



TorcsNet

Go

Patrick Esser

January 18, 2017

Overview

Self Driving Cars

Architecture

Results

Self Driving Cars

VOLVO



Mercedes-Benz



TESLA

OTTO



MOTION FLOW

LANE LINES

LANE LINES

ROAD FLOW

IN-PATH OBJECTS

ROAD LIGHTS

OBJECTS

ROAD SIGNS

LEFT REARWARD VEHICLE CAMERA

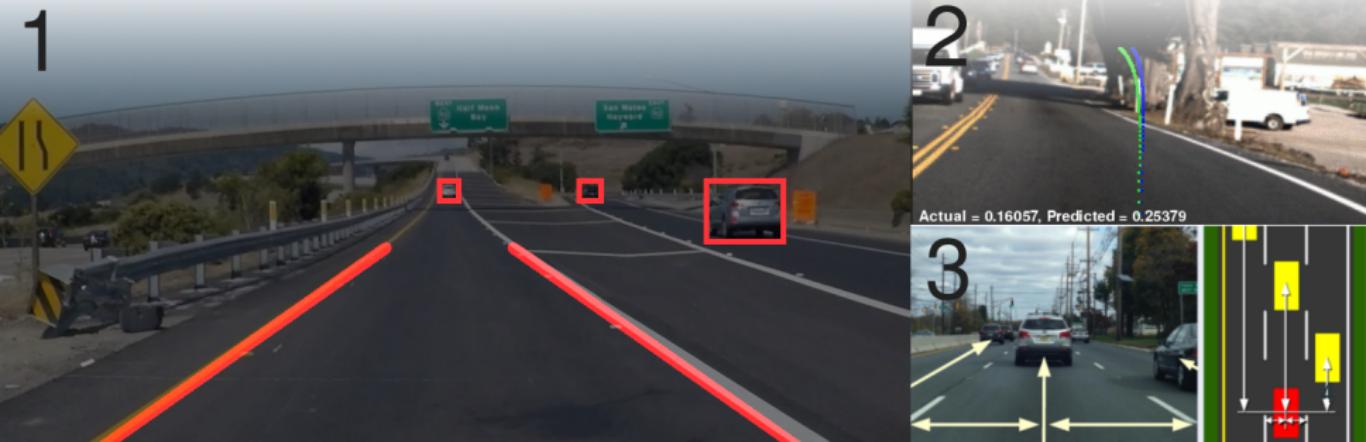
MEDIUM RANGE VEHICLE CAMERA

RIGHT REARWARD VEHICLE CAMERA



Approaches

1. Mediated Perception
2. Behavioural Reflex
3. Direct Perception



Architecture

Learning in TORCS

Zero cost

Open source gives perfect sensors

Safe testing of extreme situations

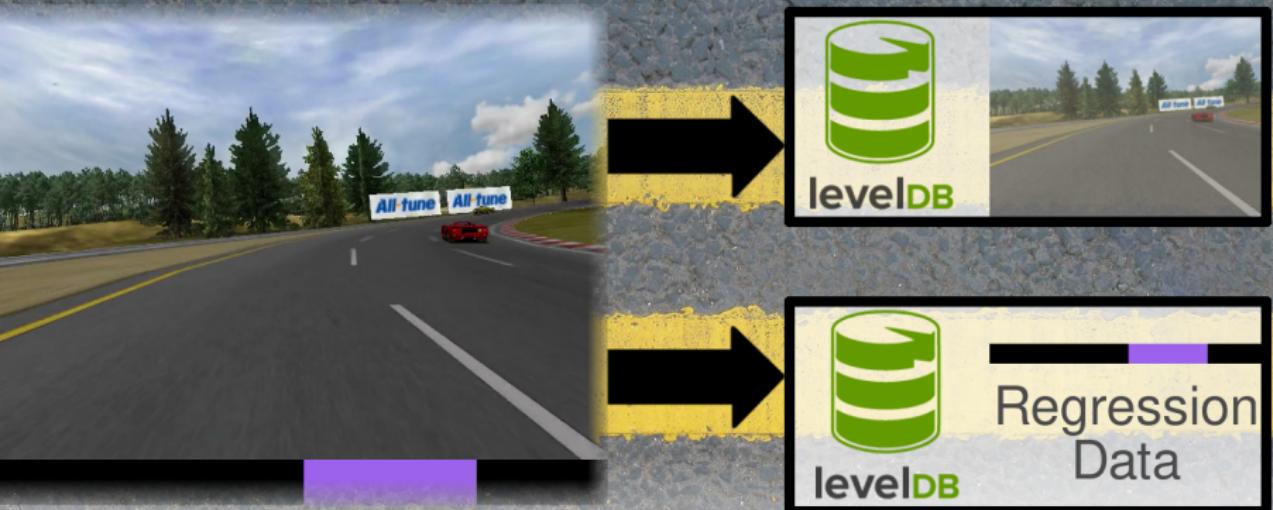
***The Open Racing
Car Simulator***

Overview



```
struct SharedStruct {  
    int written; // a label, if 1: available to read, if 0: available to write  
    uint8_t data[image_width*image_height*3]; // image data field  
    int pause;  
  
    // commands  
    double steerCmd;  
    double accelCmd;  
    double brakeCmd;  
  
    // sensors  
    double speed;  
    double dist_L;  
    double dist_R;  
};
```

Data Collection

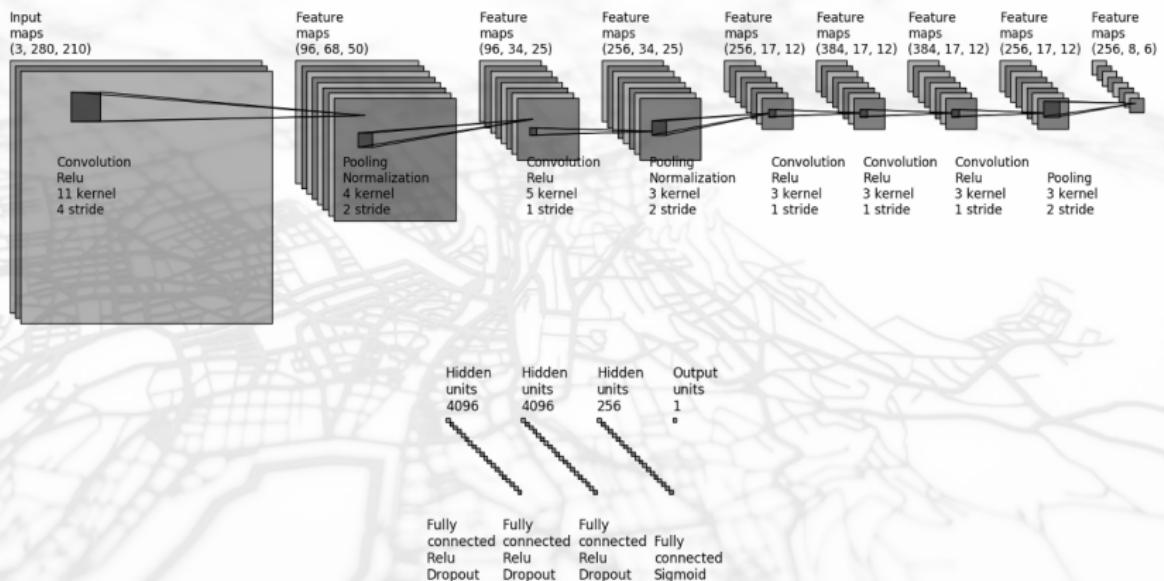


Ten frames per second.

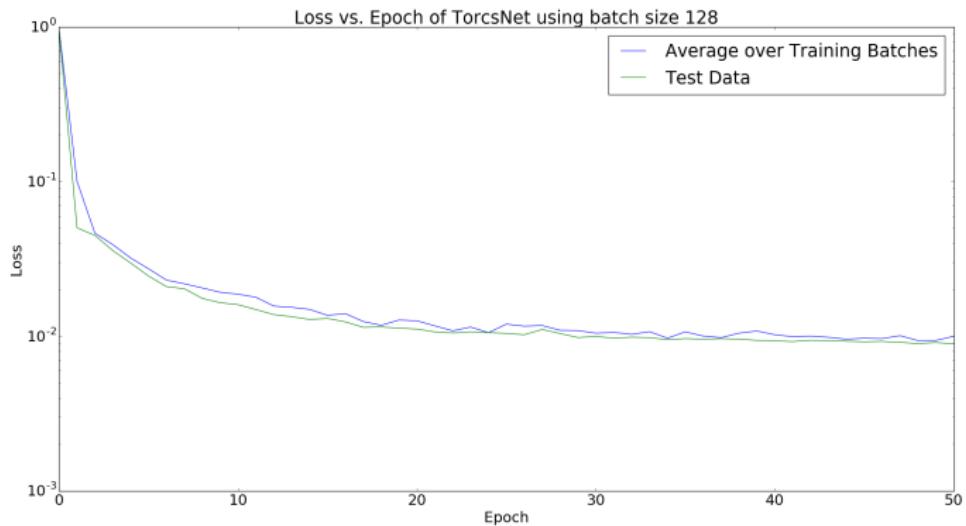
340k frames or 10 hours driving.

Shuffle, split, normalize.

Network

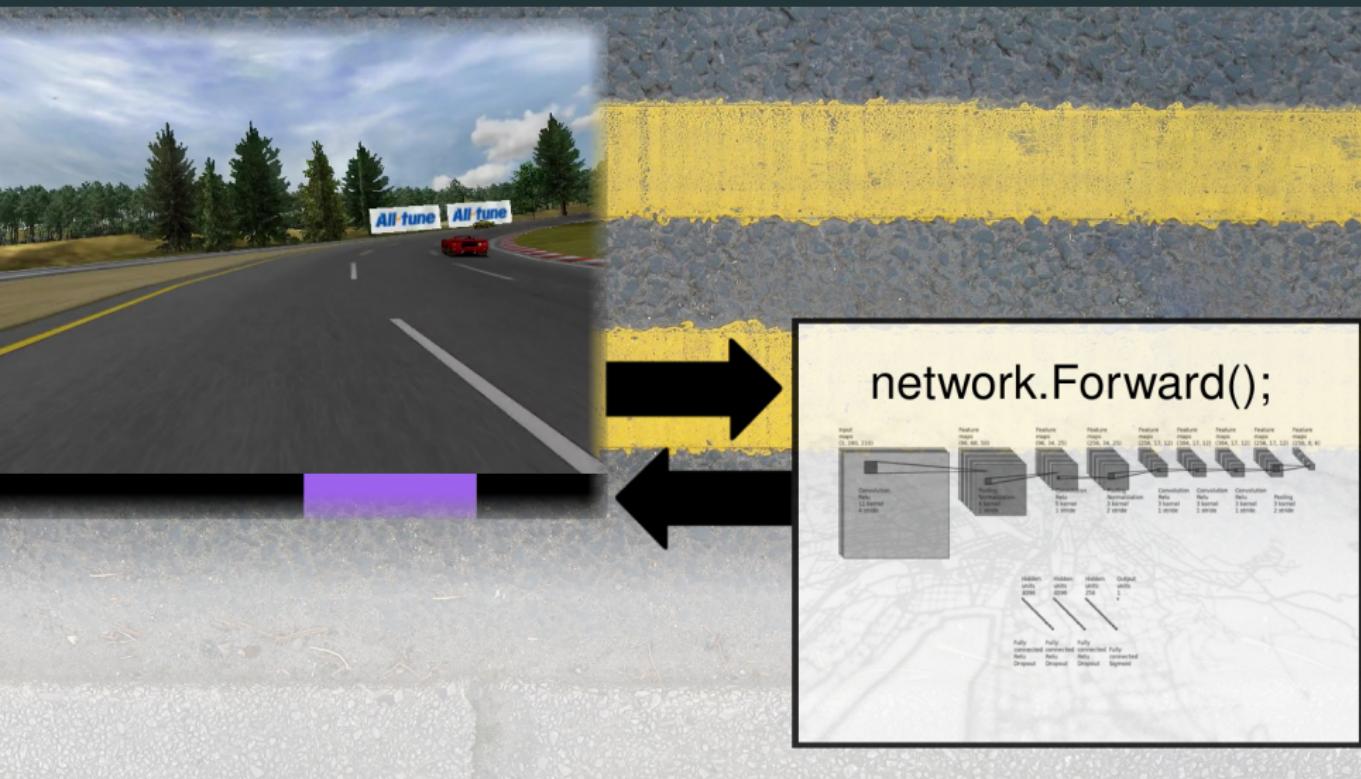


Training



Stochastic Gradient Descent
l2 loss
21.5 hours with GTX 980M

Driving



Results

Demos



Staying in the
lane



Looking at the
lanes



Failing to stay in
lane



Missing Recovery
Data

Transferability

Learn in different games



Predict real world data?

The End

