Khidmat Report
WWF Bird Recognition Model

Student 1: Ali Hamza
ah05084

Student 2: Ali Haider
xy09876

Student 3: Usaid Rehman
xy09876

August 28, 2021

Contents

1 Introduction **3**
- 1.1 Project Description . . . 3
- 1.2 About WWF . . . 3
- 1.3 Work Plan . . . 3

2 Weekly Work Log **4**
- 2.1 `Week 1:` . . . 4
- 2.2 `Week 2:` . . . 5
- 2.3 `Week 3:` . . . 6
- 2.4 `Week 4:` . . . 7
- 2.5 `Week 5:` . . . 8
- 2.6 `Week 6:` . . . 9
- 2.7 `Week 7:` . . . 10
- 2.8 `Week 8:` . . . 11

3 Conclusion **12**

4 Technical Overview **13**
- 4.1 Resources . . . 13
- 4.2 Overview of CS Techniques Used . . . 14
  - 4.2.1 Image Collection . . . 14
  - 4.2.2 Image Preprocessing . . . 14
  - 4.2.3 Neural Network Construction . . . 14
  - 4.2.4 Training the Neural Network . . . 14
  - 4.2.5 Testing and Optimization . . . 14

A Source Code **15**

B Documentation **16**

1 Introduction

1.1 Project Description

This project is aimed at creating and deploying a deep learning pipeline for WWF Pakistan to classify images of three different species of birds – namely: common myna, house crow, and the house sparrow. This project would serve as a proof-of-concept for a larger model that WWF can use to classify a larger number of birds using a mobile application.

1.2 About WWF

1.3 Work Plan

2 Weekly Work Log

2.1 Week 1:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.2 Week 2:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.3 Week 3:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.4 Week 4:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.5 Week 5:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.6 Week 6:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.7 Week 7:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

2.8 Week 8:

Item	Activity	Time	ID

The total time spent on the Khidmat this week is as follows.

ID	Total Hours
st1	
st2	
st3	

3 Conclusion

4 Technical Overview

4.1 Resources

The resources that we used for this project can be categorized into two main categories: images, and technologies. Our first step was to acquire a set of images that would function as our dataset. We collected around 550 images for each of the three species of birds — the house crow, common myna, and the house sparrow. We used several different websites and online databases to find these images, we list these websites below:

1. https://search.macaulaylibrary.org/catalog?taxonCode=myna&mediaType=p&q=Common%20Myna
2. https://ebird.org/media/catalog?taxonCode=commyn&mediaType=p&sort=rating_rank_desc&q=Common%20Myna%20-%20Acridotheres%20tristis
3. https://ebird.org/media/catalog?taxonCode=houcro1&sort=rating_rank_desc&mediaType=p&regionCode=
4. https://search.macaulaylibrary.org/catalog?taxonCode=houcro1&mediaType=p&region=Pakistan%20(PK)&regionCode=PK&q=House%20Crow%20-%20Corvus%20splendens
5. https://www.kaggle.com/gpiosenka/100-bird-species
6. https://search.macaulaylibrary.org/catalog?taxonCode=houspa&mediaType=p&q=House%20Sparrow
7. https://ebird.org/media/catalog?taxonCode=houspa&mediaType=p&sort=rating_rank_desc&q=House%20Sparrow%20-%20Passer%20domesticus

All collected images can be viewed at https://drive.google.com/drive/folders/18k-roE_VJSB1dcrhvN1y_EosVF7Kb0dY?usp=sharing.

To preprocess our images, convert them into a usable dataset, and to create our deep learning model, we had to rely on several different preexisting tools. We list the tools that we used in this project below:

- `Python` — The primary programming language that we used for this project. Most of the other tools that we used are different libraries & modules for in Python.
- `OpenCV` — A computer vision module in Python to preprocess the images.
- `TensorFlow & Keras` — A Python library that we used to construct, and then ttrain and test our neural network.
- `Matplotlib` — A plotting library for Python, which we used to visualize our
- `Sci-kit learn` — A Python library for machine learning that we used to construct our training and testing set.
- `Google Colab` — We used Colab notebooks to write code and then run code using GPU-accelerated computation that is made available using Google Colaboratory.

4.2 Overview of CS Techniques Used

This project was an amalgamation of several different aspects of computer science techniques. The process can be summarized into 5 main steps:

1. Image Collection
2. Image Preprocessing
3. Construction of Neural Network
4. Training the Neural Network
5. Testing and Optimization

We briefly expand upon these steps in the following sections. For a more technical description, please view the documentation (LINK HERE).

4.2.1 Image Collection

4.2.2 Image Preprocessing

4.2.3 Neural Network Construction

4.2.4 Training the Neural Network

4.2.5 Testing and Optimization

A Source Code

B Documentation

Khidmat Completion Form

To be completed by the external supervisor.

Please use the space below to provide any comments you may have on the students' performance, the Khidmat program, or any other feedback you want to share with Habib University's Khidmat committee. We can also be reached at khidmat@sse.habib.edu.pk.

I hereby certify that I supervised XXX and XXX for the Khidmat described in this report. Furthermore, that I have read and agree with the weekly updates included in this report. My signature below marks the successful completion of the work undertaken for the Khidmat.

_____& _____

Name and signature Location and date