

Welcome To The Course

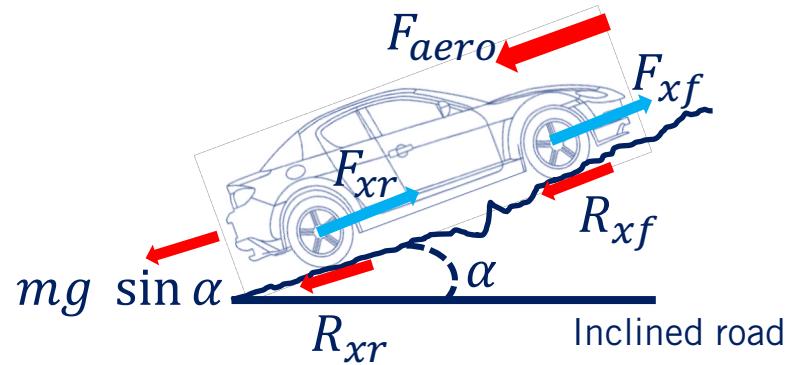
Course 3, Module 0



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

So far...

Course 1 – Introduction to Self-Driving Cars



Course 2 – State Estimation and Localization for Self-Driving Cars

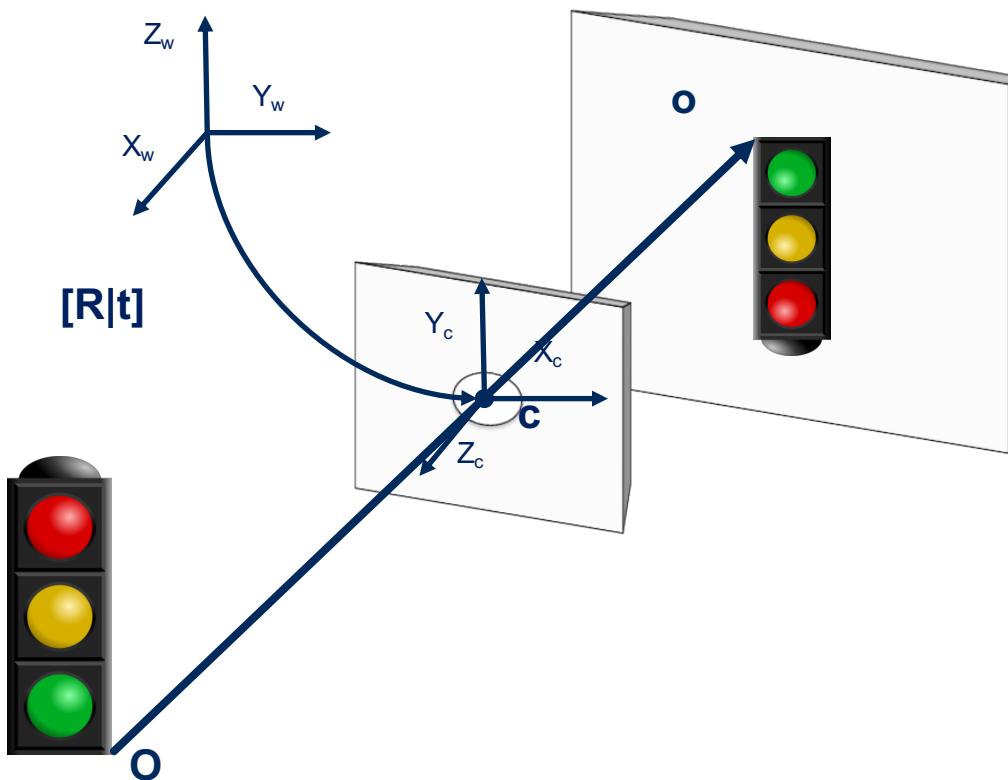
TBD – add a pic from Course 2

What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision.

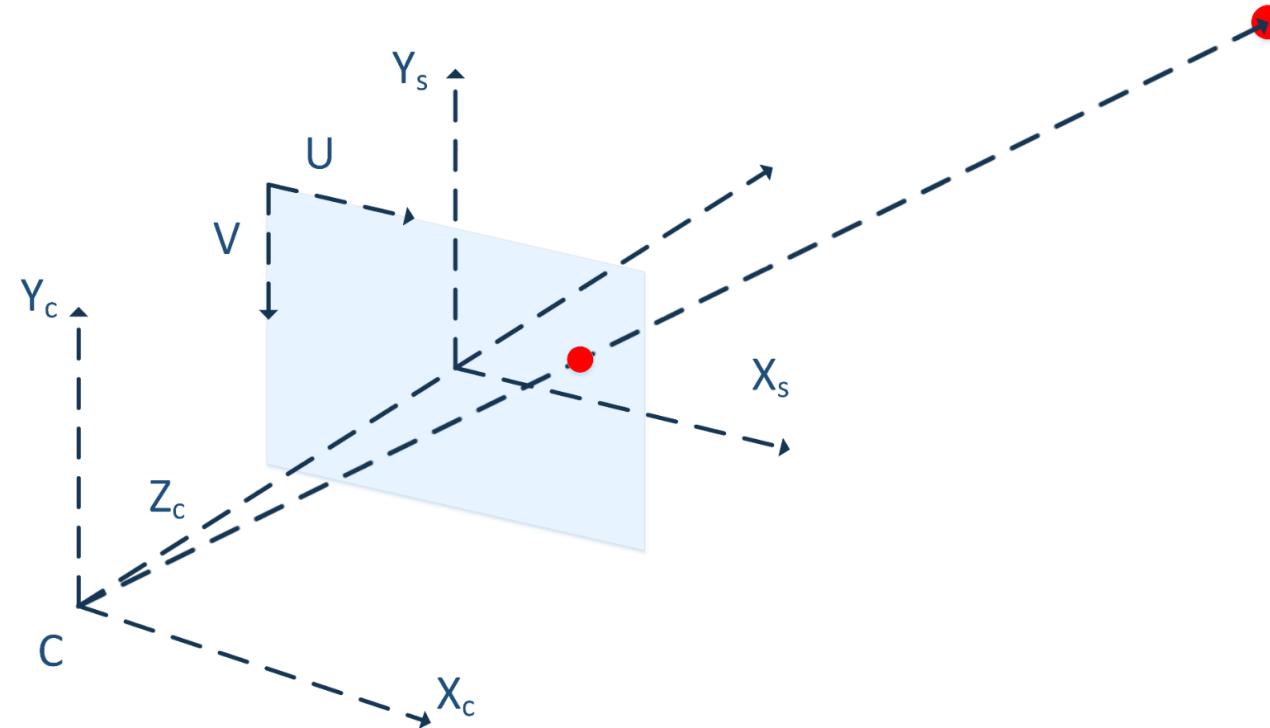
Basics Of 3D Computer Vision

- Image Formation



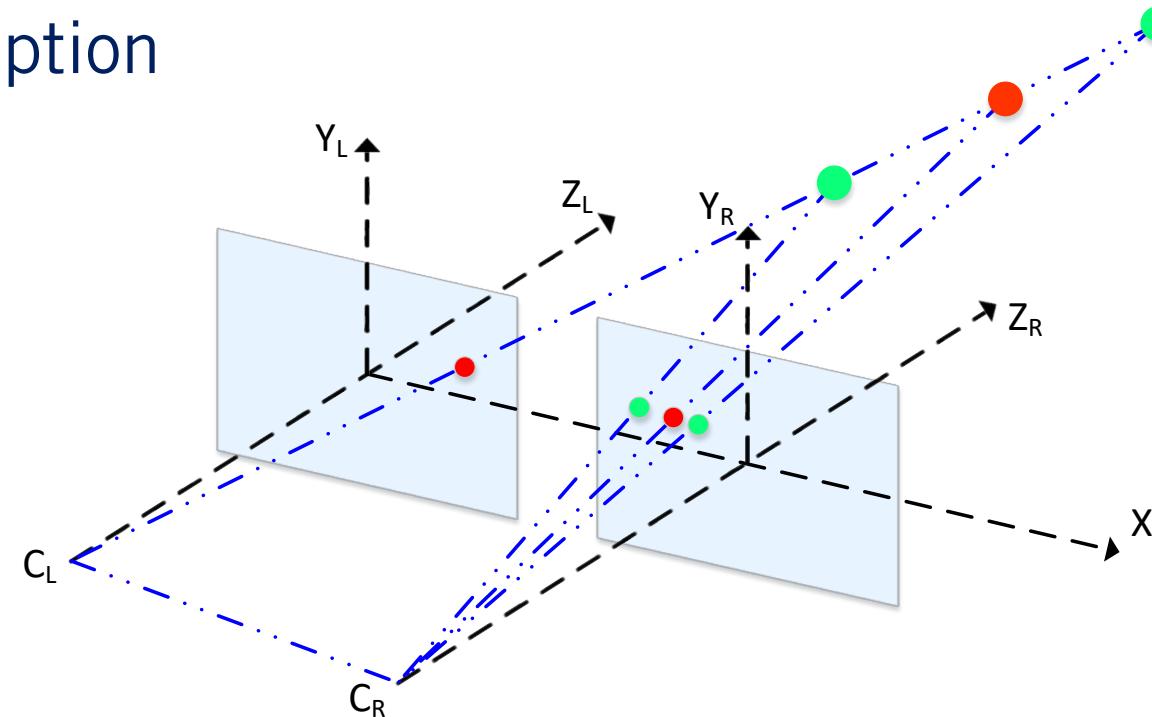
Basics Of 3D Computer Vision

- Image Formation
- Camera Projective Geometry
- Camera Calibration



Basics Of 3D Computer Vision

- Image Formation
- Camera Projective Geometry
- Camera Calibration
- Visual Depth Perception



Basics Of 3D Computer Vision

- Image Formation
- Camera Projective Geometry
- Camera Calibration
- Visual Depth Perception
- Image Filtering



*

1	2	1
0	0	0
-1	-2	-1

Horizontal
Sobel Kernel

=



What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision
 - Visual Features

Visual Features

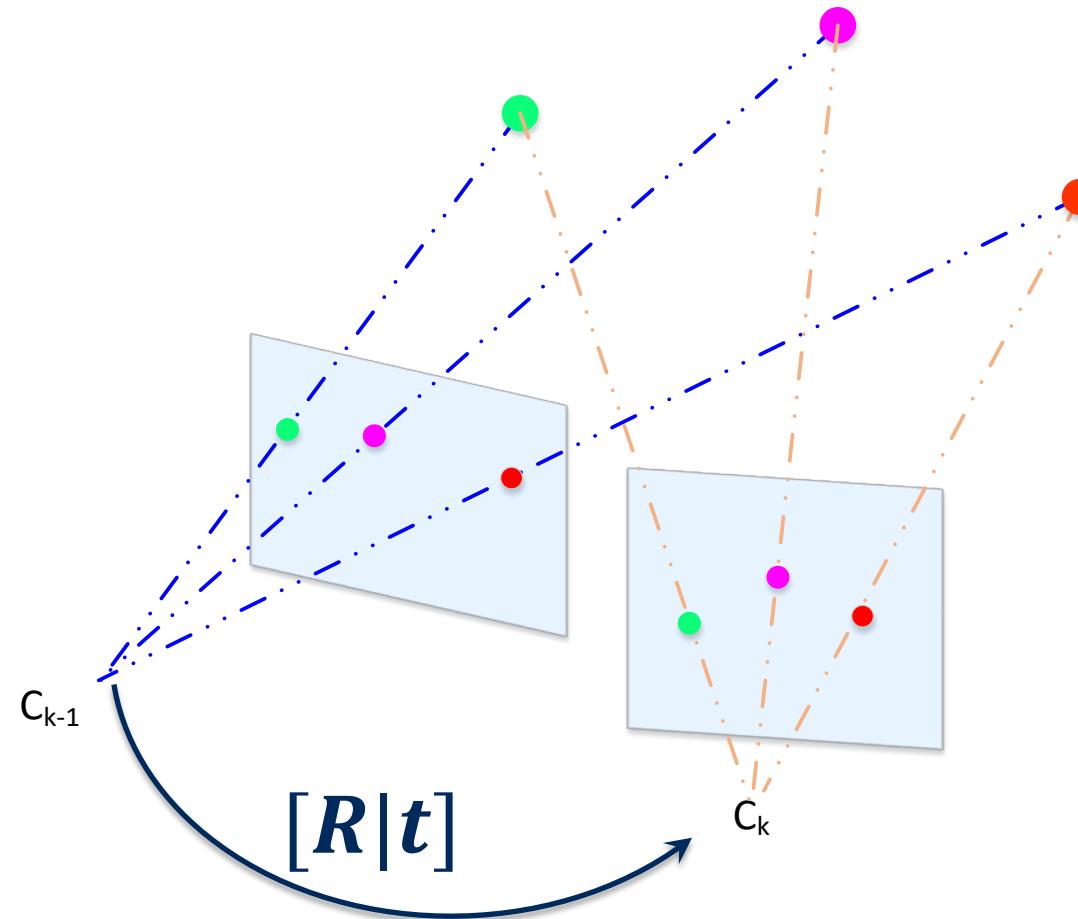
- Image Features
 - Detection
 - Description
 - Matching



Images from CITYSCAPES dataset: <https://www.cityscapes-dataset.com/>

Visual Features

- Image Features
 - Detection
 - Description
 - Matching
- Visual Odometry

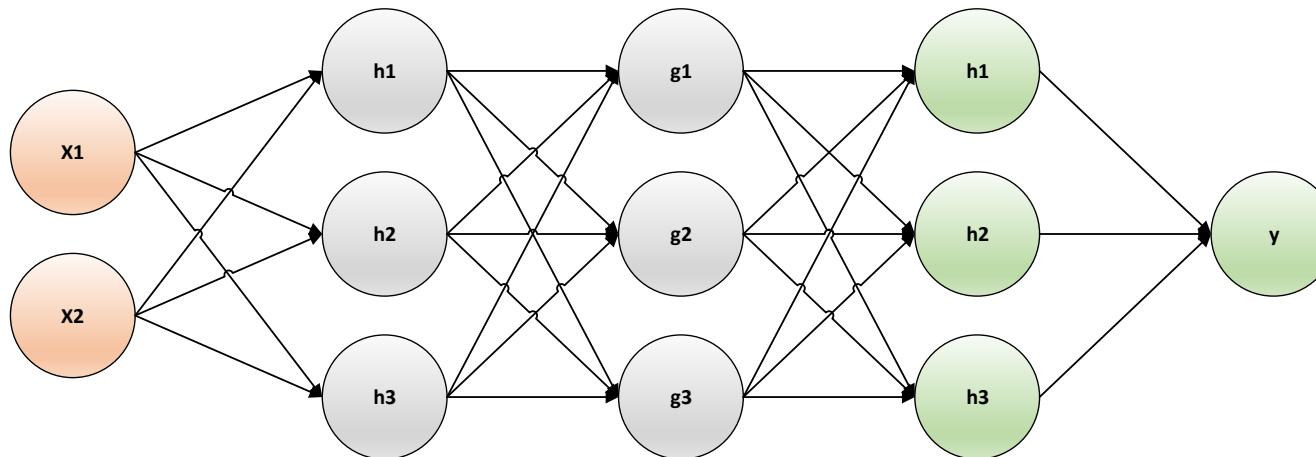


What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision.
 - Visual Features.
 - Feedforward and Convolutional Neural Networks.

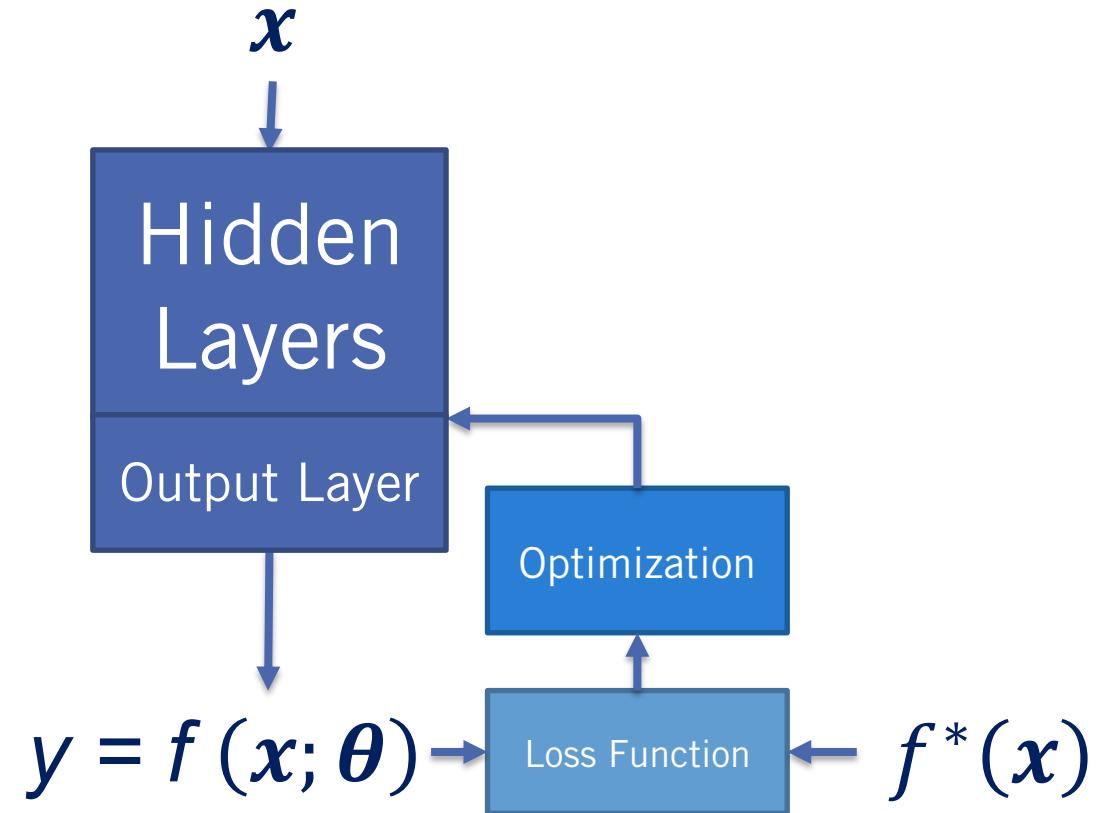
Feedforward and Convolutional Neural Networks

- FeedForward Neural Networks
- Output Layers and Loss Functions



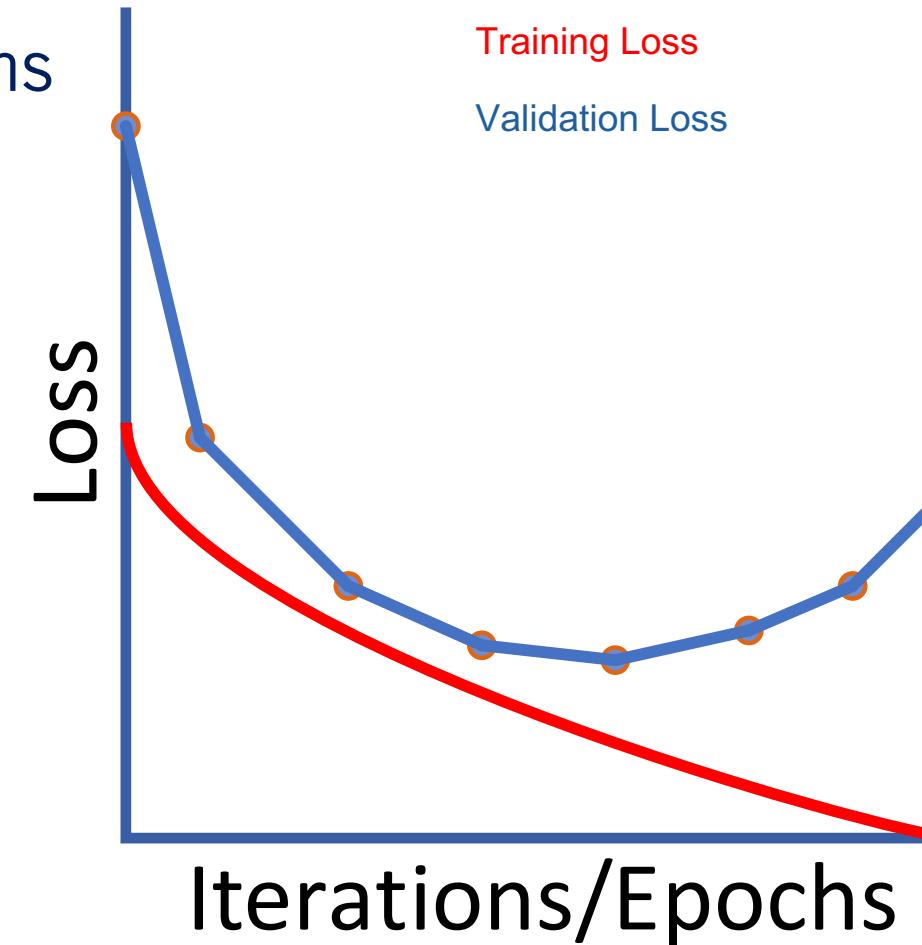
Feedforward and Convolutional Neural Networks

- FeedForward Neural Networks
- Output Layers and Loss Functions
- Neural Network Training



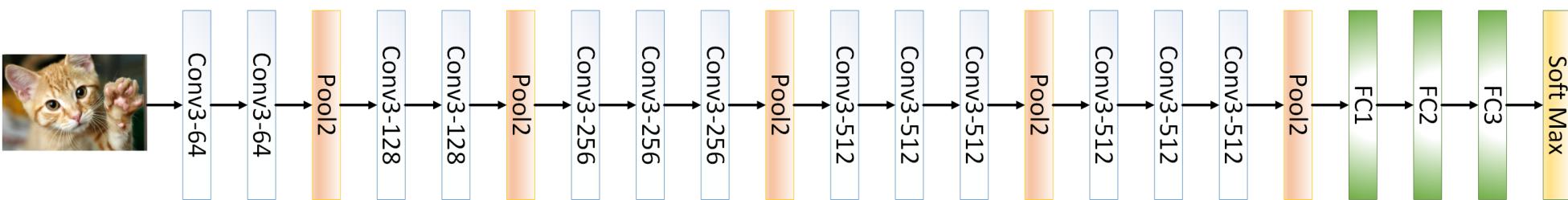
Feedforward and Convolutional Neural Networks

- FeedForward Neural Networks
- Output Layers and Loss Functions
- Neural Network Training
- Data Splits and Performance Evaluation
- Neural Network Regularization Strategies



Feedforward and Convolutional Neural Networks

- FeedForward Neural Networks
- Output Layers and Loss Functions
- Neural Network Training
- Data Splits and Performance Evaluation
- Neural Network Regularization Strategies
- Convolutional Neural Networks

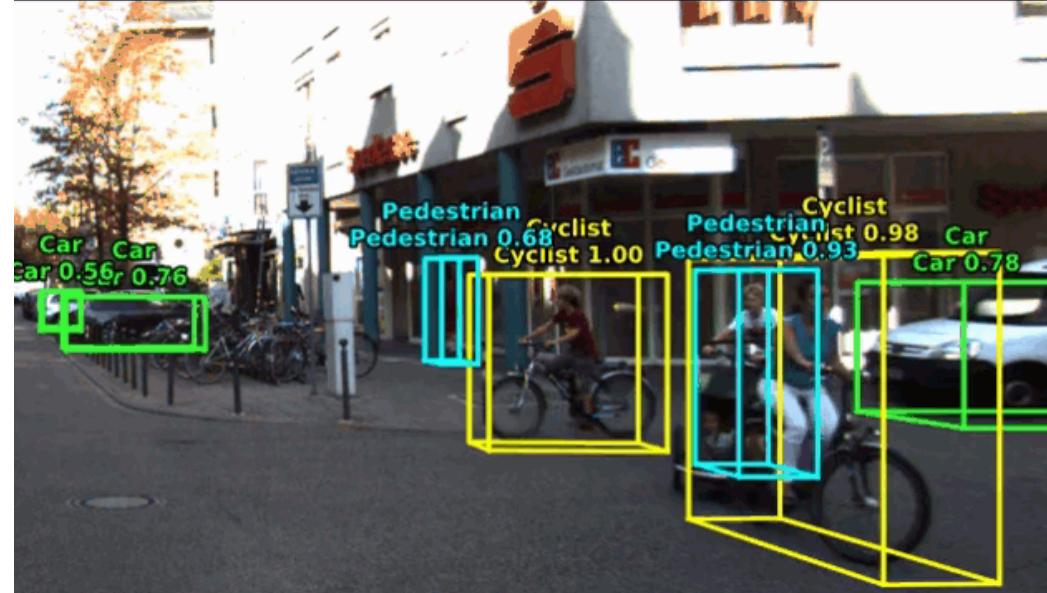


What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision.
 - Visual Features.
 - Feedforward and Convolutional Neural Networks.
 - 2D Object Detection.

2D Object Detection

- Problem Formulation
- Convolutional Neural Networks For 2D Object Detection
- Training vs Inference
- Using 2D Object Detection For Self-Driving Cars



What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision
 - Visual Features
 - Feedforward and Convolutional Neural Networks
 - 2D Object Detection
 - Semantic Segmentation

Sematic Segmentation

- Problem Formulation
- Convolutional Neural Networks For Semantic Segmentation
- Using Semantic Segmentation Output For Self-Driving Cars



Code at: <https://github.com/oandrienko/fast-semantic-segmentation>

What You'll Learn

- **Topics of this course:**
 - Basics of 3D Computer Vision.
 - Visual Features.
 - Feedforward and Convolutional Neural Networks.
 - 2D Object Detection.
 - Semantic Segmentation.
 - Final Project.