human, cyclist and traffic lights	10,000
Test	Object Detection Evaluation 2012	car, human	7,481

Download data: UCar DATA: [training set](#); [test set](#); [KITTI](#)

TRAINING DATA-EXAMPLE

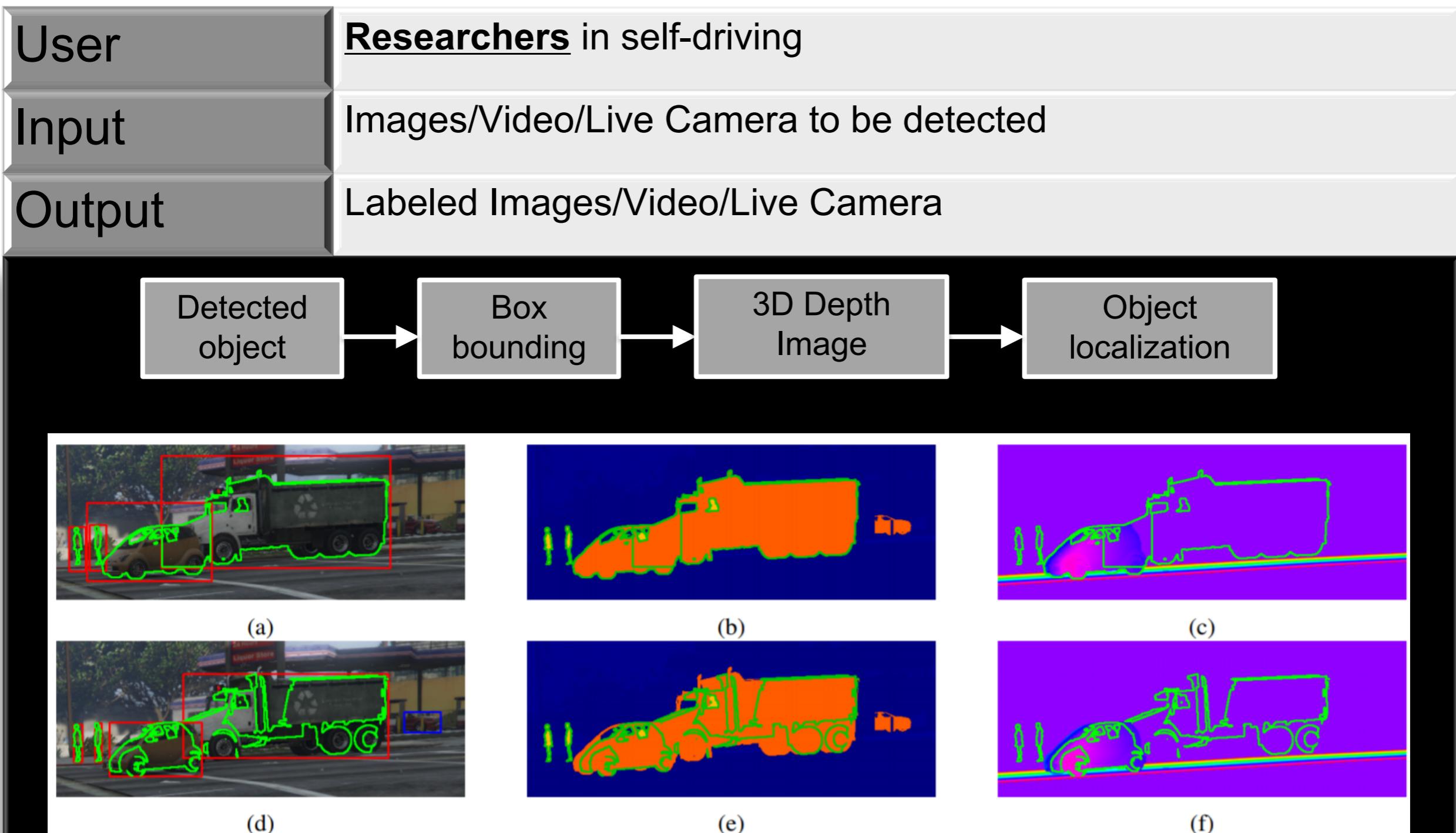
Image



**Label Map
(bounding box +
class name)**

```
{"61213.jpg": [  
    [319.00032, 185.50008, 329.83296, 217.33344, 2],  
    [258.99968, 187.99991999999997, 296.49984, 218.00016, 1],  
    [182.83328, 179.49996000000002, 237.16672, 222.5001600000002, 1],  
    [162.0, 181.9998, 199.00032, 209.00016, 1],  
    [46.0, 176.3334, 182.0, 252.8334, 1],  
    [232.83328, 188.1666, 257.00032, 207.8334, 1],  
    [233.49952, 161.25012, 248.7500800000003, 169.0002, 20],  
    [305.49952, 187.25004, 312.49984, 208.75032, 2]]}
```

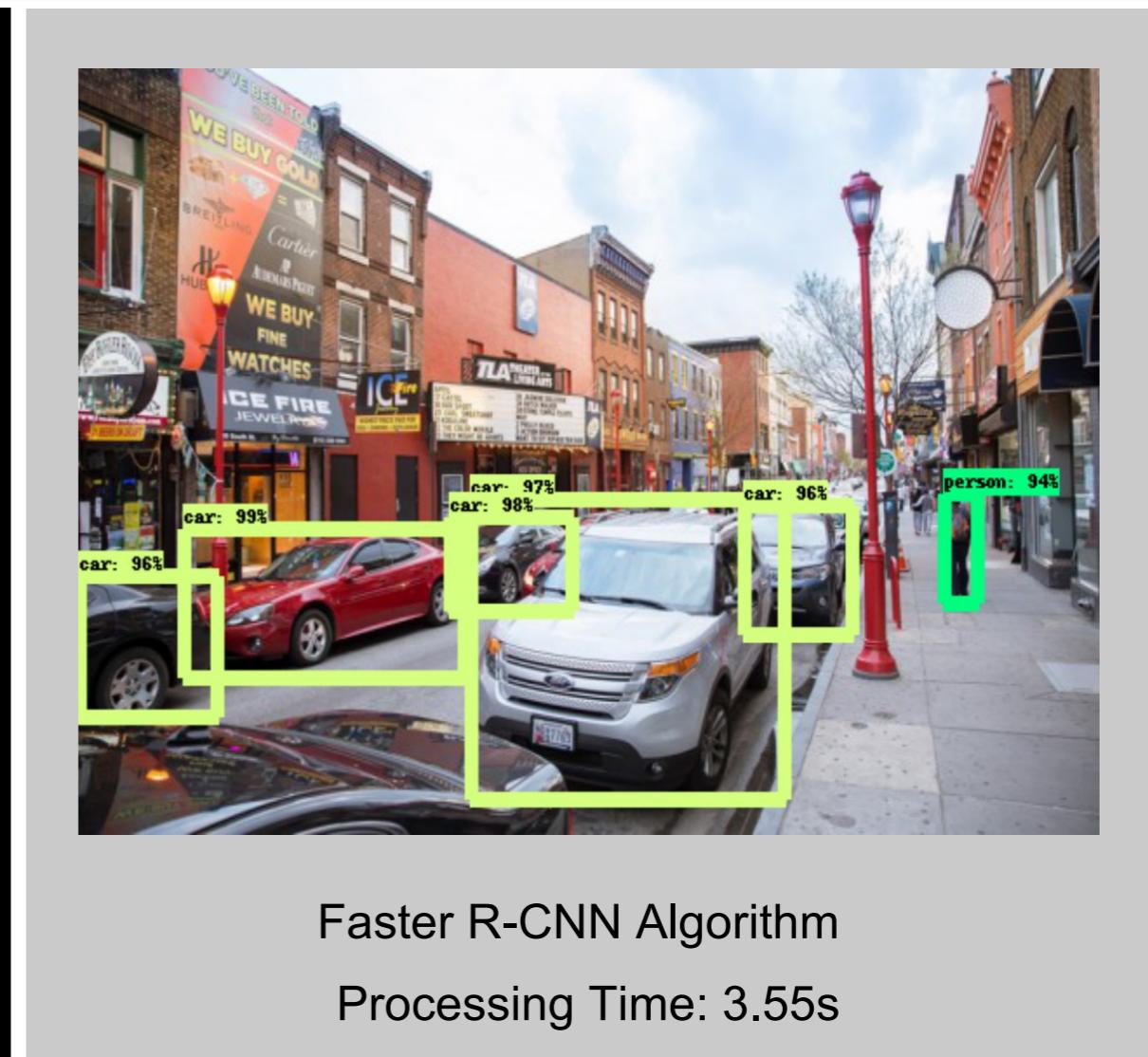
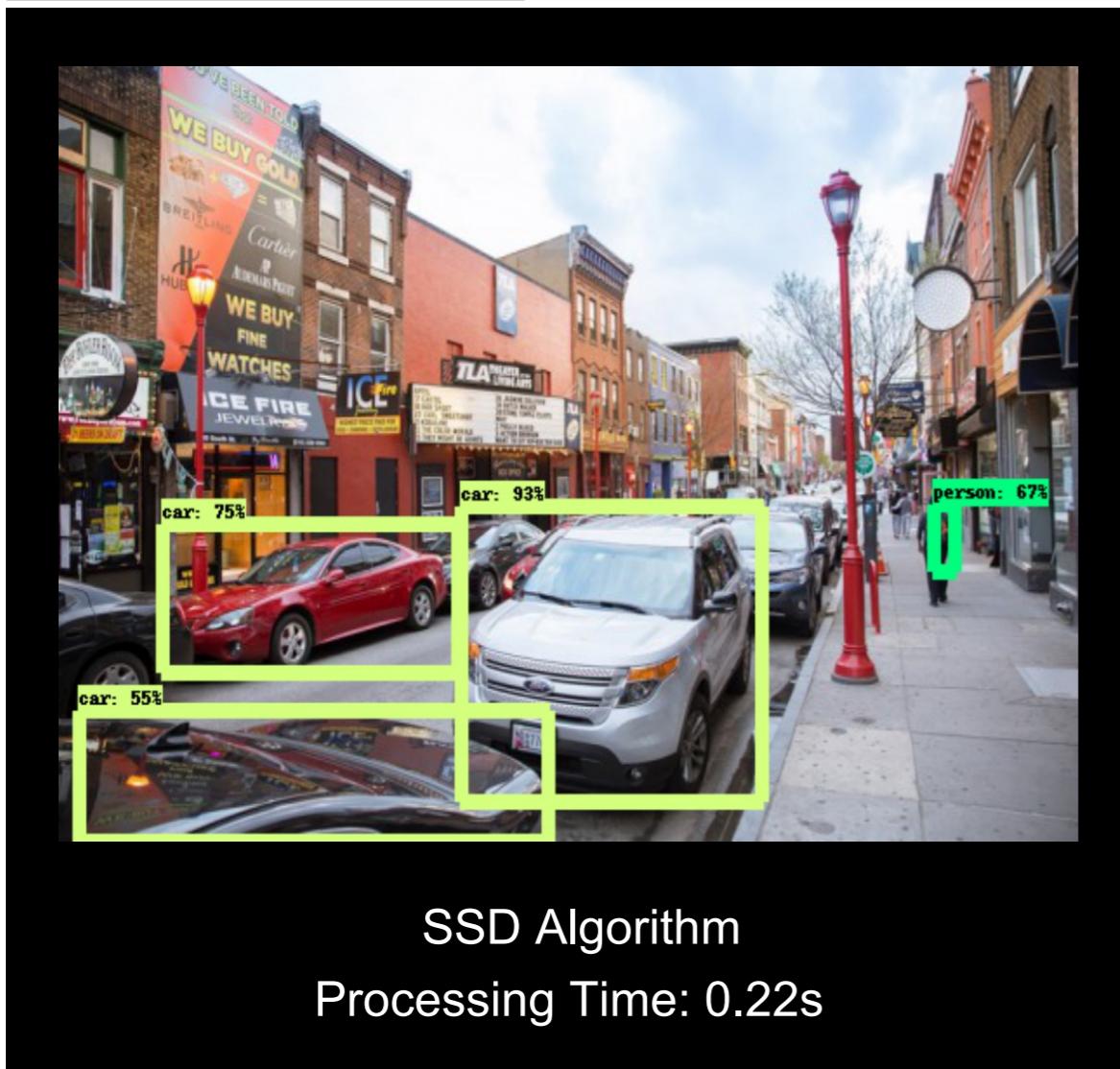
USE CASE1: Self-driving detection



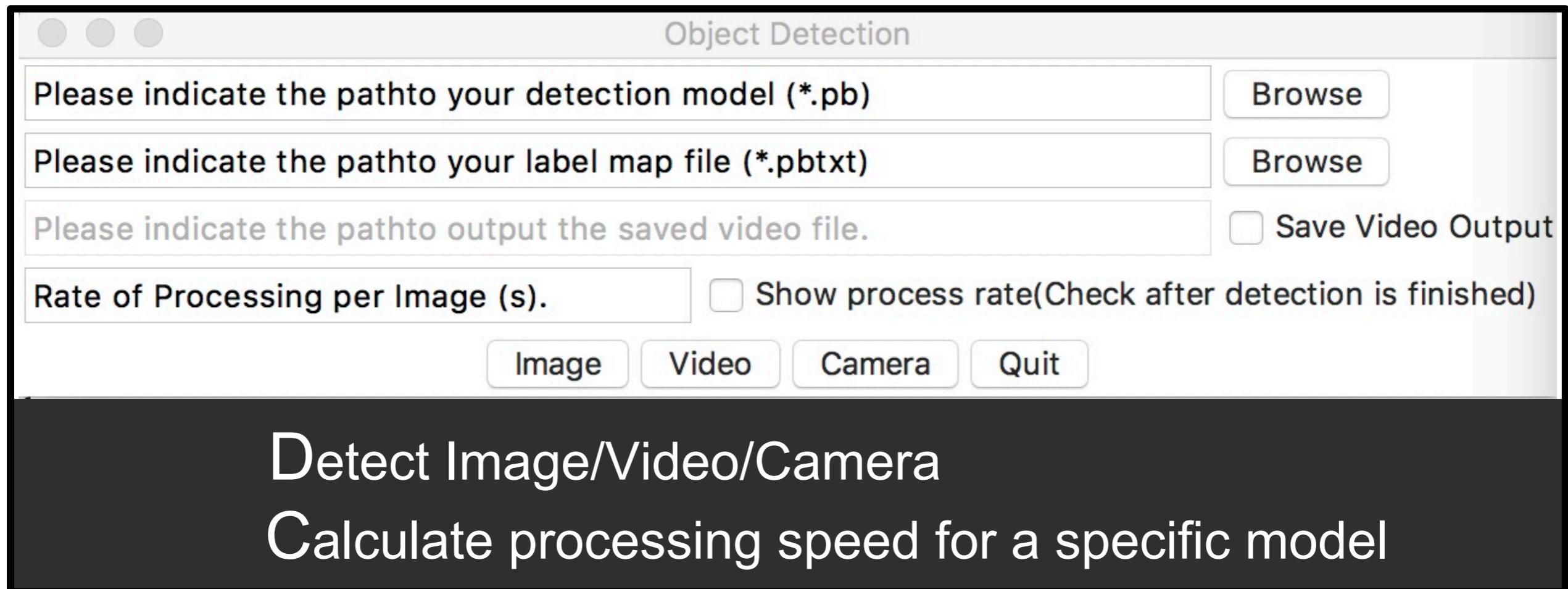
Driving in the Matrix: Can Virtual Worlds Replace Human-Generated Annotations for Real World Tasks?
(M. Johnson-Roberson, Charles Barto, Rounak Mehta, Sharath Nittur Sridhar, Karl Rosaen, Ram Vasudevan), *In IEEE International Conference on Robotics and Automation*, 2017.

USE CASE2: Compare different algorithm

User	Researchers in self-driving
Input	Different Object Detection Models, Photos to be detected, LabelMaps
Output	Labeled Images

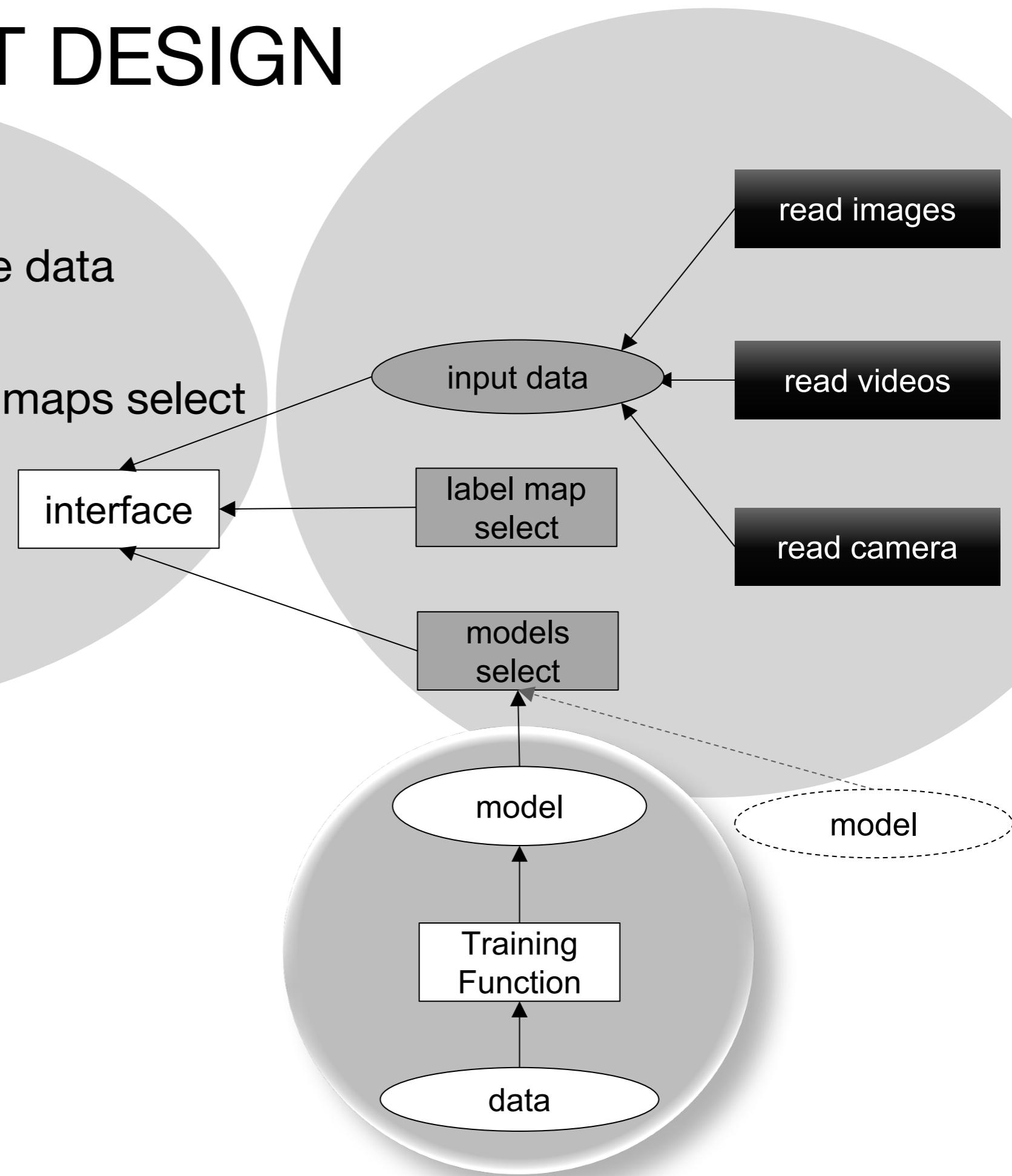


DEMO



COMPONENT DESIGN

- **Train a model**
 - Train the model with image data
- **Interface**
 - Load detect models, label maps select
 - Read in inputs
 - Show result



PROJECT STRUCTURE

[UWSEDS-aut17 / uwseds-group-zero](#)

Code Issues 4 Pull requests 0 Projects 0 Wiki Insights Settings

uwseds-group-zero  Edit

Add topics

58 commits 2 branches 5 contributors MIT

Branch: master New pull request

xhw1 fixed conflicts

Doc fixed conflicts 37 minutes ago

example slight refinement of the example jupyter notebook 21 hours ago

objectdetection fixed conflicts 37 minutes ago

.gitignore edit data.m 1 hour ago

1.png add image a month ago

LICENSE Initial commit 2 months ago

README.md added opencv installation guide for RNN 2 days ago

setup.py modify setup.py 6 days ago

--Doc/
--Examples/
--objectdetection/
 |--data/
 |--ssd_mobilenet/
 |--submodule/
 |--tests/
 |--__init__.py
 |--objdetapp.py
 └ -user_interface.py
--README.md
--LICENSE
└ -setup.py

LESSON LEARNED

- Design and implemented a complete software (detection algorithm, component, interface, test...)
- Git version control



Tk

(Tkinter)

- Dealing with different data format (images, json, csv, pbtxt , camera input, tensorflow tf record, etc)

FUTURE WORK

- Tune hyperparameters in Faster R-CNN Model
- Upgrade user interface
- Add input data from other sensors (radar, lidar) to make more robust detection.

Thank you!

<https://github.com/UWSEDS-aut17/uwseds-group-zero>

