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Predication of Human Behavior through Handwriting Using Raspberry Pi

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ABSTRACT

Throughout history, scientists, philosophers, artists and others have been interested in the relationship between the handwriting and the writer. This attempted to relate specific handwriting elements to specific human traits.

Nowadays deep neural network is one of the trending method to work on with various algorithmic innovations. We have designed image processing based handwriting recognising system to predict human behaviour. In this innovation we have used open CV to perform image processing and used tensorflow to for neural networking and also worked on Python programming to develop the software of the project.

Keywords—Python programming, open CV, Convolution neural networks, Raspberry 8th April 2020 Pi, Tenser flow.

I. INTRODUCTION

Healthcare Human personality detection is become more and more important in the modern world. Handwriting analysis Agra philosophy is the scientific method of identifying for recognizing and personality over move and the pattern notify with the handwriting. Convolution layer apply operation with the input passing result the next player the convolution simulates the response of individual neuron to a visual stimuli the main measure is depleted the behavior of the user using uses in writing. There are two ways to recognize any handwriting it could be worked online as well as offline .We are working on offline method of handwriting detection. We are working on image of handwriting to detect its behavior. It's tough task or seems to be challenging one. The basic reason behind this is every individual have different way or style of writing. The advance one is technical issue . There are different characters to write such as numbers, alphabet (capital letters or small letters), special characters. So the huge amount of data that needs to be instruct for precise neural networking. The accuracy percentage has to be 98% to fulfill the demand of project. As per as the current knowledge the most commercial and the modern system is not able to reach this accuracy.

Measures of system

A software application

This application is used to take picture of the text which needs to recognized through the camera (USB 2.0 webcam). We are using Raspberry Pi with the software raspbian OS capturing the image for prediction. this picture process by Python programming running on open CV to give the information about behavior. This is the front end of system

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Open CV server

This OpenCV-server is portable computer system which is going to use for running the Python program. We are using Linux Ubuntu system for open CV server. We are using convolution neural networks for the execution. CNN which is termed as convolution neural networks consists of three elements for the operation which are input image feature detector feature mapping. Optimization function for seen in model is used to calculate final accuracy and losses. CNN model is trained using tensor flow which has an Open CV library used for Artificial Intelligence and machine learning applications. Open CV is a library used for image processing.

II. RELATED WORK

Numerous amount of research is happening for Predication of Human Behavior using handwriting. Large amount of people have researched and developed system on the same. We have learnt some of them which are: A character recognition system has been designed using fuzzylogic[1]. The system prepared by them can be created on aVLSI structure. This character predication system is variations in shiftand immuneto distortion. The use ofhamming neural network is done in their system.

An innovative method for recognition of handwritten Tamil characters using Neural Networks has been developed[2]. They use the method of (SOM) Kohonen Self Organizing Mapwhichis an unsupervised neural network. This systemcan be used for recognition of Tamil characters. They are also used for the recognition of other Indic languages. This systemprovides nearly accurate results but sometimes fewerrors are there, if the handwritten characters are not properly settled or segmented.

One of the paper has presented a different method for computing a person based on their handwritting[3]. The paper has worked on the Multi layer feed forward neural network for the given system. The purpose of this paper thatthe height and width of a handwritten alphabet is different foreach and every person. The paper has presented a methodfor identifying of a person's behaviour from theirhandwriting.

A novel way of handwritten character recognition has beenformed which does not use feature extraction[4]. They havebuilt their system in Matlab. Their system works on feedforward neural network with backpropogation.

Another authors have showed an differnt methodfor handwriting recognition[5]. Their system uses SelfOrganizing Map (SOM)[6] for feature extraction. They have worked on Recurrent neural network[7] for learning. This method is used for the recognition of Japanese characters.

III. REQUIRED TOOLS

Camera USB 2.0 webcam and Raspberry Pi for Hardware and Python 2.7 or above, open CV and tensor flow for software.

IV. LITERATURE SURVEY

The literature survey is considered as a part of the work. It interference the queries related the improvement of work already done and clearly outline the development of the research projects.

[1]Esmeralda C. Djamal projected Autography movement emulate the written element of each individual's periodicity and design. By analyzing all fundamentals of handwriting and interpreting them, using typical of graphology author could initiate a chart of the writer's character attribute, sentimental constitution and gracious design. In graph logical analysis"s, an image is separated into two accession that graphics attributes and partition digit each character. In this research, author 1employ graphical accession based on signature and digit of character of consumption scheme using many-frame algorithms and artificial neural networks (ANN). The image crack into two space: the signature occupied on nine appearance and consumption scheme of letters digit space. Each space had performed preprocessing to improve the recognition accuracy. ANN based classifier applies on five features of impression which outcome an exactness of 56-78%. While four appearance of the impression that disclosure using many frame algorithm result 87-100% exactness.

[2]Sandeepdhang on Handwriting Analysis of Human Behaviour Based on Neural Network, Graphology or Handwriting analysis is a scientific method of identifying, evaluating and understanding of anyone personality through the stroke and pattern revealed by handwriting. Handwriting reveals the true personality including emotional outlay, honesty, fears and defenses and etc. Handwriting stroke reflects the on paper draw of each individual's rhythm and Style. The image split into two areas: the signature based on three features and application form of letters digit area. In this research performance evaluation is done by calculating mean square error using Back Propagation Neural Network (BPNN).Human behavior is analyzed on the basis of signature by using neural network

[3] Javier Galbally, Julian Fierrez, Marcos Martinez-Diaz, R'ejeanPlamondonE'cole Polytechnique de Montre'al focus on "Quality Analysis of Dynamic Signature Based on the Sigma- Lognormal Model". In this paper author distinct that various personal ethics can be precisely illuminate as a set of influential describe sequenced together by a Markov chain. To diagnose personal ethics from sensible data and to deduce personal ethics over a few seconds time, author then use these influential Markov layout. To ensure the virtue of this designing avenue, creator report an experiment in which, author was able to achieve 95% precision at predicting automobile drivers" subsequent actions from their starting preparatory movements.

[4] In this author distinguish a new behavioral biometric technique based on human computer communication. Author urbanized a system that captures the user communication via a lighten, and uses this observable information to verify the individuality of an individual. Using analytical pattern credit techniques, author developed a sequential classifier that processes user interaction, as reported by the user identity is considered real if a predefined accuracy level produced, and the user is classified as a pretender otherwise. Two statistical models for the features were tested, namely Parsing density opinion and a unimodal disposal. The system was checked with different numbers of users in order to assess the scalability of the proposal. Experimental results show that the normal user communication with the computer via a pointing device entails behavioral information with particular power that

[5]Proposed a paper addressing problem of personal authentication through the use of autograph recognition is described in this paper. There are two method of verification: online andoffline signature verification. The dynamic methods covered, are based on the analysis of the shape, speed, stroke, pen pressure and timing information. While the stationary methods involve general shape recognition techniques. The paper inclined a sharp historical outline of the extant methods and presents some of the recent research in the field. In this paper problem of exclusive testimonial through the use of signature perception is considered. Twain on-line and offline methods have been described.

V. BLOCK DIAGRAM



Fig 1. Block diagram

Module Description:

a) User:

In this user module capture the image from the camera. Camera connected to the raspberry pi for capturing the handwriting images for prediction.

b) Behavior detection system

In this module system will take input an image. Then it will perform certain operation on it like feature extraction, noise removal and detect behavior of user.

Algorithm Description CNN:

Convolution Operation

Here are the three elements that enter into the convolution operation:

- 1. Input image
- 2. Feature detector
- 3. Feature map

Step 1(b): ReLU Layer

The reason we want to do that is that images are naturally non-linear.

When you look at any image, you'll find it contains a lot of non-linear features (e.g. the transition between pixels, the borders, the colors, etc.). The rectifier serves to break up the linearity even further in order to make up for the linearity that we might impose an image when we put it through the convolution operation.

Step 2: Pooling

Again, max pooling is concerned with teaching your convolutional neural network to recognize that despite all of these differences that we mentioned, they are all images are same. In order to do that, the network needs to acquire a property that is known as "spatial variance." This property makes the network capable of detecting the object in the image without being confused by the differences in the image's textures, the distances from where they are shot, their angles, or otherwise.

Step 3: Flattening

This will be a brief breakdown of the flattening process and how data move from pooled to flattened layers when working with Convolutional Neural Networks.

Step 4: Pooling

What happens after the flattening step is that you end up with a long vector of input data that you then pass through the artificial neural network to have it processed further which is called pooling. Types of pooling: Mean, Max, Sum

Step 5: Full Connection

In this part, everything that we trained throughout the section will be merged together. By learning this, you'll get to envision a fuller picture of how Convolutional Neural Networks operate and how the "neurons" that are finally produced learn the classification of images.

Step 6:Summary

In the end, it will wrap everything up and give a quick recap of the concept covered in the training.

Step 7: SoftMax & Cross-Entropy

Optimization Functions for CNN model. To calculate final accuracy and losses.

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VII.CONCLUSION

A simpler method has been proposed to predict the personality of a person by exploring his handwriting. The system extracts features from breaks, size, space between words, baseline, loop of 'e' and few other features like pressure, margin, slant and dot distance in 'i. The proposed system can be used as a twin tool by graphologist to improve the accuracy and anticipate the behaviour s of a person faster.

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