Nepali Consonant Character Classification Using Artificial Neural Network

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Contents

Introduction

- Nepali Character is one of the most spoken language in Nepal.
- Artificial Neural Network provides classification and regression capabilities to the machine.
- Backpropagation is the algorithm that was used during the training of the neural networks.

Problem Statement

- To change the hardcopy into softcopy form is the time consuming task.
- Without the classification or recognition of the characters it is not possible to make the OCR system.
- So we are here to classify the nepali characters

Objective

- To build a neural network model that can classify the scanned or handwritten isolated Nepali characters.
- To classify the Nepali consonant characters.

Project Questions

- Does ANN gives the optimum result for the classification of nepali characters?
- What is the main purpose of that project?
- What methods is going to be used for the achievement of the results in this project?

Scope and Limitations

- Our system recognizes the nepali isolated scanned or handwritten character but in case of the joined set of characters our system can’t work.
- Our system only works for the images of size 32×32 but in case of the images greater than that the system can’t work.

Applications

- Banking
- Legal
- HealthCare
- Other sectors

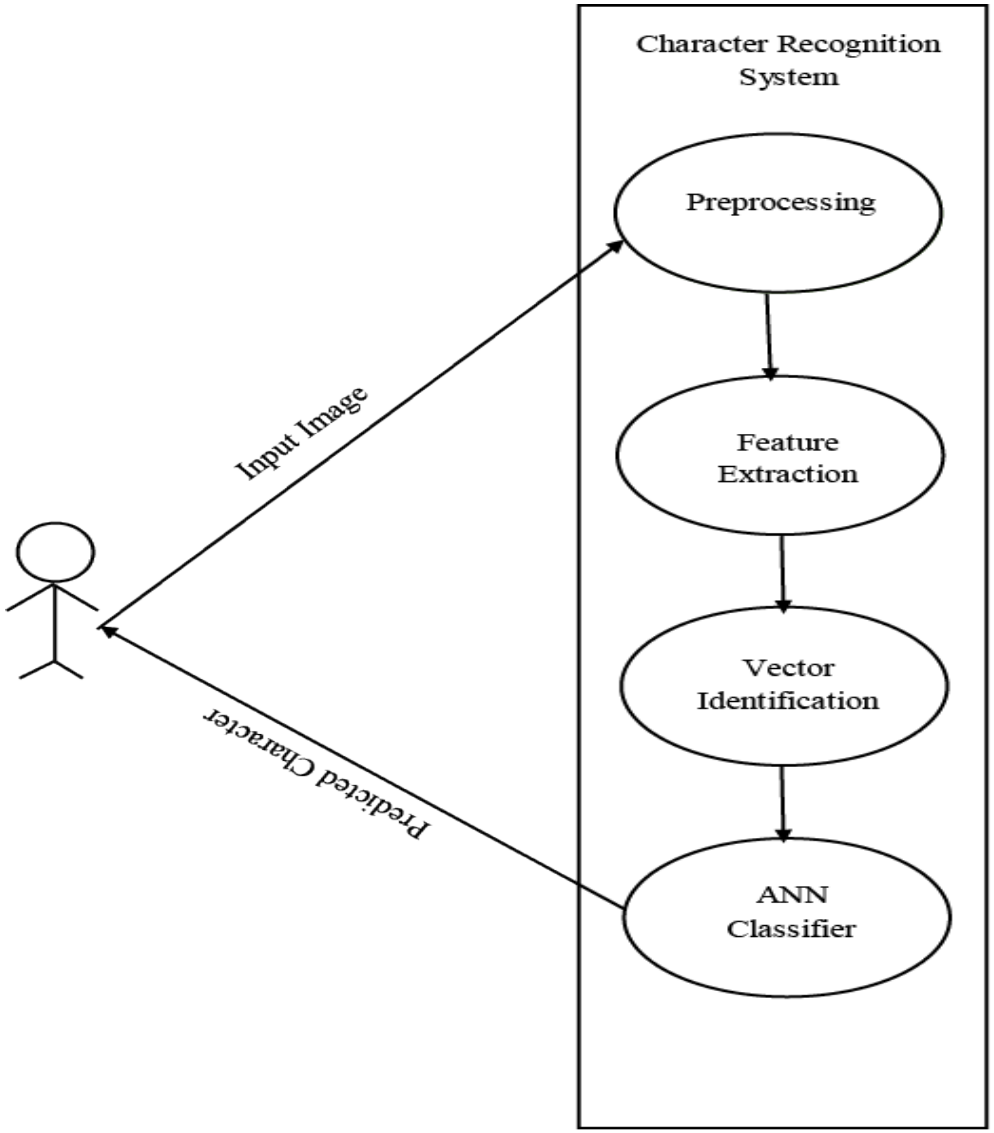
Literature Review

- Related Works
  - Character Recognition (CR) is somewhat limited until 1980 due to lack of powerful hardware and data perception devices.
  - The periods from 1980-1990 witness a growth in CR system development due to rapid growth in information technology.
  - Research progress on the offline and on-line recognition during 1980 -1990.
  - After 1990, image processing technique and pattern recognition were combined using artificial intelligence.

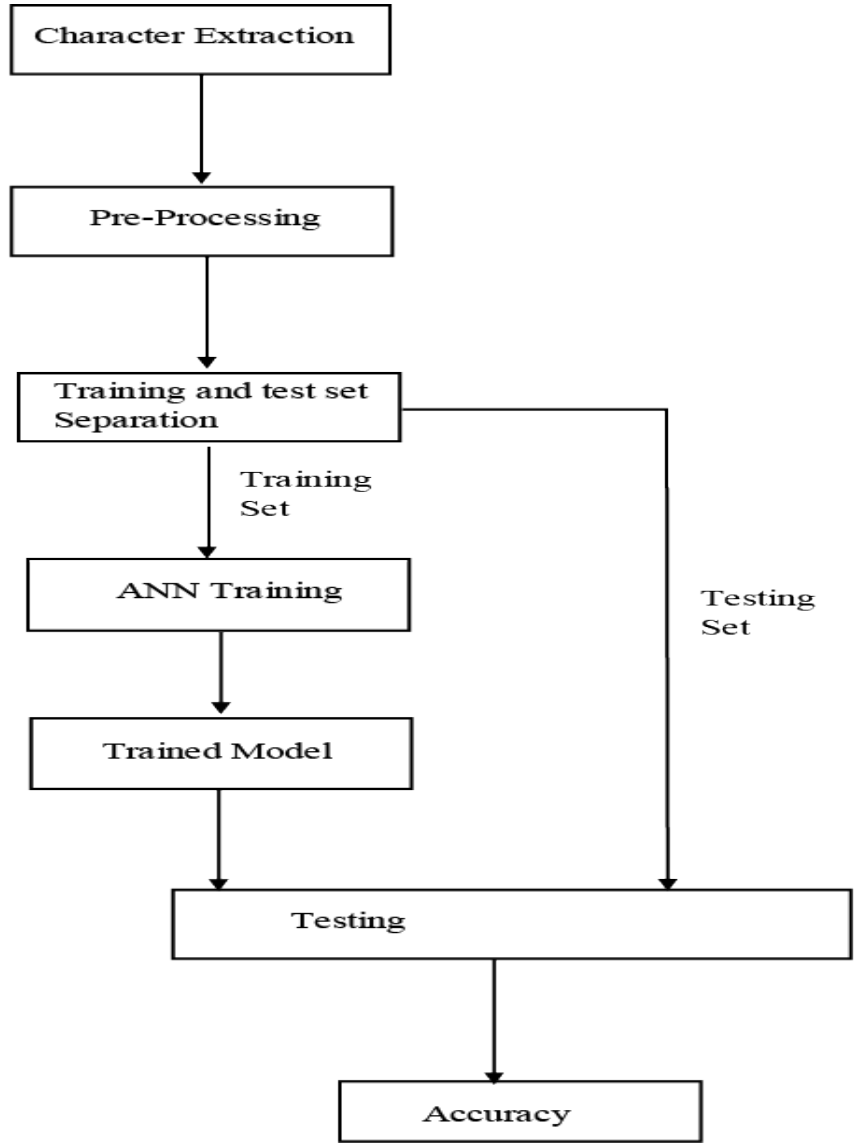
Requirement Analysis and Feasibility Analysis

- Operational Feasibility Analysis
- Technical Feasibility Analysis
- Economic Feasibility Analysis
- Schedule Feasibility Analysis

Use Case Diagram



Methodology



Model Training

- Input nodes: 1024 input neurons
- Output nodes: 36 output nodes
- Activation Function: Sigmoid
- Number of Hidden layer: 1 hidden layer with 340 nodes
- Learning Rate: 0.075
- Training algorithm: Error Back Propagation(Mean Squared Error)

Algorithm of The System

Step 1: Start

Step 2: Train the Neural Network Model

Step 3: Load the model into the system

Step 4: Draw the character into the canvas

Step 5: Save the Drawn character into the .png(image) format

Step 6: Input the saved image into the system

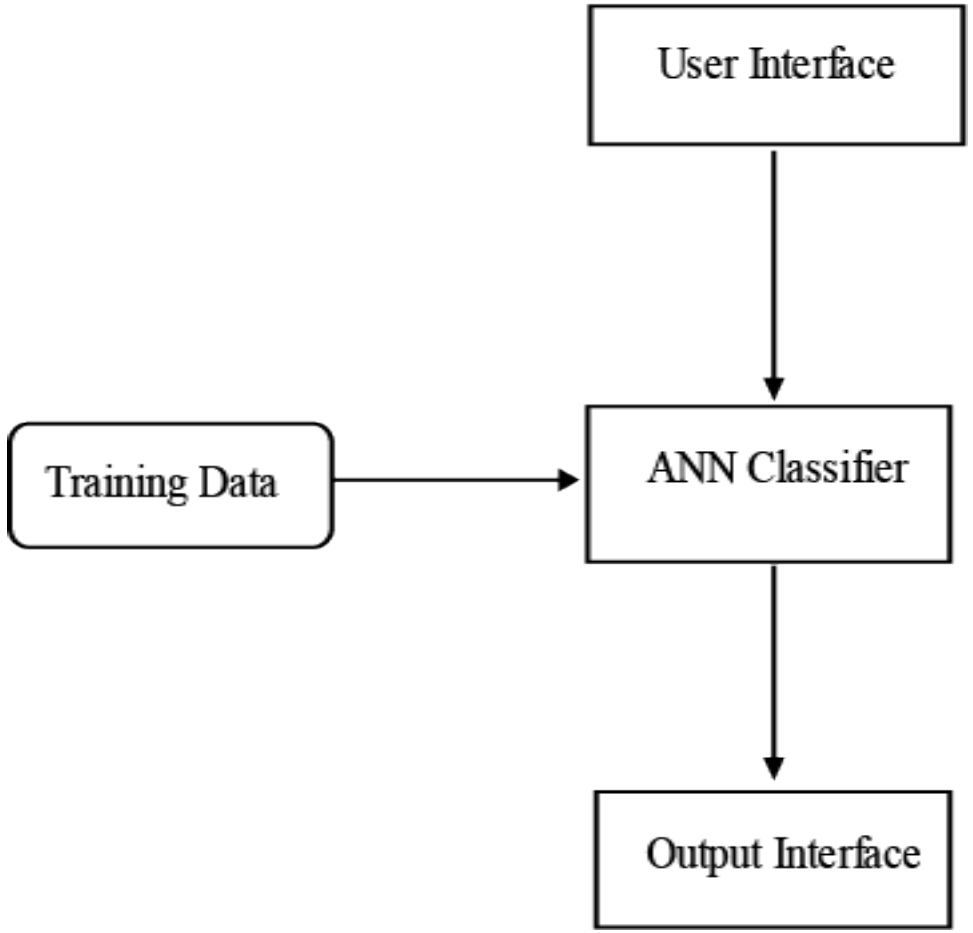
Step 7: Feed the character to the Neural Network Model

Step 8: Display Output

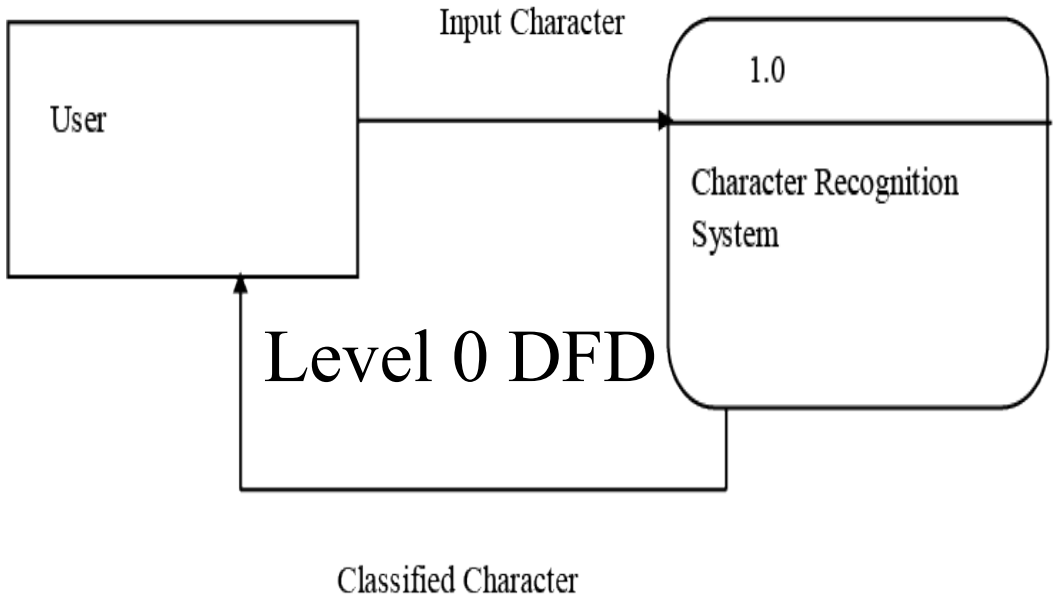
Step 9: Stop

Structuring System Requirements

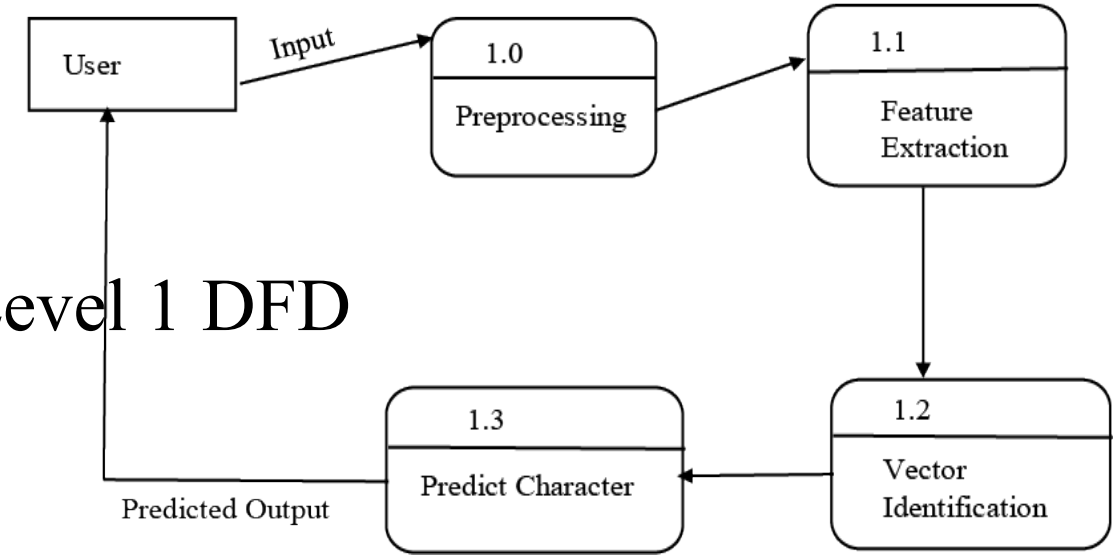
System Architecture



Data Flow Diagram

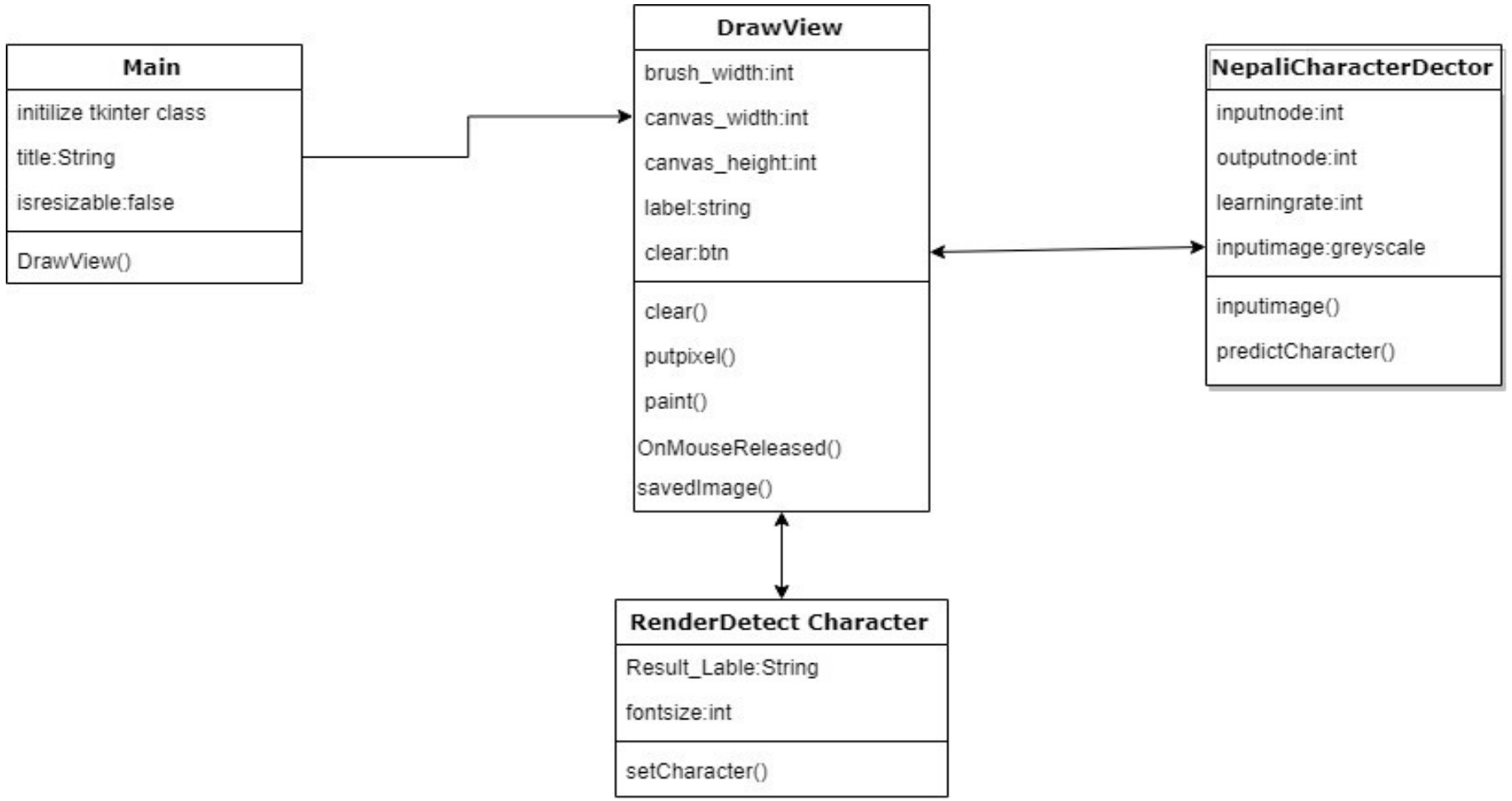


Level 0 DFD

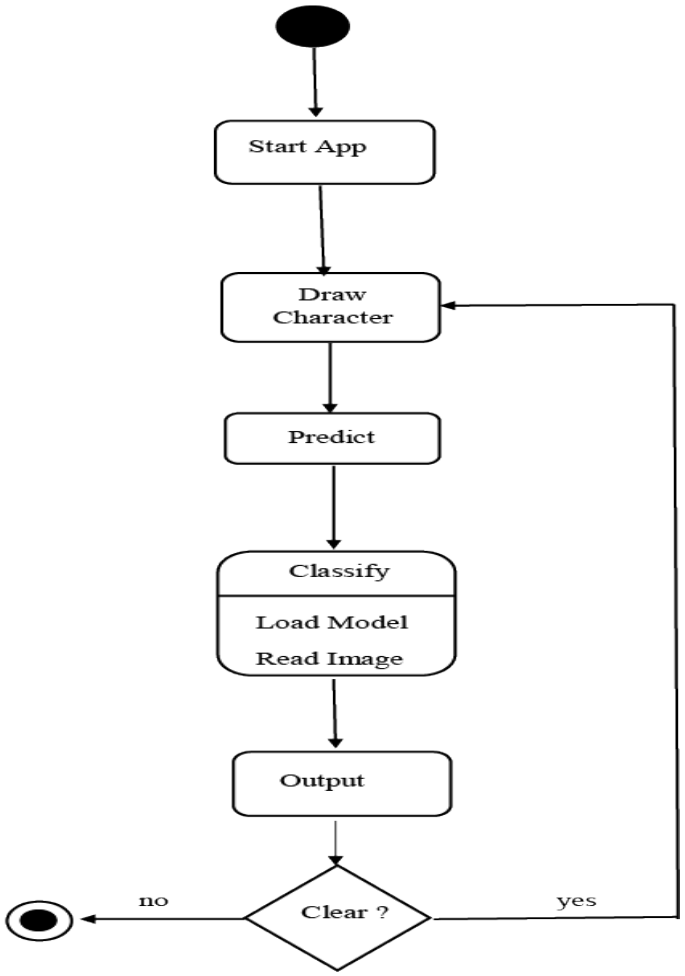


Level 1 DFD

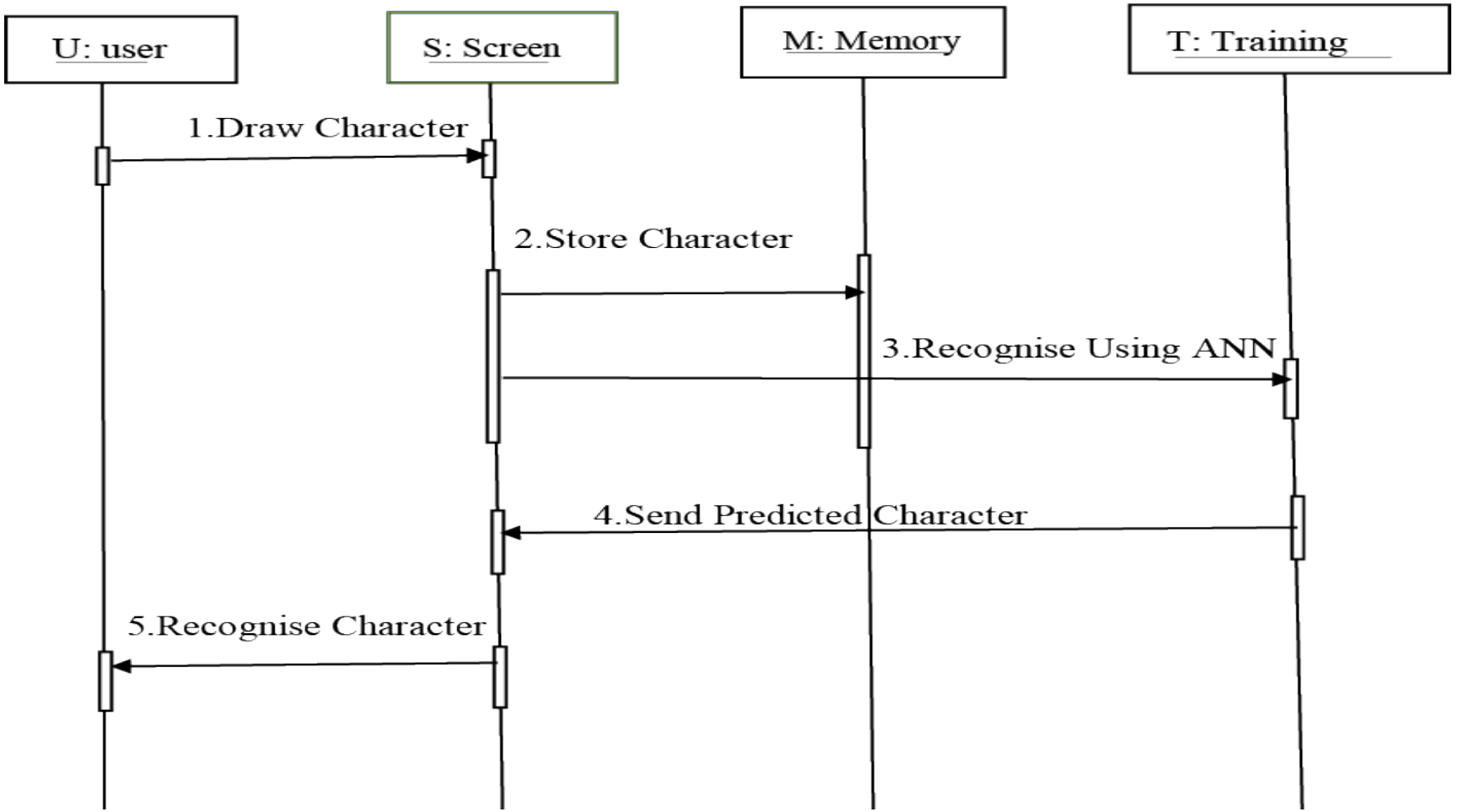
Class Diagram



Activity Diagram



Sequence Diagram



Testing

Unit Testing

S.no.	Test Case	Input	Expected Result	Test Result
1.	Drawing Canvas	Character	Character Drawn	User Can draw on canvas
2.	Clear Button	Press clear button	Canvas clear	Canvas is clear
3.	Prediction label	Draw character	Drawn character should be predicted	The drawn character was predicted
4.	Preprocess data	Image Dataset	Reshape Dataset into 32*32 Image	Dataset was reshaped successfully
5.	Training Model	Training Dataset	Model Should be trained.	The model was trained.
6.	Recognize Nepali Character	Test Data	Predict the drawn character.	The character was predicted.
7.	Model Performance	Nepali character	Predicted in a second.	Got result in a second.

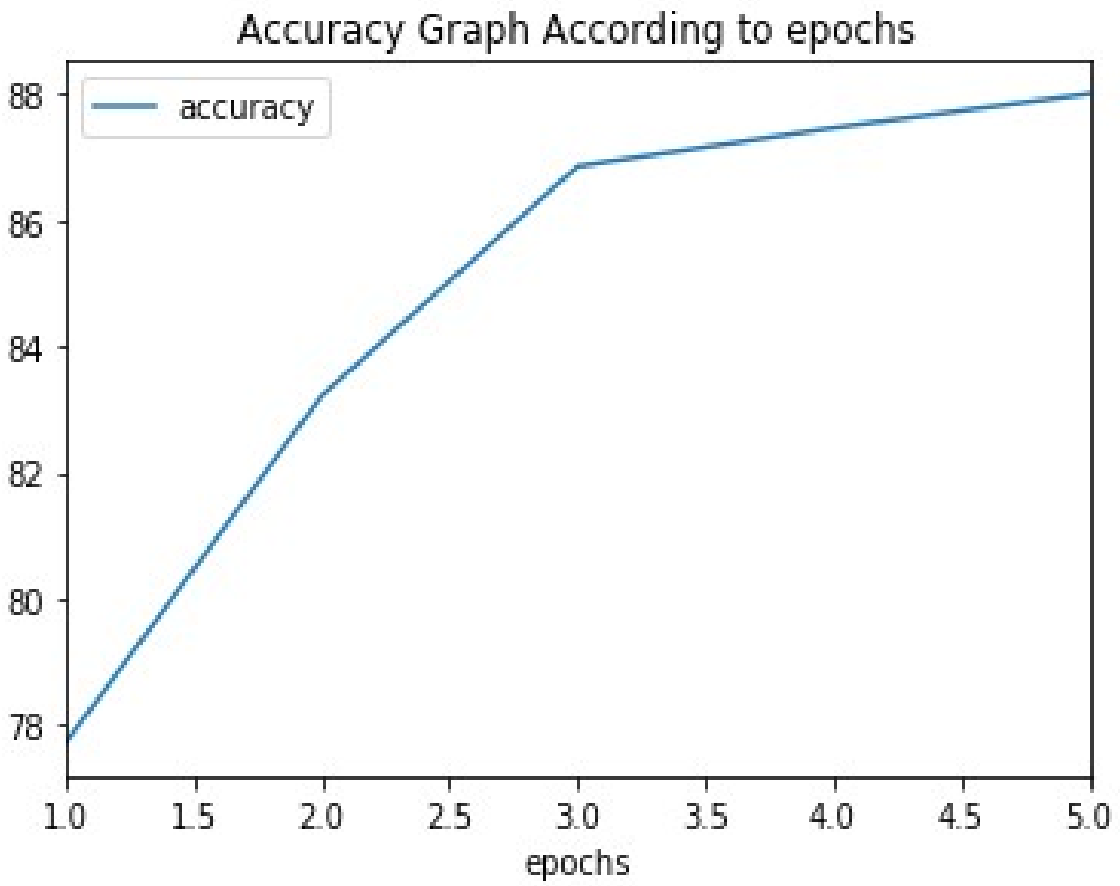
Integration Testing

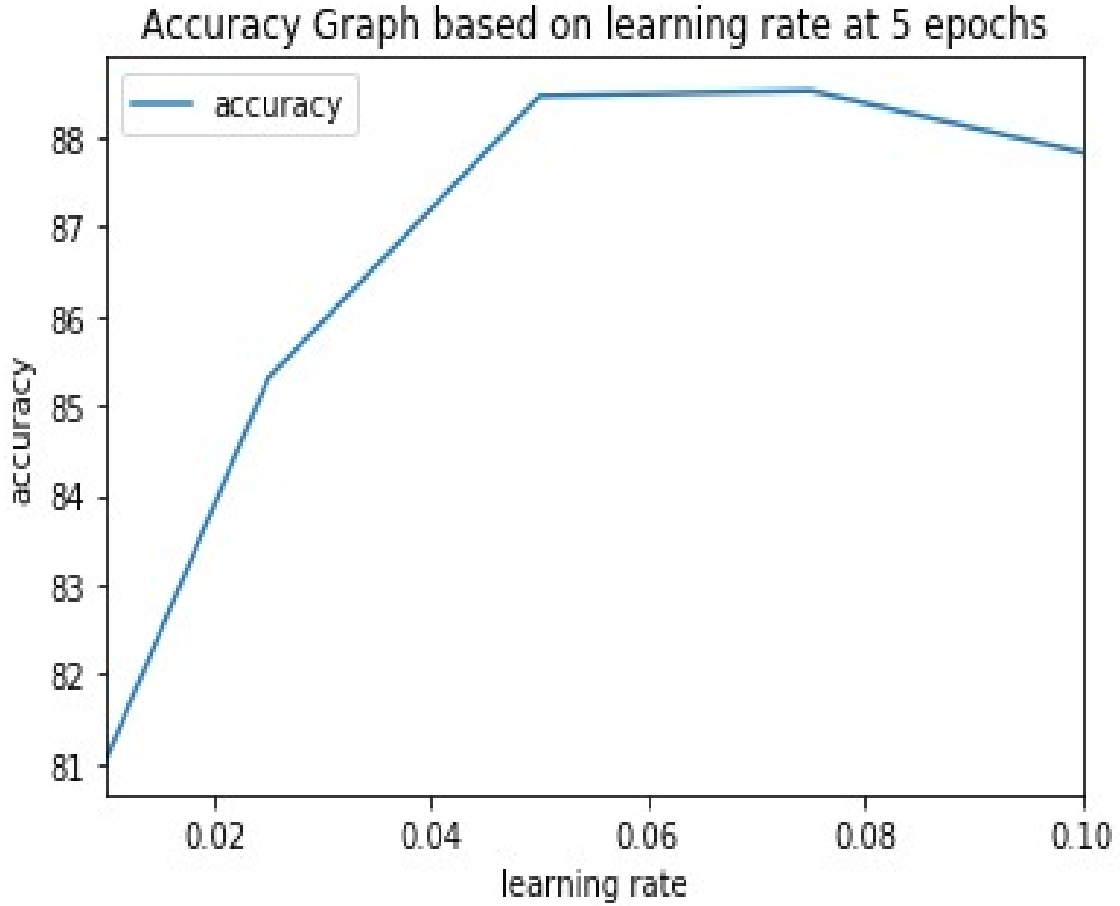
S.no.	Test Cases	Input	Expected Result	Test Result
1.	Load Model	Input test and training datasets	Model must load successfully	The model was loaded
2.	Prediction	Draw Character	Predict the drawn character	The character was predicted successfully

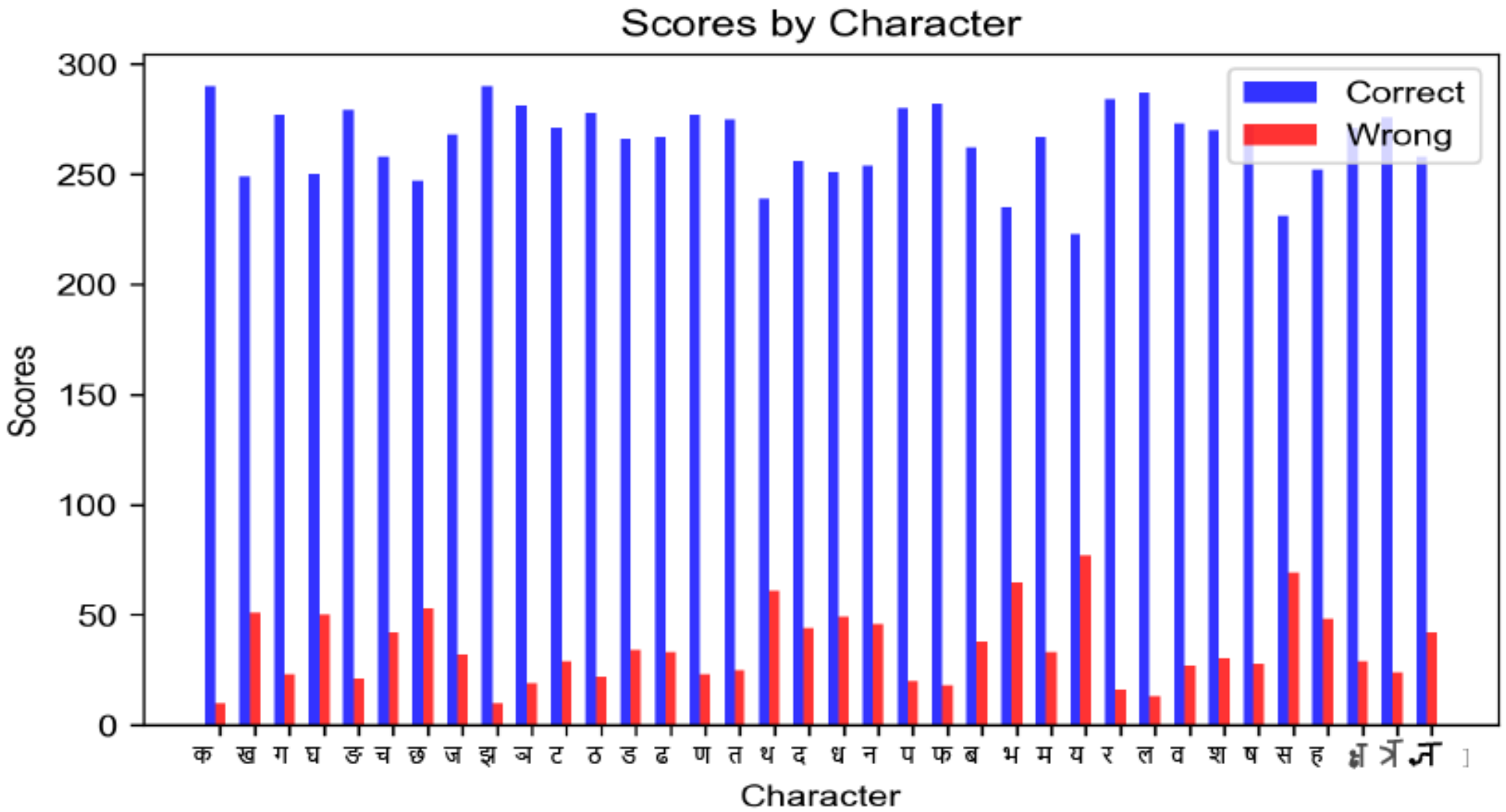
System Testing

S.no.	Test Case	Input	Expected Result	Test Result
1.	Predict Drawn Character	Draw Character on the canvas	Prediction Label filled with the drawn character.	As expected.

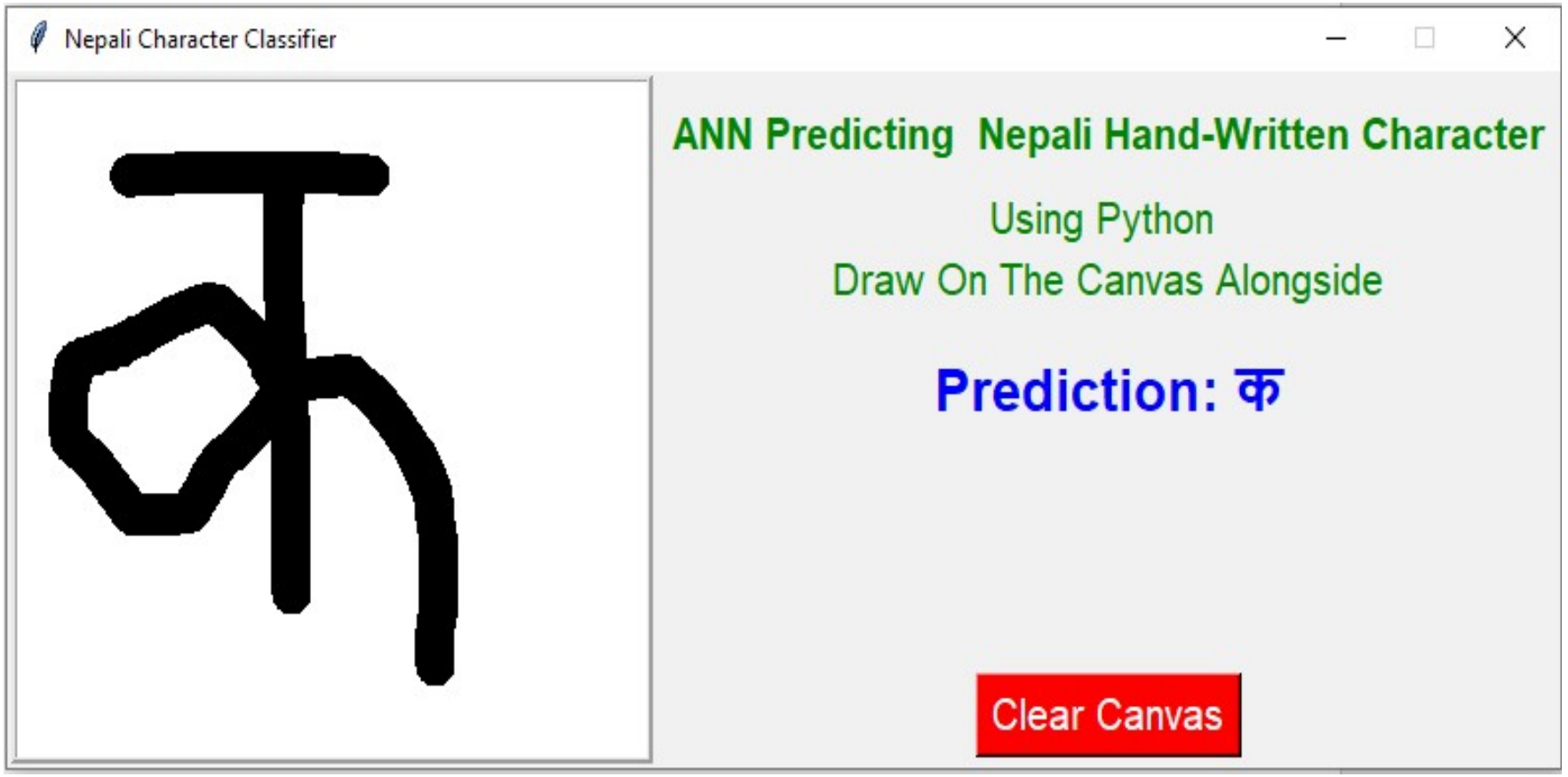
Analysis


Accuracy Graph According to epochs
accuracy
88
86
84
82
80
78
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
epochs

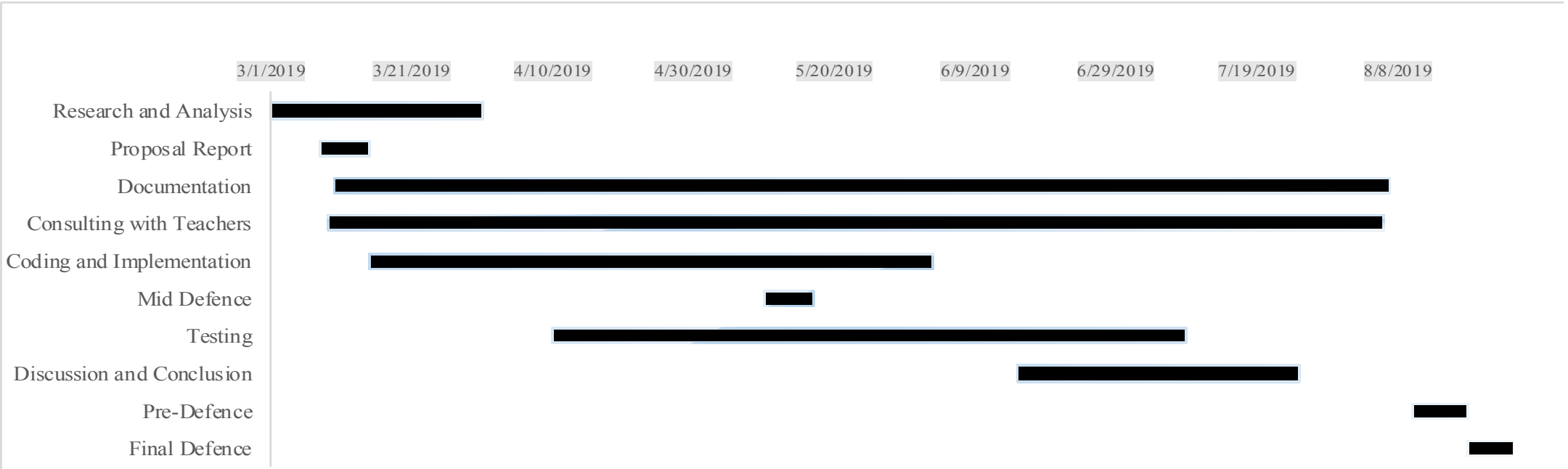

Accuracy Graph based on learning rate at 5 epochs
accuracy
88
87
86
85
84
83
82
81
accuracy
0.02
0.04
0.06
0.08
0.10
learning rate


Scores by Character
Correct
Wrong
Scores
300
250
200
150
100
50
0
क ख ग घ ङ च छ ज झ ञ ट ठ ड ढ ण त थ द ध न प फ ब भ म य र ल व श ष स ह
Character

Output


Nepali Character Classifier
ANN Predicting Nepali Hand-Written Character
Using Python
Draw On The Canvas Alongside
Prediction: क
Clear Canvas

Time Frame



	Final Defence	Pre-Defence	Discussion and Conclusion	Testing	Mid Defence	Coding and Implementation	Consulting with Teachers	Documentation	Proposal Report	Research and Analysis
Start Date	8/18/2019	8/10/2019	6/15/2019	4/10/2019	5/10/2019	3/15/2019	3/9/2019	3/10/2019	3/8/2019	3/1/2019
duration	10	8	40	90	7	80	150	150	7	30

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Thank You