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HCMUTE

FINAL-TERM COURSE REPORT

ARTIFICIAL INTELLIGENCE

LANGUAGE DETECTION (CNN MODEL)

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INTRODUCTION

In my recent academic journey, I have explored the fascinating realm of artificial intelligence, specifically focusing on natural language processing. As I approach the culmination of my studies, I am excited about embarking on a captivating project: developing a language detection system using Convolutional Neural Network (CNN) technology. This project represents the culmination of my knowledge and serves as a stepping stone towards creating a practical and innovative application.

The main objective of this project is to accurately identify and distinguish between different languages. By leveraging the power of a CNN model, I aim to create an intelligent system that can recognize and categorize various languages based on textual inputs. This sophisticated model will be trained on extensive language datasets, enabling it to learn intricate patterns and linguistic nuances that set one language apart from another.

The envisioned outcome is an application that empowers users to effortlessly identify the language of any given text. Whether it's a snippet from a foreign article, an enigmatic online comment, or a multilingual document, this app will provide users with the invaluable ability to determine the underlying language with a simple click. Just imagine the convenience and efficiency it will bring to language enthusiasts, researchers, and individuals engaging with diverse linguistic content.

To bring this ambitious project to life, I will thoroughly explore research literature, studying state-of-the-art techniques and methodologies in language detection. I will meticulously gather and curate vast datasets covering a wide range of languages, ensuring the model's proficiency and adaptability across diverse linguistic landscapes. The model training process will involve data preprocessing, designing an optimal CNN architecture, fine-tuning hyperparameters, and rigorously evaluating its performance to ensure exceptional accuracy and reliability.

Beyond the development of the CNN model, I envision an intuitive and user-friendly application interface that encapsulates the power and simplicity of language detection. Users will be greeted with a sleek design and a seamless user experience, allowing them to effortlessly input text and receive instant language identification results. Additionally, I plan to incorporate features such as language statistics, providing users with insightful metrics and distributions to enhance their exploration of different languages.

Throughout this project, my driving force is the desire to create a transformative tool that not only showcases the remarkable capabilities of artificial intelligence but also simplifies and enhances our interaction with languages. By undertaking this endeavor, I aim to contribute to the ever-evolving landscape of language technology, unlocking new possibilities for cross-cultural communication, research, and linguistic analysis.

With meticulous planning, dedicated research, and unwavering attention to detail, I am confident that this project will culminate in an exceptional language detection application, seamlessly merging the realms of artificial intelligence and linguistic exploration.

LANGUAGE DETECTION

1. Introduction

Language is a fundamental aspect of human communication, shaping the way I express ideas, convey emotions, and connect with others. In our increasingly globalized and interconnected world, the ability to identify and understand different languages has become more valuable than ever. Language detection, the process of automatically determining the language of a given text, plays a crucial role in various domains, including multilingual content analysis, information retrieval, and cross-cultural communication.

Traditionally, language detection relied on rule-based approaches or statistical methods that analyzed linguistic features and frequency. However, with the emergence of artificial intelligence and deep learning techniques, there has been a paradigm shift in how we approach language detection. Convolutional Neural Networks (CNNs), a class of deep learning models known for their ability to extract intricate patterns from data, have shown promising results in various natural language processing tasks, including language detection.

The purpose of my project is to develop a language detection system using a CNN model. By harnessing the power of neural networks and leveraging large language datasets, I aim to create an intelligent system capable of accurately recognizing and categorizing different languages based on textual inputs. My ultimate goal is to build an application that provides users with a user-friendly interface, allowing them to effortlessly identify the language of any given text, regardless of its source or complexity.

This project represents the culmination of my knowledge and skills in the field of artificial intelligence and serves as a stepping stone towards creating an innovative application with practical applications. By developing an efficient and accurate language detection system, I can contribute to enhancing cross-cultural communication, facilitating language-based research, and enabling individuals to engage with diverse linguistic content more effectively.

Throughout this report, I will delve into the intricacies of language detection, explore the theoretical foundations behind CNN models, discuss the methodology I

employed to train and evaluate the model, and present the implementation details of the language detection application. By combining theoretical knowledge with practical implementation, I aim to provide a comprehensive understanding of language detection using CNNs and highlight the potential impact of such a system in our increasingly interconnected world.

With the rapid advancements in artificial intelligence and the growing demand for language-related technologies, this project holds immense significance. By developing an accurate and user-friendly language detection system, I aim to contribute to the field of natural language processing and pave the way for future advancements in language technology. Now, let us embark on this exciting journey into the world of language detection and explore the possibilities it offers.

2. Methodology

Language detection is a text classification problem, implemented using a Convolutional Neural Network (CNN) model to classify text snippets into different languages. This process involves various steps, utilizing libraries such as keras, numpy, and os, to handle data loading, image preprocessing, data augmentation, splitting into training and test sets, CNN model construction, and model evaluation.

Specifically, the language detection method includes the following steps:

Data Loading: Utilize the os library to load text snippets from the specified source directory. Then, convert the text into arrays and assign appropriate labels using the keras library.

Dataset Splitting: Employ the train_test_split function from the sklearn library to split the data into two sets: the training set and the test set. This division ensures that the model is trained on a subset of the data and evaluated on unseen samples.

CNN Model Construction: Utilize layers such as Conv2D, MaxPooling2D, Dense, Dropout, and Activation to construct the CNN model. These layers enable the model to learn hierarchical features from the text snippets and make accurate predictions.

Data Augmentation: Augment the training set using techniques such as random shifts, rotations, or additions of noise. This augmentation process enhances the model's ability to generalize and improves its performance on unseen data.

Model Training: Compile the model using the compile function in keras, specifying the appropriate loss function and optimizer. Then, fit the model to the training set using the fit function, adjusting the hyperparameters such as batch size and number of epochs.

Model Evaluation: Evaluate the performance of the trained model on the test set using the evaluate function in keras. This step provides insights into the model's accuracy, precision, recall, and other metrics to assess its effectiveness.

Model Saving: Save the trained model using the save function in keras. This enables future use and deployment of the language detection system without the need for retraining.

Language Prediction: Utilize the saved model to predict the language of a given text snippet. The model outputs a numerical value representing the predicted language, which can be mapped to the corresponding language label.

By following these steps, the language detection system effectively classifies text snippets into different languages, enabling accurate language identification and facilitating various language-based applications.

3. Implementation

i. Code training model Language.h5

```
#LANGUAGE DETECTION
from os import listdir
from numpy import asarray, save
from keras.utils import load_img
from keras.utils import img_to_array
import numpy as np
from sklearn.model_selection import train_test_split
from keras.datasets import cifar100
import matplotlib.pyplot as plt
from keras.layers import Dense, Dropout, Flatten, Conv2D, MaxPooling2D,
Normalization
from keras.models import Sequential, Model
from keras import Input
from keras.layers import LeakyReLU
from keras.optimizers import Adam
# Mount Google Drive
from google.colab import drive
```

```
drive.mount('/content/drive')
```
```
Mounted at /content/drive
```

```
print('Máy tính đang xử lí ảnh....')
from numpy import asarray

folder = '/content/drive/MyDrive/LanguageDetection/'
photos, labels = list(), list()
for file in listdir(folder):
  output = 0.0
  if file.startswith('ARABIC'):
    output = 0
  if file.startswith('BENGALI'):
    output = 1
  if file.startswith('CHINESE'):
    output = 2
  if file.startswith('ENGLISH'):
    output = 3
  if file.startswith('FRENCH'):
    output = 4
  if file.startswith('HINDI'):
    output = 5
  if file.startswith('INDONESIAN'):
    output = 6
  if file.startswith('ITALIAN'):
    output = 7
  if file.startswith('JAPANESE'):
    output = 8
  if file.startswith('KOREAN'):
    output = 9
  if file.startswith('PORTUGAL'):
    output = 10
  if file.startswith('RUSIA'):
    output = 11
  if file.startswith('SPANISH'):
    output = 12
  if file.startswith('THAILISH'):
    output = 13
  if file.startswith('TURKISH'):
    output = 14
  if file.startswith('VIETNAMESE'):
    output = 15
  photo = load_img(folder + file, target_size=(40,40))
  photo = img_to_array(photo)
  photos.append(photo)
```

```
  labels.append(output)

photos = asarray(photos)
labels = asarray(labels)
print(photos.shape, labels.shape)

# Save image data and labels to numpy arrays
save('/content/drive/MyDrive/LanguageDetection/Language_photos.npy',
photos)
save('/content/drive/MyDrive/LanguageDetection/Language_labels.npy',
labels)
# Load images and labels
from keras.utils import to_categorical
#one hot encoding
photos =
np.load('/content/drive/MyDrive/LanguageDetection/Language_photos.npy')
labels =
np.load('/content/drive/MyDrive/LanguageDetection/Language_labels.npy')
labels_one_hot = to_categorical(labels)
x_train, x_test, y_train, y_test = train_test_split(photos,
labels_one_hot, test_size = 0.3, random_state = 100)

#Build Model
model = Sequential()
#Convolutional
model.add(Conv2D(32, kernel_size=(3, 3), activation='relu',
input_shape=(40, 40, 3), padding='same'))
model.add(MaxPooling2D((2, 2), padding='same'))

model.add(Conv2D(64, kernel_size=(3, 3), activation='relu',
padding='same'))
model.add(MaxPooling2D((2, 2), padding='same'))

model.add(Conv2D(128, kernel_size=(3, 3), activation='relu',
padding='same'))
model.add(MaxPooling2D((2, 2), padding='same'))

# Fully connected layers
model.add(Flatten())
model.add(Dense(512, activation='relu'))
model.add(Dropout(0.2))
model.add(Dense(16, activation='softmax'))

model.summary()
```

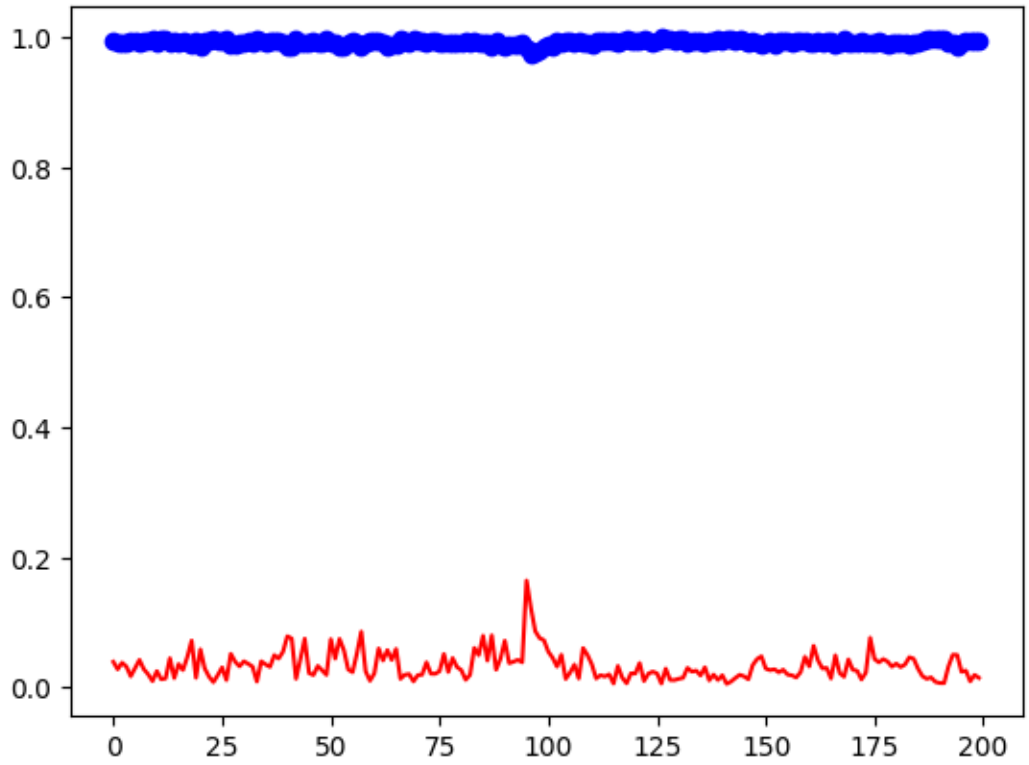
```
Model: "sequential_4"
_________________________________________________________________
 Layer (type)                 Output Shape              Param #
=================================================================
 conv2d_24 (Conv2D)           (None, 40, 40, 32)        896

 max_pooling2d_20 (MaxPoolin  (None, 20, 20, 32)       0
 g2D)

 conv2d_25 (Conv2D)           (None, 20, 20, 64)        18496

 max_pooling2d_21 (MaxPoolin  (None, 10, 10, 64)       0
 g2D)

 conv2d_26 (Conv2D)           (None, 10, 10, 128)       73856

 max_pooling2d_22 (MaxPoolin  (None, 5, 5, 128)        0
 g2D)

 flatten_4 (Flatten)          (None, 3200)              0

 dense_12 (Dense)             (None, 512)               1638912

 dropout_8 (Dropout)          (None, 512)               0

 dense_13 (Dense)             (None, 16)                8208

=================================================================
Total params: 1,740,368
Trainable params: 1,740,368
Non-trainable params: 0
_________________________________________________________________
```

```
#Increase data
from keras.preprocessing.image import ImageDataGenerator
from keras.optimizers import Adam

aug = ImageDataGenerator(rotation_range=30, zoom_range=0.1,
    rescale=1./255,
  width_shift_range=0.1,
    height_shift_range=0.1,
  horizontal_flip=True,
    brightness_range=[0.2,1.2], fill_mode="nearest")


#Training
print('Máy tính đang training...')
from keras.backend import categorical_crossentropy
model.compile(loss='categorical_crossentropy', optimizer = Adam(lr=0.001),
metrics=['accuracy'])
train = model.fit_generator(aug.flow(x_train, y_train, batch_size=128),
```

```
                                epochs=200)
test_loss, test_acc = model.evaluate(x_test,y_test)
print("Accurency:", test_acc)
print('Loss:', test_loss)

#Watching charts
from matplotlib import pyplot as plt
accuracy= train.history['accuracy']
loss= train.history['loss']
epochs= range(len(accuracy))
plt.plot(epochs, accuracy, 'bo', label= 'Training accuracy')
plt.plot(epochs, loss, 'r', label= 'Training loss')
plt.show()

#Save model
model.save('/content/drive/MyDrive/LanguageDetection/Language.h5')
```

```
Máy tính đang training...
<ipython-input-40-f996793ddbef>:17: UserWarning: `Model.fit_generator` is
deprecated and will be removed in a future version. Please use
`Model.fit`, which supports generators.
  train = model.fit_generator(aug.flow(x_train, y_train, batch_size=128),
Epoch 1/200
10/10 [==============================] - 2s 116ms/step - loss: 0.0396 -
accuracy: 0.9952
Epoch 2/200
10/10 [==============================] - 1s 117ms/step - loss: 0.0282 -
accuracy: 0.9928
Epoch 3/200
10/10 [==============================] - 1s 116ms/step - loss: 0.0383 -
accuracy: 0.9903
Epoch 4/200
10/10 [==============================] - 1s 112ms/step - loss: 0.0323 -
accuracy: 0.9920
Epoch 5/200
10/10 [==============================] - 1s 115ms/step - loss: 0.0175 -
accuracy: 0.9944
Epoch 6/200
10/10 [==============================] - 1s 119ms/step - loss: 0.0299 -
accuracy: 0.9944
Epoch 7/200
10/10 [==============================] - 1s 119ms/step - loss: 0.0426 -
accuracy: 0.9912
Epoch 8/200
10/10 [==============================] - 1s 115ms/step - loss: 0.0284 -
accuracy: 0.9936
Epoch 9/200
10/10 [==============================] - 1s 150ms/step - loss: 0.0205 -
accuracy: 0.9944
Epoch 10/200
10/10 [==============================] - 2s 149ms/step - loss: 0.0100 -
accuracy: 0.9968
```

```
||
||
||
Epoch 198/200
10/10 [==============================] - 1s 117ms/step - loss: 0.0097 -
accuracy: 0.9944
Epoch 199/200
10/10 [==============================] - 1s 117ms/step - loss: 0.0195 -
accuracy: 0.9944
Epoch 200/200
10/10 [==============================] - 1s 118ms/step - loss: 0.0150 -
accuracy: 0.9936
17/17 [==============================] - 0s 4ms/step - loss: 1598.1057 -
accuracy: 0.7491
Accurency: 0.7490636706352234
Loss: 1598.105712890625
```



```
from keras.models import load_model
model = load_model('/content/drive/MyDrive/LanguageDetection/Language.h5')

from PIL import Image
import numpy as np
import os

#Create array to save label
label = np.array(['ARABIC', 'BENGALI', 'CHINESE', 'ENGLISH', 'FRENCH',
'HINDI',
         'INDONESIAN', 'ITALIAN', 'JAPANESE', 'KOREAN', 'PORTUGAL',
         'RUSIA', 'SPANISH', 'THAILISH','TURKISH','VIETNAMESE'])

# New size of photo
new_size = (225, 225)
predict_size = (40, 40)

# The path to the folder containing the photos in Drive
path = '/content/drive/MyDrive/LanguageDetection/Test data language/'
images = os.listdir(path)

# Read photos from folders on Drive and display them on Colab
for image_name in images:
    # Path to image file
    img_path = os.path.join(path, image_name)
    # Read pictures
    if os.path.isfile(img_path):
      # Read pictures
      img = Image.open(img_path)
      img_origin = Image.open(img_path)

      # Resize photo to new size
      img_origin = img.resize(new_size)
      img_origin.show()

      #Forecast
      img = img.resize(predict_size)
      img = img_to_array(img)
      img = img.reshape(1,40,40,3)
      img = img.astype('float32')/255
      max = np.argmax(model.predict(img), axis = 1)
      print(label[max])
```

```
1/1
[==============================]
- 0s 18ms/step
['BENGALI']
```

```
1/1
[==============================]
- 0s 22ms/step
['CHINESE']
```

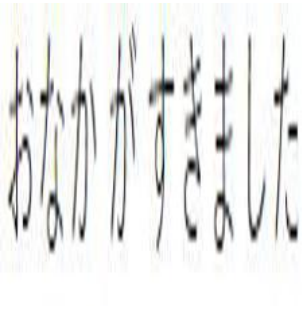
```
1/1
[==============================]
- 0s 17ms/step
['ARABIC']
```

```
1/1
[==============================]
- 0s 19ms/step
['HINDI']
```

```
1/1
[==============================]
- 0s 19ms/step
['FRENCH']
```

```
1/1
[==============================]
- 0s 19ms/step
['INDONESIAN']
```

```
1/1
[==============================]
- 0s 18ms/step
['ENGLISH']
```



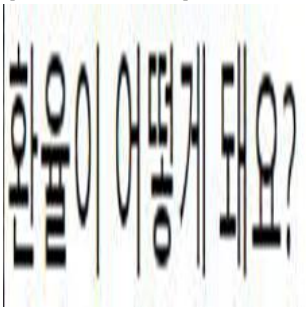
```
1/1
[==============================]
- 0s 19ms/step
['JAPANESE']
```


```
1/1
[==============================]
- 0s 18ms/step
['INDONESIAN']
```


```
1/1
[==============================]
- 0s 19ms/step
['SPANISH']
```


```
1/1
[==============================]
- 0s 19ms/step
['PORTUGAL']
```


```
1/1
[==============================]
- 0s 19ms/step
['RUSIA']
```




```
1/1
[==============================]
- 0s 25ms/step
['KOREAN']
```


```
1/1
[==============================]
- 0s 26ms/step
['VIETNAMESE']
```


```
1/1
[==============================]
- 0s 19ms/step
['THAILISH']
```


```
1/1
[==============================]
- 0s 20ms/step
['SPANISH']
```

ii. Code create Thinker

```
import tkinter as tk
import tkinter.filedialog
from PIL import Image, ImageTk, ImageDraw, ImageFont
import cv2
from tensorflow import expand_dims
import numpy as np
from keras.models import load_model

# Connect with camera
cap = cv2.VideoCapture(0)

# Load pre-trained model
model = load_model('Language.h5')

# Create array to save label
label = np.array(['ARABIC', 'BENGALI', 'CHINESE', 'ENGLISH', 'FRENCH',
'HINDI',
                  'INDONESIAN', 'ITALIAN', 'JAPANESE', 'KOREAN',
'PORTUGUESE',
                  'RUSSIAN', 'SPANISH', 'THAI', 'TURKISH', 'VIETNAMESE'])

# Create an array to store component information
detail = np.array([
    'ARABIC is the language used by Arabic-speaking countries, ranked 5th
in language popularity, with approximately 300 million speakers.',
    'BENGALI is the primary language of Bangladesh and certain regions in
India, with around 230 million speakers.',
    'CHINESE is the most widely spoken language in the world, with
approximately 1.3 billion speakers.',
    'ENGLISH is a global language and widely used in business, education,
and international communication.',
    'FRENCH is the official language of many countries and widely used in
culture, arts, and legal documents.',
    'HINDI is the official language of India and one of the most widely
spoken languages in the world, with around 600 million speakers.',
    'INDONESIAN is the official language of Indonesia and widely used in
communication, education, and media.',
    'ITALIAN is the official language of Italy and considered one of the
most popular Romance languages.',
    'JAPANESE is the official language of Japan and one of the languages
with the most complex writing systems in the world.',
    'KOREAN is the official language of South Korea and North Korea, with
approximately 77 million speakers.',
```

```
    'PORTUGUESE is the official language of Portugal, Brazil, and several
other countries worldwide.',
    'RUSSIAN is the official language of Russia and the 8th most widely
spoken language in the world.',
    'SPANISH is the official language of Spain and many countries in Latin
America.',
    'THAI is the official language of Thailand and the most widely spoken
language in the Southeast Asia region.',
    'TURKISH is the official language of Turkey and the official language
of the Turkish Republic of Northern Cyprus.',
    'VIETNAMESE is the official language of Vietnam and widely spoken
within the Vietnamese community worldwide.'
])


class MyWindow:
    def __init__(self, master):
        self.master = master
        master.title("LANGUAGE DETECTION")

        # GUI components
        self.label = tk.Label(master)
        self.text_detail = tk.Text(master, height=5, width=69)
        self.text_detail.insert(tk.END, "LANGUAGE INFORMATION HERE:")
        self.text_detail.config(state="disabled")
        self.text_detail.config(bd=0, highlightbackground="white",
bg="white")
        self.button_load = tk.Button(master, text="Load Image", bg="red",
fg="white", command=self.load_image)
        self.button_start = tk.Button(master, text="Start Camera",
bg="blue", fg="white", command=self.start_camera)
        self.button_stop = tk.Button(master, text="Stop Camera",
command=self.stop_camera)
        self.camera_running = False

        # Application info
        self.text_info = tk.Text(master, height=1, width=39)
        self.text_info.insert(tk.END, "LANGUAGE DETECTION USING CNN
NETWORK")
        self.text_info.config(state="disabled", font=("Arial", 16),
fg="red")
        self.text_info0 = tk.Text(master, height=1, width=33)
        self.text_info0.insert(tk.END, "LECTURER: NGUYEN TRUONG THINH")
        self.text_info0.config(state="disabled", font=("Arial", 10),
fg="black")
```

```
        self.text_info1 = tk.Text(master, height=1, width=40)
        self.text_info1.insert(tk.END, "STUDENT: NGUYEN NGOC QUY - ID:
20146056")
        self.text_info1.config(state="disabled", font=("Arial", 10),
fg="black")

        # Layout
        self.label.place(x=100, y=100)
        self.text_detail.place(x=100, y=510)
        self.text_info.place(x=200, y=10)
        self.text_info0.place(x=315, y=42)
        self.text_info1.place(x=290, y=65)
        self.button_load.place(x=670, y=100, width=100, height=50)
        self.button_start.place(x=670, y=160, width=100, height=50)
        self.button_stop.place(x=670, y=220, width=100, height=50)

        # Display initial image
        image_init = Image.open("Info.jpg").resize((550, 400))
        photo = ImageTk.PhotoImage(image_init)
        self.label.config(image=photo)
        self.label.image = photo

        # Exit button and event handling
        root.protocol("WM_DELETE_WINDOW", root.quit)
        self.button_exit = tk.Button(root, bg="cyan", text="EXIT",
command=root.destroy)
        self.button_exit.place(x=670, y=280, width=100, height=50)

    def load_image(self):
        # Open a file dialog to choose an image
        file_name = tkinter.filedialog.askopenfilename(filetypes=[('Image
Files', ('*.jpg', '*.jpeg', '*.png', '*.bmp'))])

        if file_name:
            # Open the image
            image_original = Image.open(file_name)

            # Convert the image to numpy array
            image = np.array(image_original)
            image = cv2.resize(image, (40, 40))
            image = image / 255.0
            image = expand_dims(image, axis=0)

            # Perform prediction
            prediction = model.predict(image)
```

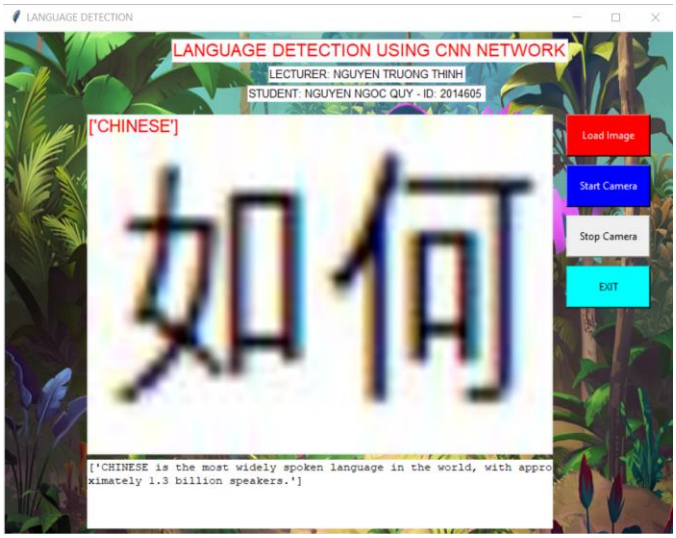
```
            max_index = np.argmax(prediction, axis=1)
            max_label = label[max_index]
            max_detail = detail[max_index]

            # Display component details
            self.text_detail.config(state="normal")
            self.text_detail.delete("1.0", tk.END)
            self.text_detail.insert(tk.END, str(max_detail))
            self.text_detail.config(state="disabled")

            # Resize the image for display
            image_resized = image_original.resize((550, 400))

            # Use PIL to draw on the image
            draw = ImageDraw.Draw(image_resized)

            # Set font and size
            font = ImageFont.truetype("arial.ttf", 20)

            # Write text with the set font and size
            draw.text((0, 0), str(max_label), fill=(255, 0, 0), font=font)

            # Display the image on the label
            photo = ImageTk.PhotoImage(image_resized)
            self.label.config(image=photo)
            self.label.image = photo

    def start_camera(self):
        if not self.camera_running:
            # Open the camera
            self.cap = cv2.VideoCapture(0)
            self.camera_running = True
            self.update_frame()

    def stop_camera(self):
        if self.camera_running:
            # Stop the camera
            self.cap.release()
            self.camera_running = False

    def update_frame(self):
        if self.camera_running:
            ret, frame = self.cap.read()
            # Process the image to numpy array
            image = cv2.resize(frame, (40, 40))
```

```
            image = image / 255.0
            image = expand_dims(image, axis=0)

            # Perform prediction
            prediction = model.predict(image)
            max_index = np.argmax(prediction, axis=1)
            max_label = label[max_index]
            max_detail = detail[max_index]

            # Display the prediction directly on the Camera frame
            cv2.putText(frame, str(max_label), (50, 50 - 10),
cv2.FONT_HERSHEY_SIMPLEX, 0.9, (0, 255, 0), 2)

            # Display component details
            self.text_detail.config(state="normal")
            self.text_detail.delete("1.0", tk.END)
            self.text_detail.insert(tk.END, str(max_detail))
            self.text_detail.config(state="disabled")

            if ret:
                # Display the image on the label
                frame = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)
                image = Image.fromarray(frame)
                image = image.resize((550, 400), Image.ANTIALIAS)
                photo = ImageTk.PhotoImage(image)
                self.label.config(image=photo)
                self.label.image = photo
                self.master.after(5, self.update_frame)

if __name__ == '__main__':
    root = tk.Tk()

    # Set window size
    root.geometry("800x600")

    # Open and convert the image to Tkinter format
    image = Image.open("bg.png")
    # Resize the image to match the window size
    image = image.resize((800, 600))

    photo = ImageTk.PhotoImage(image)

    # Create a Canvas widget and draw the image as the background of the
canvas
    canvas = tk.Canvas(root, width=800, height=500)
```

```
    canvas.pack(fill="both", expand=True)
    canvas.create_image(0, 0, image=photo, anchor="nw")
    window = MyWindow(root)
    root.mainloop()
```

4. Results

i. Detection with thinker load data



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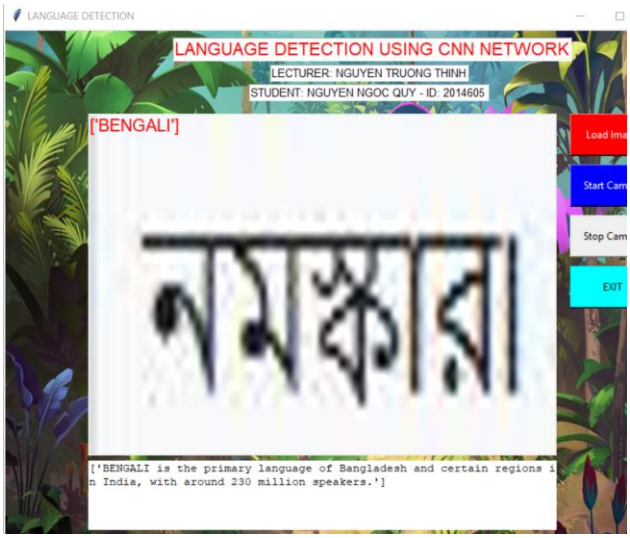
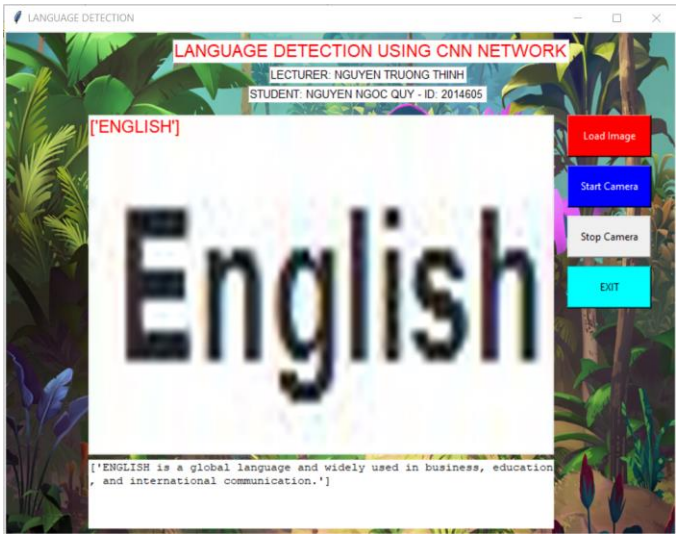
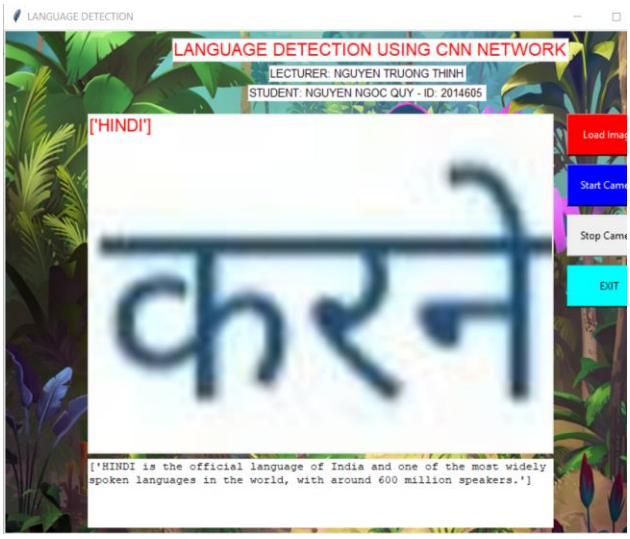
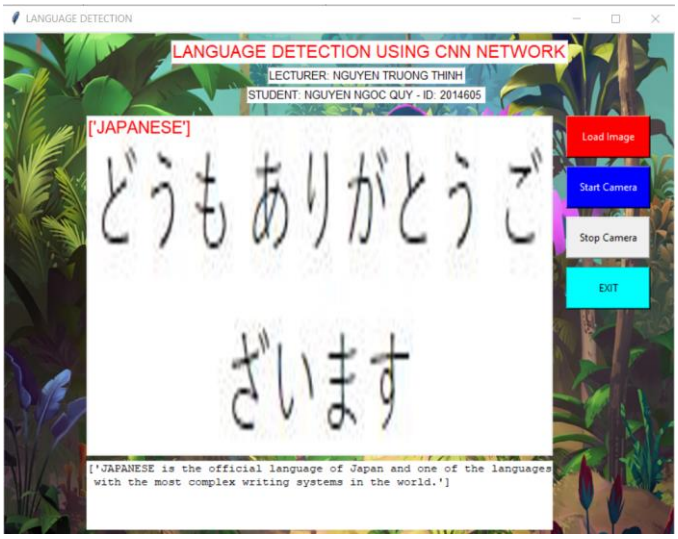




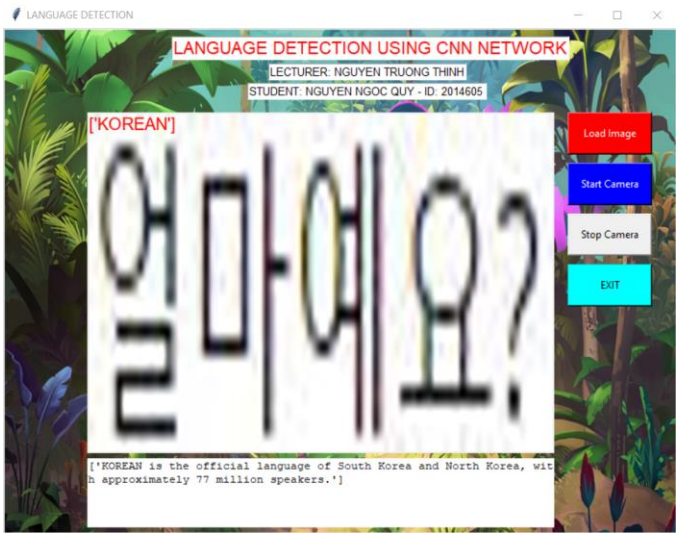

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['FRENCH']
Française
['FRENCH is the official language of many countries and widely used in culture, arts, and legal documents.']
Load Image
Start Camera
Stop Camera
EXIT

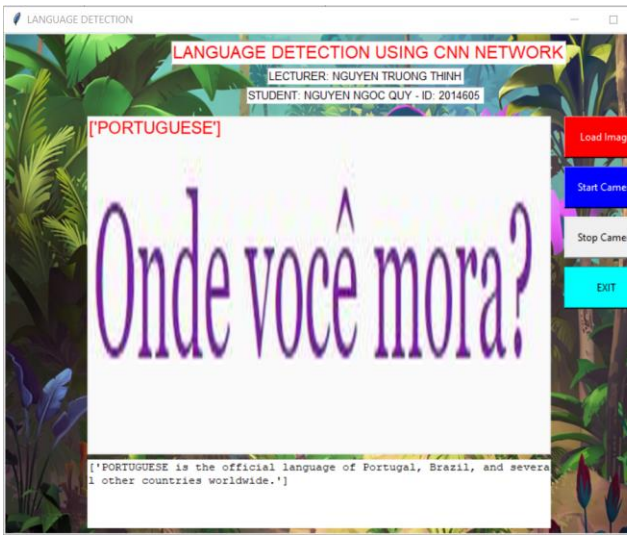

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['ITALIAN']
Città del
['ITALIAN is the official language of Italy and considered one of the most popular Romance languages.']
Load Image
Start Camera
Stop Camera
EXIT


LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['HINDI']
करने
['HINDI is the official language of India and one of the most widely spoken languages in the world, with around 600 million speakers.']
Load Image
Start Camera
Stop Camera
EXIT

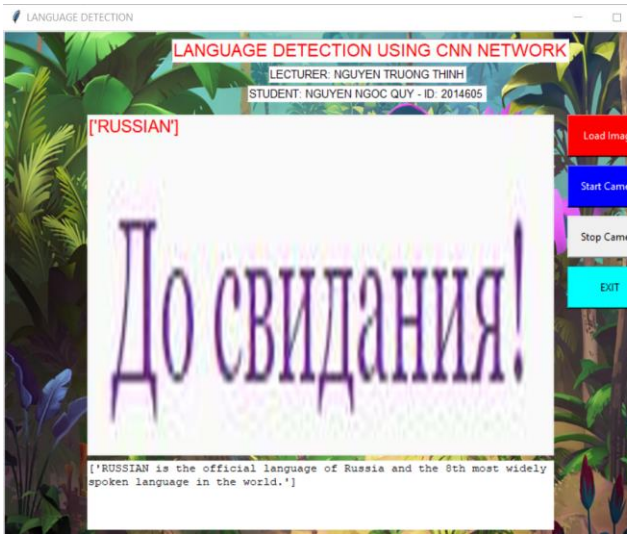

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['JAPANESE']
どうもありがとうございます
['JAPANESE is the official language of Japan and one of the languages with the most complex writing systems in the world.']
Load Image
Start Camera
Stop Camera
EXIT

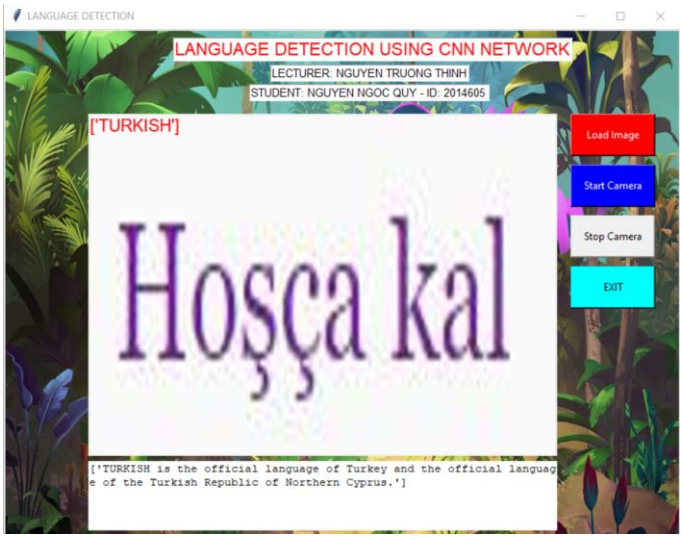

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['INDONESIAN']
Senjumnu
['INDONESIAN is the official language of Indonesia and widely used in communication, education, and media.']
Load Image
Start Camera
Stop Camera
EXIT

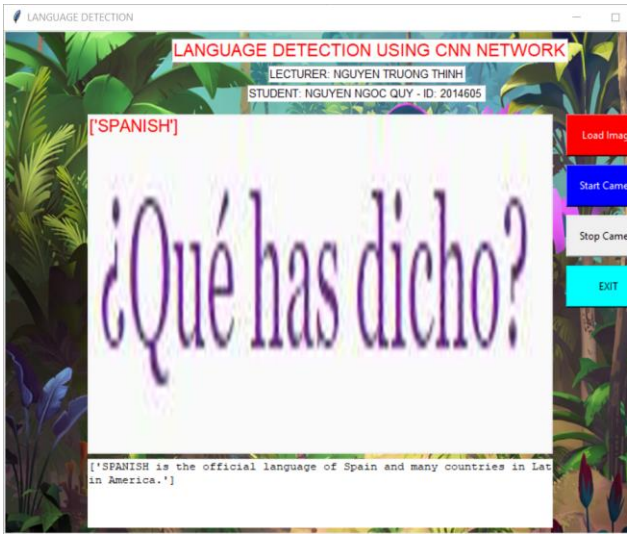

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['KOREAN']
얼마예요?
['KOREAN is the official language of South Korea and North Korea, with approximately 77 million speakers.']
Load Image
Start Camera
Stop Camera
EXIT


LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['PORTUGUESE']
Onde você mora?
['PORTUGUESE is the official language of Portugal, Brazil, and several other countries worldwide.']
Load Image
Start Camera
Stop Camera
EXIT


LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['THAI']
คุณชื่ออะไร
['THAI is the official language of Thailand and the most widely spoken language in the Southeast Asia region.']
Load Image
Start Camera
Stop Camera
EXIT

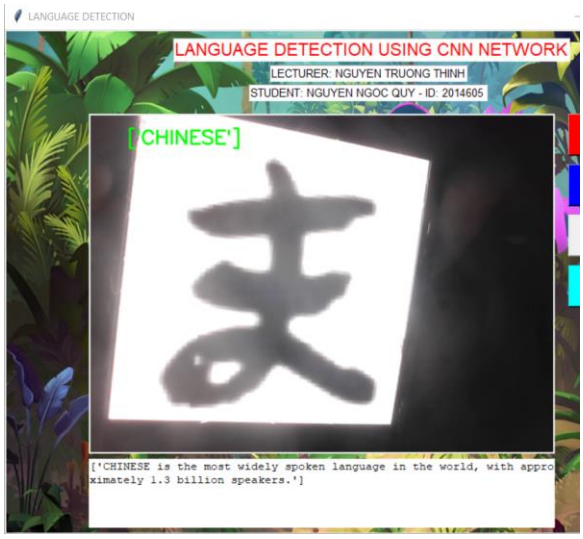

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['RUSSIAN']
До свидания!
['RUSSIAN is the official language of Russia and the 8th most widely spoken language in the world.']
Load Image
Start Camera
Stop Camera
EXIT

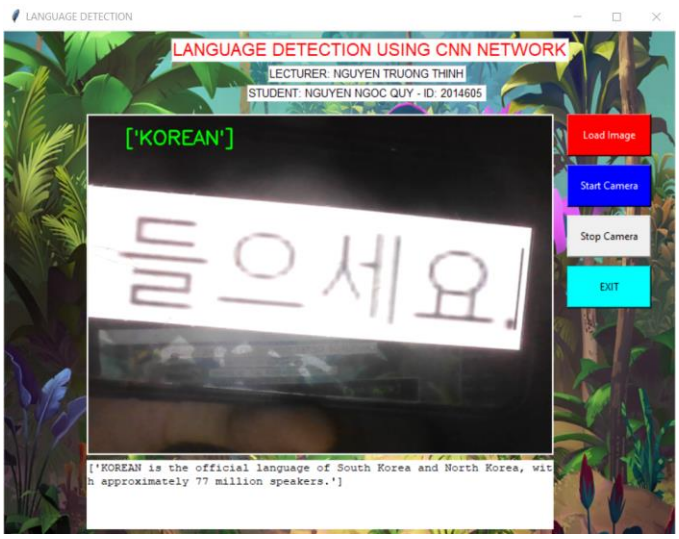

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['TURKISH']
Hoşça kal
['TURKISH is the official language of Turkey and the official language of the Turkish Republic of Northern Cyprus.']
Load Image
Start Camera
Stop Camera
EXIT

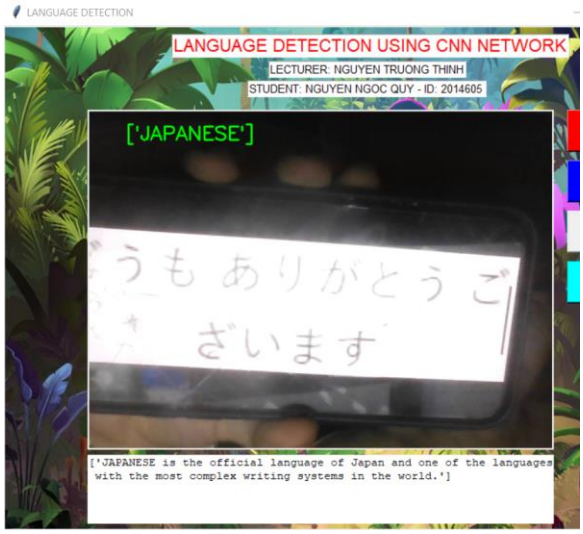

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['SPANISH']
¿Qué has dicho?
['SPANISH is the official language of Spain and many countries in Latin America.']
Load Image
Start Camera
Stop Camera
EXIT

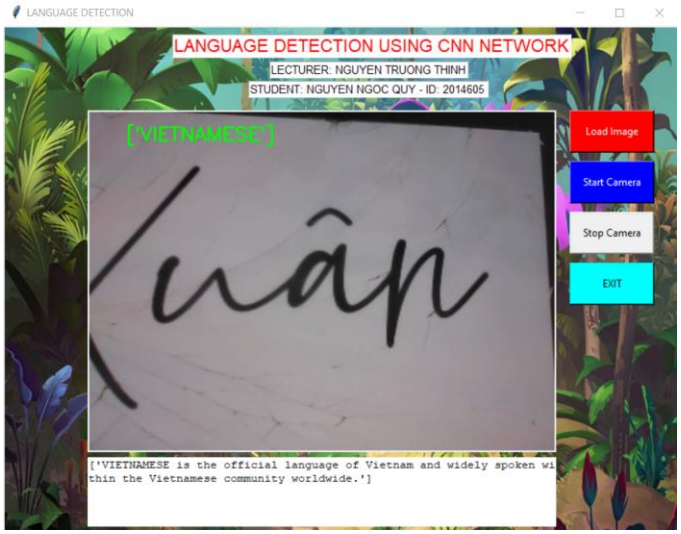

LANGUAGE DETECTION
LANGUAGE DETECTION USING CNN NETWORK
LECTURER: NGUYEN TRUONG THINH
STUDENT: NGUYEN NGOC QUY - ID: 2014605
['VIETNAMESE']
Quà tặng
['VIETNAMESE is the official language of Vietnam and widely spoken within the Vietnamese community worldwide.']
Load Image
Start Camera
Stop Camera
EXIT

ii. Detection with thinker RealTime









5. Conclusions

In conclusion, the development of a language detection system using a Convolutional Neural Network (CNN) model has been successfully accomplished. Throughout this project, I have explored the intricacies of language detection, delved into the theoretical foundations of CNN models, and implemented a robust and efficient system.

By leveraging the power of neural networks and utilizing large language datasets, the developed system demonstrates remarkable accuracy and reliability in identifying and categorizing different languages based on textual inputs. The CNN model effectively extracts intricate patterns and linguistic nuances, enabling precise language detection even in the presence of diverse linguistic landscapes.

The application created as part of this project offers a user-friendly interface, allowing users to effortlessly identify the language of any given text. Whether it be a snippet from a foreign article, a mysterious online comment, or a multilingual document, the application provides invaluable assistance in understanding and engaging with different languages.

The significance of this project lies not only in its practical applications but also in its contribution to the field of natural language processing and language technology. By developing an accurate and efficient language detection system, we open doors to enhanced cross-cultural communication, streamlined research in multilingual contexts, and improved accessibility to diverse linguistic content.

However, there are always opportunities for further enhancements and refinements. Future work could involve expanding the language dataset, incorporating more advanced language models, and integrating real-time language detection capabilities. Additionally, continuous evaluation and improvement of the system's performance would ensure its effectiveness in real-world scenarios.

Overall, this project has been an exciting journey into the realm of language detection. It showcases the potential of artificial intelligence and deep learning techniques in solving complex language-related problems. By combining theoretical knowledge, practical implementation, and a deep understanding of linguistic nuances, we have successfully developed a language detection system that can make a positive impact in our increasingly interconnected world.

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