HyperDrive: Autonomous Self-Driving Car in an Urban Setting using Deep Reinforcement Learning

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Introduction

Reinforcement Learning Achievements

Games

- Chess (1997)
- Atari (2013)
- AlphaGo (2016)
- AlphaZero (2017)

Robotics

Introduction

Self-Driving Car

CARLA (Car Learning to Act)

Deep Reinforcement Learning

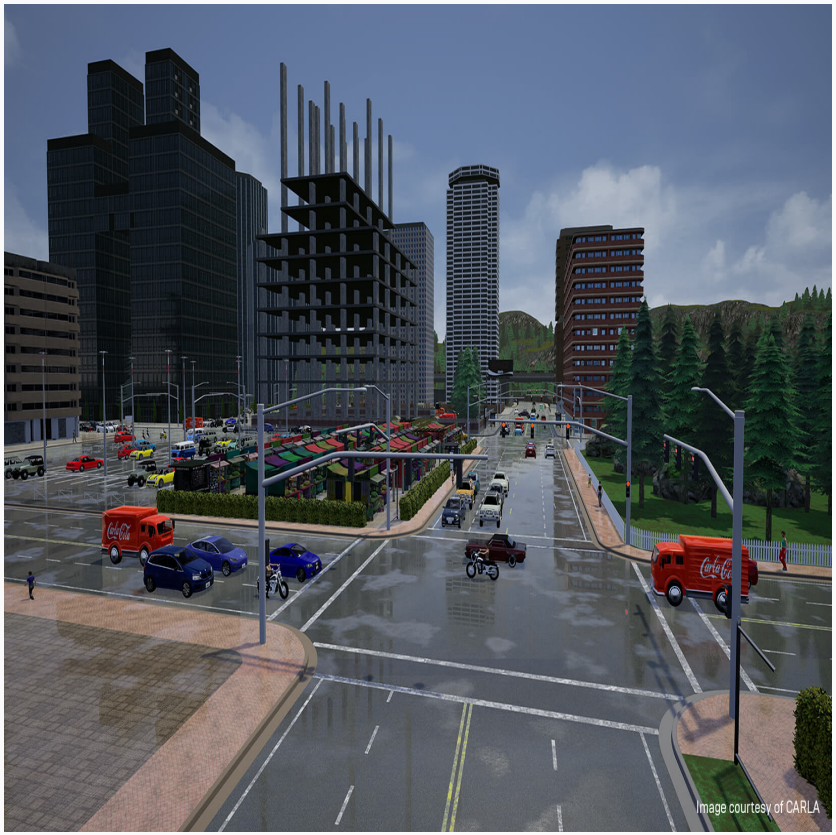
Scope

Simulated Environment

Urban & Dynamic Environment

Goal-Oriented Driving

Urban Environment of CARLA



Motivation

Motivation

Automation

- Industrial
- Healthcare
- Engineering

Motivation

Automation

- Industrial
- Healthcare
- Engineering

So, why not Cars ?

Literature Review

Literature Review

DrivingMatter [1]

- Limited Observation & Action Space
- SLAM

Robustness in Reinforcement Learning [2]

- low accuracy
- DQN

CARLA [3]

Problem

Problem

Autonomous Car's Routing in a Dynamic Urban Environment of CARLA.

How HyperDrive is Different?

How HyperDrive is Different?

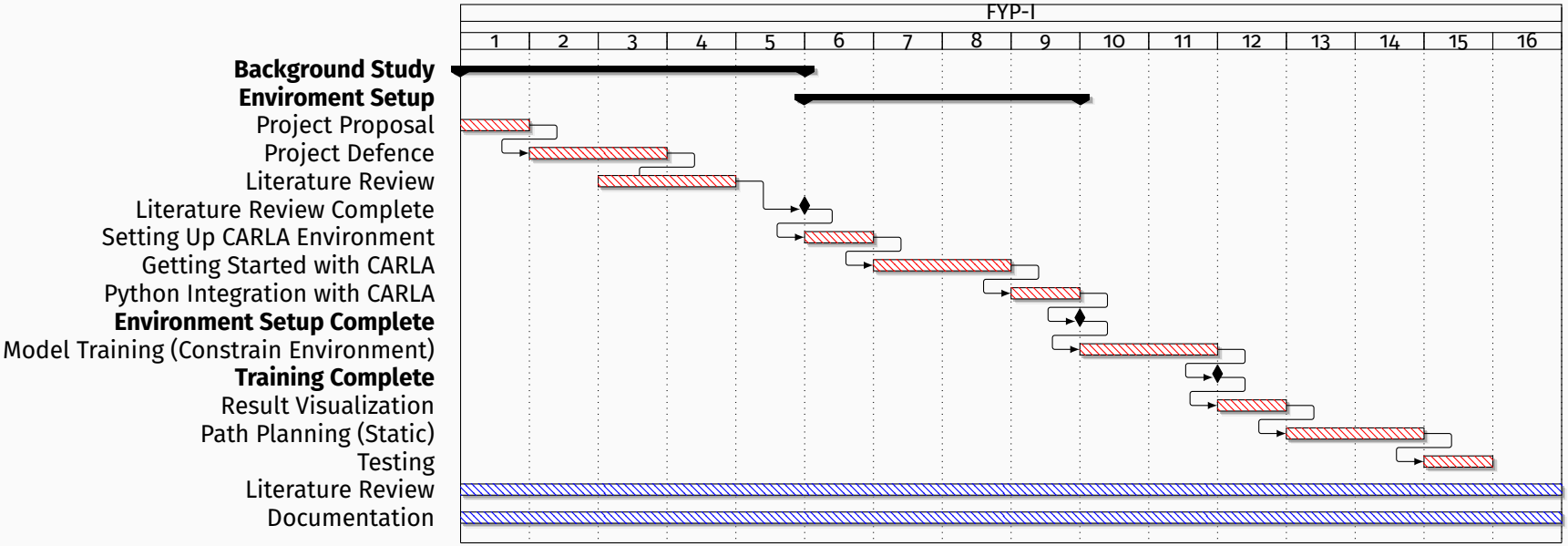
- Simulated Dynamic Urban Environment

How HyperDrive is Different?

- Simulated Dynamic Urban Environment
- Route Planning for aimed driving

Work Breakdown

FYP-I


FYP-I
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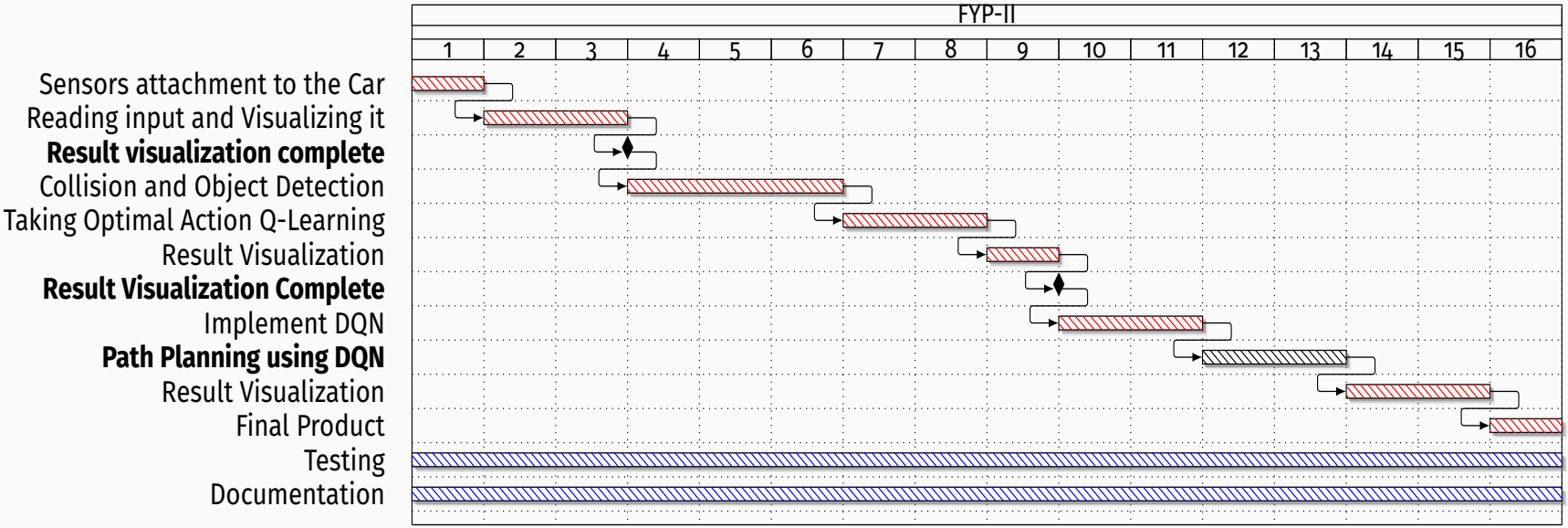
Background Study
Enviroment Setup
Project Proposal
Project Defence
Literature Review
Literature Review Complete
Setting Up CARLA Environment
Getting Started with CARLA
Python Integration with CARLA
Environment Setup Complete
Model Training (Constrain Environment)
Training Complete
Result Visualization
Path Planning (Static)
Testing
Literature Review
Documentation

FYP-II


FYP-II
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Sensors attachment to the Car
Reading input and Visualizing it
Result visualization complete
Collision and Object Detection
Taking Optimal Action Q-Learning
Result Visualization
Result Visualization Complete
Implement DQN
Path Planning using DQN
Result Visualization
Final Product
Testing
Documentation

Tools

Tools

Language Utilized

- Python

Visual Library

- OpenCV

Deep Learning Library

- TensorFlow
- Keras

Plot Library

- Seaborn
- Qt

Deliverable

Deliverable

FYP-I

- Getting Familiar & Environment Setup of CARLA
- Static Driving
- Static Path Planning

Deliverable

FYP-I

- Getting Familiar & Environment Setup of CARLA
- Static Driving
- Static Path Planning

FYP-II

- Training Agent in Dense Urban Environment
- Route Planning using DQN

References

References

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Thank you!

Any Questions?