Table of Contents

CHAPTER I. Introduction

1.1. Introduction 1

1.2. Test Data Generation and its Automation 2

1.2.1. Dynamic Test Data Generation 3

1.3. Evolutionary Algorithms 6

1.3.1. Genetic Algorithm 7

1.3.2. Particle Swarm Optimization and Binary Particle Swarm Optimization 9

1.3.3. Quantum Particle Swarm Optimization 11

1.3.4. CLONALG 13

1.4. Organization of the Thesis 15

CHAPTER II. Literature Review

2.1. Introduction 16

2.2. Search Based Test Data Generation 16

2.3. Program Based Structural Test Data Generation 19

2.3.1. Test Data Generation for Path Coverage 20

2.3.2. Test Data Generation for Branch Coverage 22

2.3 Open Problems and Thesis Objectives 24

2.4. Review of Related Work 24

2.4.1. Branch Selection 25

2.4.2. Fitness Function Design 26

2.4.3. Test Data Generation with Structured Evolutionary Algorithms 28

CHAPTER III. Automated Test Data Generation for Branch Testing using Genetic Algorithm and Quantum Particle Swarm Optimization: An Improved Approach using Branch Ordering, Memory and Elitism

3.1. Introduction 30

3.2. Test data generation for branch coverage using GA and QPSO 31

3.2.1. Test Data Generation with a Genetic Algorithm 34