AIR WRITING RECOGNITION USING DEEP CONVOLUTIONAL NEURAL NETWORKING IN MACHINE LEARNING

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Abstract

Air-writing recognition has received wide attention due to its potential application in intelligent systems. To date, some of the fundamental problems in isolated writing have not been addressed effectively. This paper presents a simple yet effective air-writing recognition approach based on deep constitutional neural networks (CNNs). A robust and efficient hand tracking algorithm is proposed to extract air-writing trajectories collected by a single web camera. The algorithm addresses the push-to-write problem and avoids restrictions on the users' writing without using a delimiter and an imaginary box. A novel preprocessing scheme is also presented to convert the writing trajectory into appropriate forms of data, making the CNNs trained with these forms of data simpler and more effective. Experimental results indicate that the proposed approach not only obtains much higher recognition accuracy but also reduces the network complexity significantly compared to the popular image-based methods.

Introduction

In tha era of digital world, traditional art of writing is being replaced by digital art. Digital art refers to forms of expression and transmission of art form with digital form. Relying on modern science and technology is the distinctive characteristics of the digital manifestation. Traditional art refers to the art form which is created before the digital art. From the recipient to analyse, it can simply be divided into visual art, audio art, audio-visual art and audio-visual imaginary art, which includes literature, painting, sculpture, architecture, music, dance, drama and other works of art. Digital art and traditional art are interrelated and interdependent. Social development is not a people's will, but the needs of human life are the main driving force anyway. The same situation happens in art. In the present circumstances, digital art and traditional art are inclusive of the symbiotic state, so we need to systematically understand the basic knowledge of the form between digital art and traditional art. The traditional way includes pen and paper, chalk and board method of writing. The essential aim of digital art is of building hand gesture recognition system to write digitally. Digital art includes many ways of writing like by using keyboard, touch-screen surface, digital pen, stylus, using electronic hand gloves, etc. But in this system, we are using hand gesture recognition with the use of machine learning algorithm by using python programming, which creates natural interaction between man and machine.

Literature Survey

Our paper "Air writing recognition using Wearable Motion Sensors" By ChristophAmma ,Dirk Gehrig , Tanja Schultz in2019 ,present a wearable input device which enables the user to input text into a computer. The text is written into the air via character gestures, like using an imaginary blackboard. To allow hands-free operation, we designed and implemented a data glove, equipped with three gyroscopes and three accelerometers to measure hand motion. Data is sent wirelessly to the computer via Bluetooth. On a character database with 10 writers, achieve an average writer-dependent character recognition rate of 94.8% and a writer-independent character recognition rate of 81.9%. Based on a small vocabulary of 652 words, achieve a single-writer word recognition rate of 97.5%, a performance we deem is advisable for many applications. The final system is integrated into an online word recognition demonstration system to showcase its applicability.

Our paper "Modeling And Recognition Characters, Words, And Connecting Motions" by Mingy u Chen in 2020Air-writing refers to writing of linguistic characters or words in a free space by hand or finger movements. Air-writing differs from conventional handwriting; the latter contains the pen-up-pen-down motion, while the former lacks such a delimited sequence of writing events. It address air-writing recognition problems in a pair of companion papers. In Part I, recognition of characters or words is accomplished based on six-degree-of-freedom hand motion data. We address air-writing on two levels: motion characters and motion words

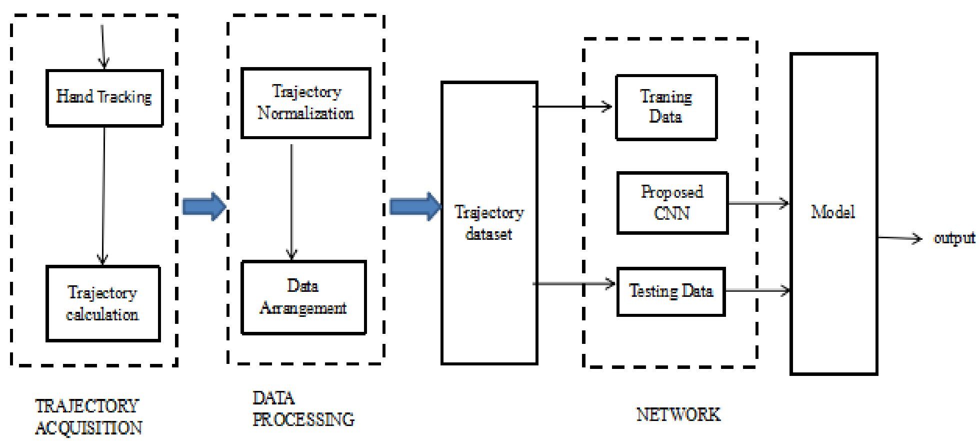
Our paper" A Pointing Gesture Based Egocentric Interaction system: Datasets, Approach, And Application" By Y. Huang, X. Liu, X. Zhang, and L. Jin in 2022,With the heated trend of augmented reality (AR) and popularity of smart head-mounted devices, the development of natural human device interaction is important, especially the hand gesture based interaction. This paper presents a solution for the point gesture based interaction in the egocentric vision and its application. Firstly, a dataset named Ego-finger is established focusing on the pointing gesture for the egocentric vision.

System Design

In product development, it is important to understand the difference between the baseline functionality necessary for any system to compete in that product domain, and features that make the system different from their competitor's products. Some strategies have important implications for software architecture. Specifically, it is not just

the Software requirements specifications of the initial release that must be supported in the architecture. The Software requirements specifications of initial products need to be explicitly taken into consideration.

System Architecture



IMPLEMENTATION

1.#importing the required libraries

from tensorflow.keras.datasets import mnistfrom tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Conv2D

from tensorflow.keras.layers import MaxPool2D

from tensorflow.keras.layers import Flatten from tensorflow.keras.layers import Dropout

from tensorflow.keras.layers import Dense

2.#loading data

(X_train,y_train) , (X_test,y_test)=mnist.load_data()

3.#reshaping data

X_train = X_train.reshape((X_train.shape[0], X_train.shape[1], X_train.shape[2], 1))

X_test=X_test.reshape((X_test.shape[0],X_test.shape[1],X_test.s hape[2]

4.#checking the shape after reshaping

print(X_train.shape)

print(X_test.shape)

5.#normalizing the pixel values

X_train=X_train/255

X_test=X_test/255

6. #defining model

model=Sequential()model=Sequential()7

7. #adding convolution layer

model.add(Conv2D(32,(3,3),activation='relu',input_shape=(28,28,1)))

8.#adding pooling layer

model.add(MaxPool2D(2,2))

9.#adding fully connected layer

model.add(Flatten())

model.add(Dense(100,activation='relu'))

10.#adding output layer

model.add(Dense(10,activation='softmax'))

11.#compiling the model

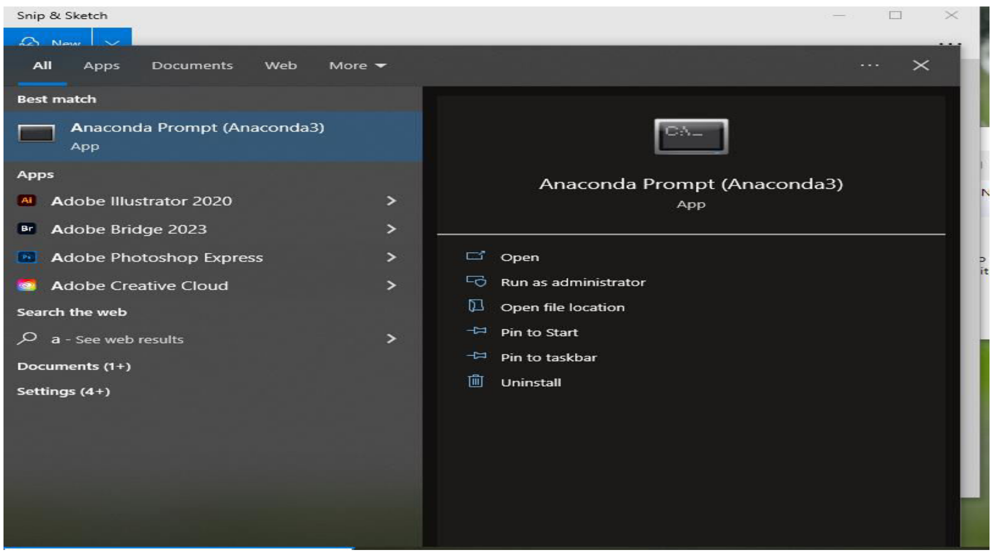
model.compile(loss='sparse_categorical_crossentropy',optimizer='adam',metrics=['accuracy'])

12.#fitting the model

model.fit(X_train,y_train,epochs=10)

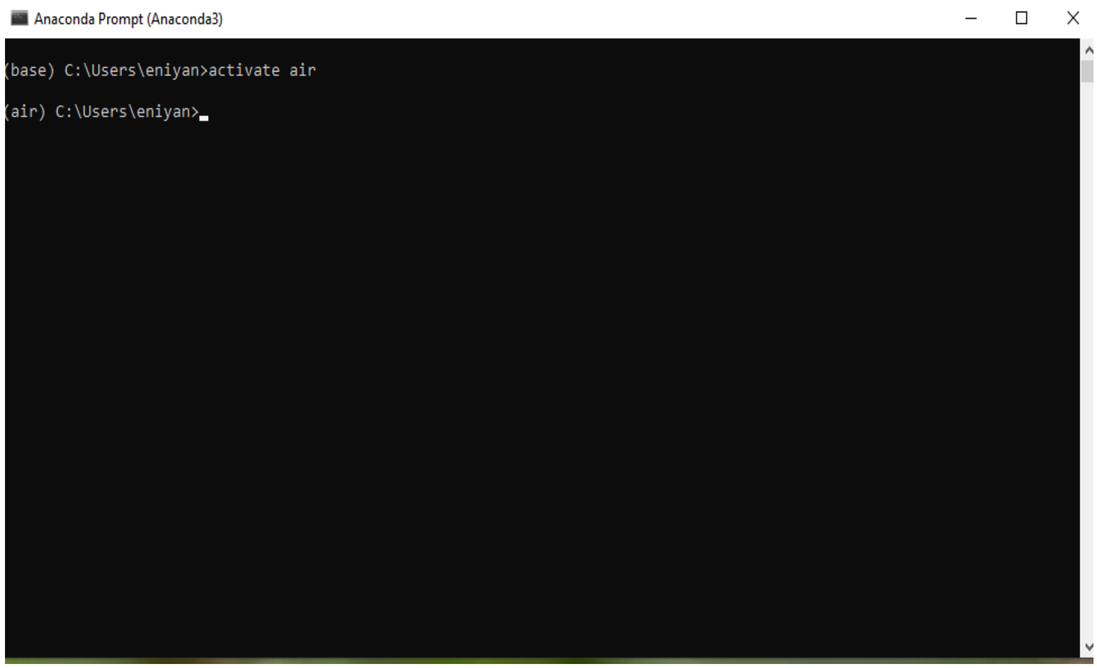
SNAPSHOTS

Open Anaconda prompt:

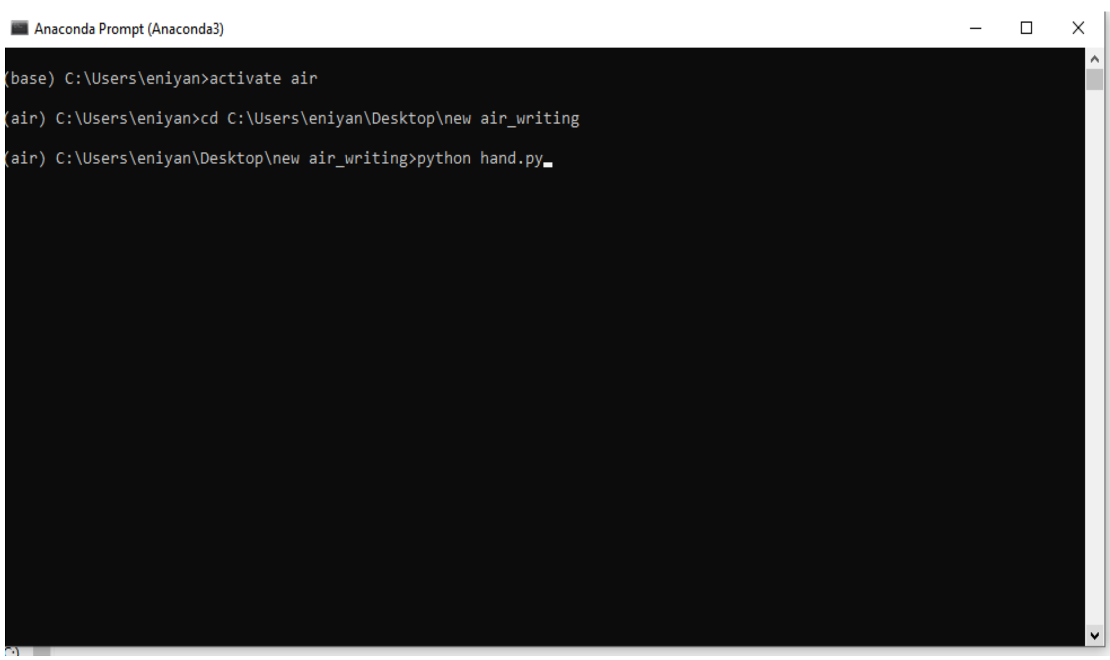


Command Prompt:

Create Environment:

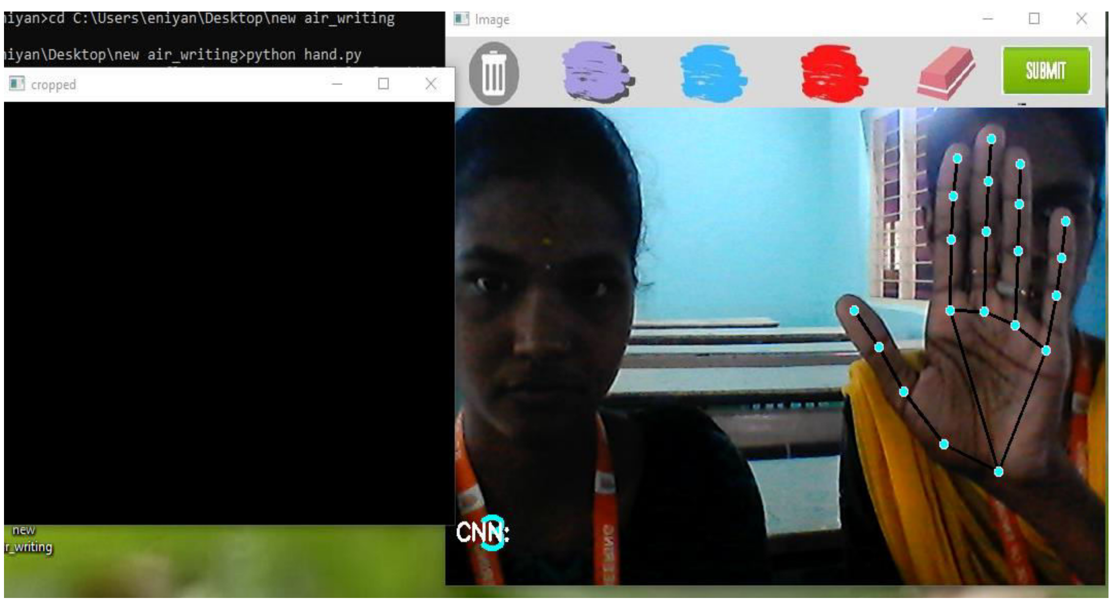


Create An Environment In Prompt:

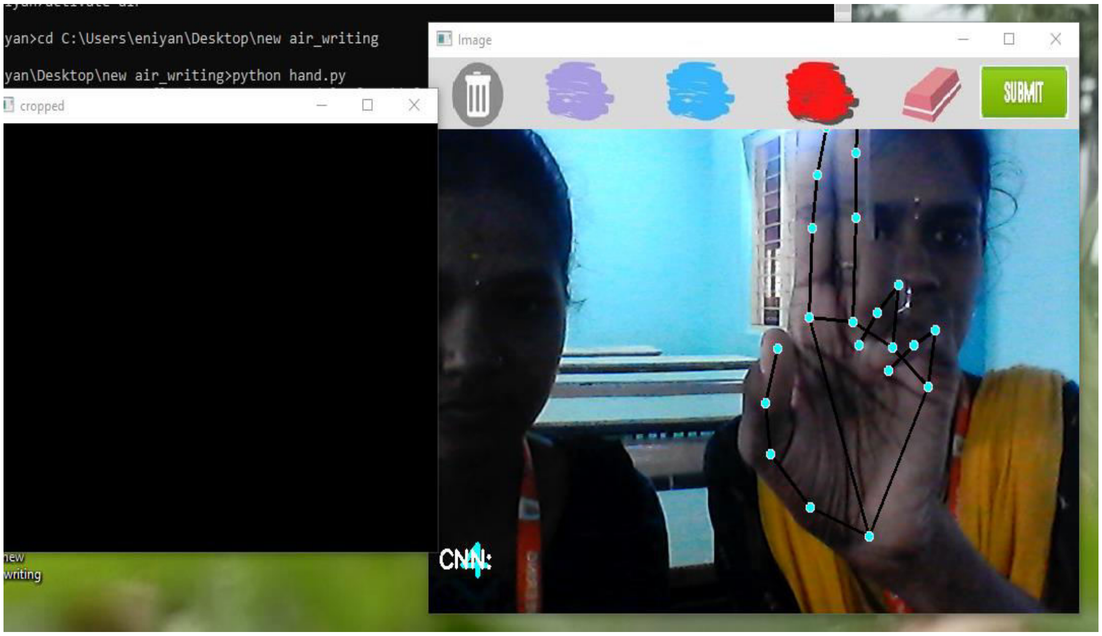


Hand Tracking Of TKinter Framework:

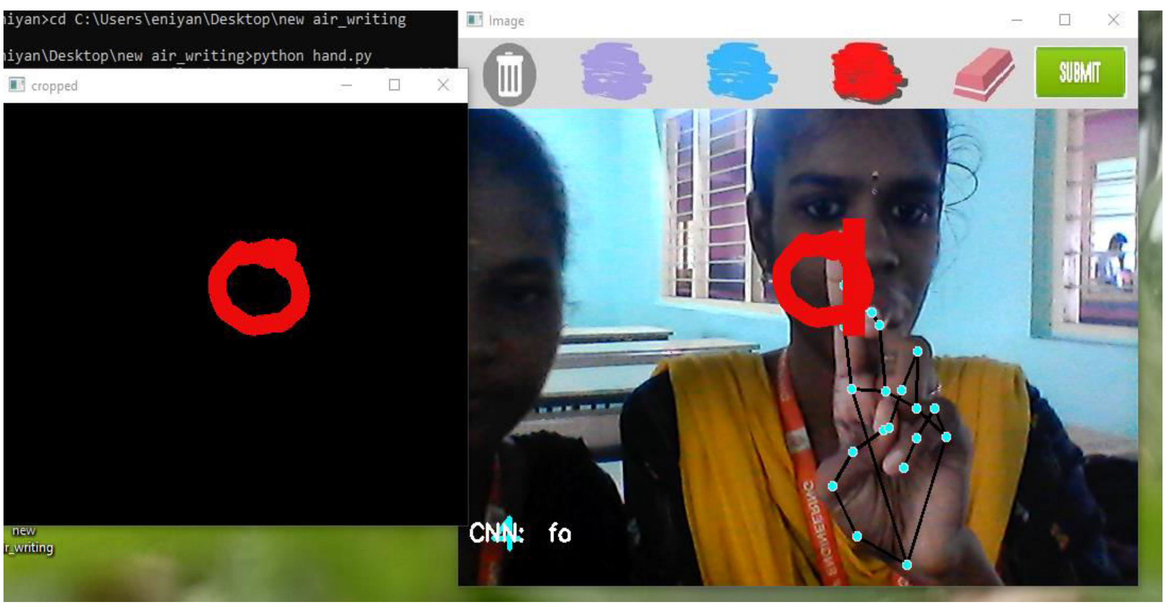
Hand Tracking:



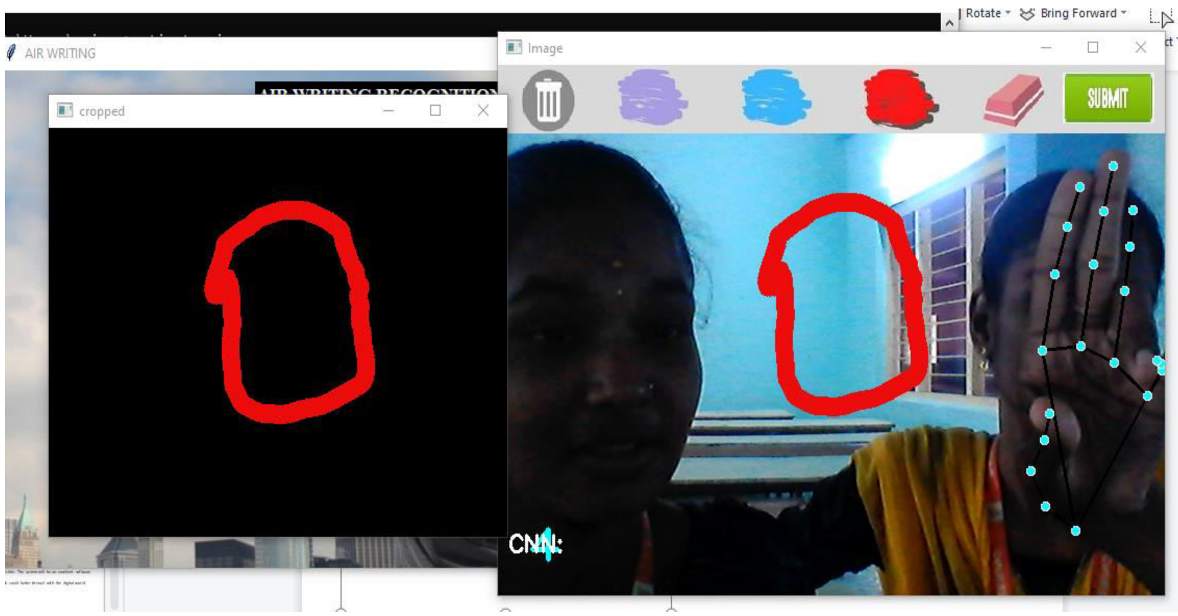
Choosing Color Tip:



Writing On Air:



Submitting Writing Letter:



CONCLUSION

The system has the potential to challenge traditional writing methods. It eradicates the need to carry a mobile phone in hand to jot down notes, providing a simple on-the-go way to do the same. It will also serve a great purpose in helping especially able people communicate easily. Even senior citizens or people who find it difficult to use keyboards will able to use system effortlessly.Drawing in the air can also be made possible. The system will be an excellent software for smart wearable using which people could better interact with the digital world

FUTURE ENHANCEMENTS

Our project helps to predict the stroke risk using prediction model in older people and for people who are addicted to the risk factors are mentioned in the project. In future the same project can be extended to give the update in stroke risk percentage using the output of current project. This project can also be used to find the stroke probabilities in young people and under age by collecting respective risk factor information and doctor consulting.

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