Metamorphic Testing Applied on Baidu Apollo Autonomous Driving System

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Abstract

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Chapter 1

Introduction

This chapter introduces the background information of autonomous vehicles as well as the basic concepts of metamorphic testing and fuzz testing. The motivation, aims and objectives of the project are then described. Finally, the outline of the dissertation is given.

1.1 Background

1.1.1 Autonomous Vehicles and Baidu Apollo

Give background information, history, technologies and applications of autonomous vehicles. Introduce Baidu Apollo system in details, especially in the level of software.

1.1.2 Oracle Problem and Metamorphic Testing

Describe the definitions of Oracle problem, MT and MR. Give simple examples here. Explain why this approach is suitable for autonomous driving.

1.1.3 Fuzz Testing

Explain the concepts of fuzz and fuzz testing. Give examples and explain the reason of using this technique.

1.2 Motivation

Provide real life problems or accidents of autonomous driving systems

1.3 Aims and Objectives

Explain the overall intention of the project and specific steps that will be taken to achieve the intention.

1.4 Dissertation Outline

Summarize the chapter and give the outline of the rest of the dissertation

Chapter 2

Related Work

This chapter gives two (or more) related researches of autonomous vehicle testing and the methodologies and results of these researches. New thoughts in my project and better approaches than existing work in the same field are introduced.

2.1 Metamorphic Fuzz Testing on Autonomous Vehicles

Apart from methodology and results, explain the advantages of the project. Give extra information about potential drawback and how to avoid or optimise it.

2.2 Metamorphic Testing of Driverless Cars

Same as previous section...

2.3 Innovative MRs and Improvements

Introduce different thoughts, design, new MRs and testing approaches that is better than the existing experiments.

Chapter 3

Methodology

Chapter 4

Design & Implementation

Chapter 5

Results and Analysis

Chapter 6

Summary & Reflections

References