TABLE OF CONTENTS

APPROVAL i

SELF DECLARATION AGAINST PLAGIARISM ii

ABSTRACT iii

ABSTRAK iv

ACKNOWLEDGEMENTS v

LIST OF CONTENTS vi

List of Figures ix

List of Tables x

Symbols xii

1 INTRODUCTION 1
- 1.1 Rationale . . . 1
- 1.2 Statement of the Problem . . . 3
- 1.3 Objective . . . 3
- 1.4 Theoretical Framework . . . 3
  - 1.4.1 Region Label Annotation . . . 3
  - 1.4.2 Global Process of Region Label Annotation . . . 4
- 1.5 Conceptual Framework/Paradigm . . . 5
- 1.6 Hypothesis . . . 6
- 1.7 Scope and Delimitation . . . 6
- 1.8 Significance of The Study . . . 6

2 REVIEW OF LITERATURE AND STUDIES 8
- 2.1 Related Literature (Previous Works) . . . 8
  - 2.1.1 Exploiting Provided Annotation . . . 8
  - 2.1.2 Contextual Cueing . . . 9
    - 2.1.2.1 Region Label Annotation by Fuzzy Based Contextual Cueing Label Propogation . . . 9
  - 2.1.3 Weakly Label . . . 10
    - 2.1.3.1 Label to Region by Bi-Layer Sparsity Priors . . . 10
    - 2.1.3.2 Segmenting Objects in Weakly Labeled Videos . . . 11

2.1.4 Related Literature Summary . . . 12
2.2 Related Studies . . . 12
2.2.1 SLIC Superpixel . . . 12
2.2.2 Superpixel-based Mid-Level Image Description for Image Recognition . . . 14
2.2.3 Genetic Algorithm . . . 15
2.2.4 Image Annotation using Support Vector Machines . . . 15

3 RESEARCH METHODOLOGY 18
3.1 Region Label Annotation System Design . . . 18
3.2 Process Design . . . 19
3.2.1 Superpixel Level Training . . . 19
3.2.1.1 Building New Ground Truth . . . 20
3.2.1.2 Model Distribution Building . . . 24
3.2.1.3 Superpixel Training . . . 25
3.2.1.3.1 Features Extraction . . . 26
3.2.1.3.2 SVM Training . . . 30
3.2.2 Image Level Annotation Testing . . . 30
3.2.2.1 Superpixel Level Annotation . . . 30
3.2.3 Label Refining by Contextual Cueing . . . 31
3.2.3.1 Appropriate Scene Selection . . . 32
3.2.3.2 Label Refining . . . 33
3.2.3.2.1 Identify Potential miss-labelling . . . 33
3.2.3.2.2 Correcting Miss-Label Based on Neighborhood Relationship . . . 35
3.3 Contribution . . . 37

4 EXPERIMENT AND ANALYSIS 39
4.1 Experiment Design . . . 39
4.1.1 Data Specification . . . 39
4.1.2 Data Validation . . . 39
4.1.3 Performance Metric . . . 41
4.1.4 Experiment Scenario . . . 41
4.2 Experiment Result and Analysis . . . 42
4.2.1 Experimented Result on Superpixel Level Training . . . 42
4.2.2 Experiment Result on Image Level Annotation Testing . . . 46
4.2.2.1 Testing Image Based on Secon SVM Model . . . 46
4.2.2.2 Result of Labeling Refining on Image Level . . . 47
4.2.3 Performance Comparison with Earlier Works . . . 51

5 CONCLUSION AND RECOMMENDATIONS 52
5.1 Conclusion . . . 52
5.2 Recommendation . . . 52

Bibliography 56

A Detailed Procedure and Function **57**

B CURRICULUM VITAE **61**