

Universiti Teknologi MARA

**Color-Based Of Bird Species
Classification
Using Support Vector Machine**

Nur Amalina Binti Nazery

**Thesis submitted in fulfilment of the requirements
for Bachelor of Computer Science (Hons.)
Faculty of Computer and Mathematical Sciences**

July 2017

STUDENT'S DECLARATION

I certify that this thesis and the project to which it refers is the product of my own work and that any idea or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.

.....
NUR AMALINA BINTI NAZERY
2014696404

JULY 24, 2017

ABSTRACT

Bird classification is an important task in computer vision problem. The problem is to classify the images from the set of training images. Birds in images may also appeared in different situation such as in different sizes, different pose and angle of view. Therefore, this project proposed a prototype of bird species classification based on color features from bird images. There are three phases involved in this project which are data collection, processing (i.e feature extraction and classification) and post processing (i.e test and evaluation). For the data collection, 200 images from two different species of birds which are snowy owl and toucan has been collected from Datasets for Computer Vision Study website. All the bird image dataset are utilized as the train and test image data. The color moment extracted from the bird images in processing phase. There are nine color features experimented which are mean, standard deviation, and skewness. These nine color features are computed from the color component of red, green, and blue. The feature vectors of mean, standard deviation and skewness are then applied in Support Vector Machine to classify two group of bird species. The results proved that it significantly works on two bird species of Snowy Owl and Toucan to classify that bird images. Hence, this prototype significantly benefits to the users who are involved in ornithology and birdwatcher. In future, more features can be added in feature extraction process to produce more accurate result of classification.

Keywords— Bird Classification; Color Based Features Extraction; Support Vector Machine, Machine Learning; Algorithm.

TABLE OF CONTENTS

| CONTENT | PAGE |
|--|-------------|
| SUPERVISOR'S APPROVAL | ii |
| STUDENT'S DECLARATION | iii |
| ACKNOWLEDGEMENT | iv |
| ABSTRACT | v |
| TABLE OF CONTENTS | vi |
| LIST OF FIGURES | viii |
| LIST OF TABLES | ix |
| LIST OF ABBREVIATIONS | x |
| CHAPTER ONE : INTRODUCTION | |
| 1.1 Background of Study | 1 |
| 1.2 Problem Statement | 2 |
| 1.3 Objectives | 3 |
| 1.4 Scope | 3 |
| 1.5 Significances | 4 |
| 1.6 Organization of the Thesis | 5 |
| 1.7 Conclusion | 6 |
| CHAPTER TWO : LITERATURE REVIEW | |
| 2.1 Introduction | 7 |
| 2.2 Bird Species | 7 |
| 2.3 Image Processing | 9 |
| 2.4 Feature Extraction | 10 |
| 2.4.1 Color Feature Extraction | 10 |
| 2.4.2 Texture Features Extraction | 13 |
| 2.4.3 Shape Features Extraction | 15 |
| 2.5 Bird Species Classification | 19 |
| Support Vector Machine | 19 |
| Artificial Neural Network | 20 |
| K-Nearest Neighbor | 20 |
| Morphological | 21 |
| Template Matching | 22 |

| | |
|---|-----------|
| Bag-of-Words Model | 23 |
| 2.6 Conclusion | 25 |
| CHAPTER THREE : METHODOLOGY | |
| 3.1 Introduction | 26 |
| 3.2 Framework | 26 |
| 3.3 Data Collection | 28 |
| 3.4 Feature Extraction | 29 |
| 3.5 Bird Species Classification | 34 |
| 3.6 Test and Evaluation | 37 |
| 3.7 Hardware and Software Requirement | 38 |
| 3.8 Conclusion | 39 |
| CHAPTER FOUR : PROTOTYPE DESIGN AND IMPLEMENTATION | |
| 4.1 Introduction | 40 |
| 4.2 System Prototype | 40 |
| 4.3 Conclusion | 43 |
| CHAPTER FIVE : RESULT AND DISCUSSION | |
| 5.1 Introduction | 44 |
| 5.2 Color-Based Feature Extraction | 44 |
| 5.3 Bird Species Classification | 45 |
| 5.4 Conclusion | 46 |
| CHAPTER SIX : CONCLUSION AND FUTURE WORKS | |
| 6.1 Introduction | 47 |
| 6.2 Summary of the Study | 47 |
| 6.3 Strength and Limitation of the System | 48 |
| 6.4 Recommendation and Future Work | 49 |
| 6.5 Conclusion | 49 |
| REFERENCES | 50 |
| APPENDICES | |
| APPENDIX A RESULT OF FEATURE EXTRACTION FOR SNOWY OWL | 57 |
| APPENDIX B RESULT OF FEATURE EXTRACTION FOR TOUCAN | 62 |
| APPENDIX C RESULTS OF CLASSIFICATION FOR SNOWY OWL | 67 |
| APPENDIX D RESULTS OF CLASSIFICATION FOR SNOWY OWL | 88 |