Emotion Recognition And Drowsiness Detection Using Python

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ABSTRACT:

Human emotions are natural expressions that people tend to make naturally, instead of any conscious effort that is accompanied by the reflexing of facial muscles. Some of the common emotions are Happy, sad, surprised, anger and stable (normal) which a human face can make according to the different situations one may find itself in. We present the software which detects and recognizes faces as well as tells a lot more about that person which could be used to get feedback from customers or to know if a person needs motivation. The objective of the project is to be an affordable and efficient product. Artificial Intelligence & Digital image processing technology used to make the system in python. Detection of eye blinking is important in certain scenarios where to avoid any accident or mishappening like in vehicles or in security vigilance. As the system also recognizes the identity card, this is a simple feature wherein the camera installed is trained in such way that it firstly focuses on the card and recognizes its shape and color.

1. INTRODUCTION

The area of Artificial Intelligence and Digital Image Processing is development in the world in drastically. Many areas of industry have started using the various techniques and applications of AI with deep learning. The project can be implemented for marketing and enhancement change to new thing innovation purpose also, let us know the feedback of any product development the products. It provides accurate perfect results analysis. As well as are easy to be implemented and understood in the most common systems, the features can be installed in a cost helpful and efficient approach in schools or colleges or any other area to surveillance is required, but lack of finances is a most important factor to trouble to development AI. The project, surveillance could be provided which results help in maintaining a regular health check and to identify the emotion of a person at employment place. It can also be used as criticism of personnel after production a quantity of change at work place. An Artificial Intelligence & Digital image processing technology used to make the system which contains face recognition, emotion recognition, and drowsiness detection in user. The face recognition conventional kNN algorithm is used. The given proposed work has shown us that the performance of face recognition technique can be better much better by mixing Tensorflow, deep learning features extraction and the K Nearest Neighbor and Sparse Representation Classifier (KNN-SRC) for classification to under the . The aim to development a Convolutional -Neural Network (CNN) based on Facial Expression Recognition System (FER) to analysis the facial expression. The deep learning algorithm used for drowsiness detection detects the blinking of the eye through the camera installed using live video stream.

2. LITERATURE SURVEY

Literature surveyis the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy n company strength. Once these things r satisfied, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmersstart building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from bookor from websites. Before building the system the above consideration are taken into account for developing the proposed system.

1.Nian Zhang, WelezaneKarimoune, Lara Thompson, and Hongmei Dang. "A BetweenClass Overlapping Coherence-Based Algorithm in KNN Classification", An improved KNN algorithm to overcome the class overlapping problem in the class distribution is skewed. Different from the conventional KNN algorithm, it not only finds out the k nearest neighbors of each sample (even the test object itself) in the training dataset, but also the neighbors of the unknown test object. Then the validity value of a data point is computed based on the label of the data and the labels of its k nearest neighbors. A classifier is designed to assign the unknown test object to a class membership based on the proposed validity ratings equations.

2. SeongJoonBaek and Koeng-Mo Sung, "Fast K-nearest-neighbor search algorithm for nonparametric classification."

t kNN classification algorFast KNN search algorithm to uses a projection value to test whether distance calculation is required. An inequality between the projection values and the distance is derived and incorporated into the classification algorithm. Experimental results confirm the effectiveness of the accurate results in K-nearest neighbor. 3. Wen-Jyi Hwang and Kuo-Wei Wen. "Fasithm based on partial distance search.",

3. SYSTEM ANALYSIS

3.1 Existing System

The existing system has unable to find out the facial expression. It's not supporting the machine learning (ML), artificial intelligence (AI).here database only capturing the data only management the data base. The existing system to totally failures the capturing Images to identifying the facial emotion expression.

Disadvantages
• No accurate results
• Not possible to find the facial expression.
• Loss the data base.

3.2 Proposed System

The proposed system in which there is a thought for an better face expression recognition technique which is based on the region of interesting to let the convolution neutral networks (CNN) focus only on those areas which are associated with that particular expression which the human face makes. The given training data, it also identifies the relationship between the different areas which are helpful in intensifying the accuracy, thereby making it reliable of the predicted targets. In test stage, we investigated recognition. Identify the test image directly; implemented decision fusion strategy on areas. Emotions are natural expressions that people tend to make naturally, instead of any conscious effort that is accompanied by the refluxing of facial muscles. Some of the common emotions are Happy, sad, surprised, anger, stable(normal) etc which a human face can make according to the different situations

one may find itself in. This is a proposed method to find the emotions of a person.

Advantages
• Time saving
• Find the facial expression
• Accurate results

Introduction to Convolution Neural Network
It is assumed that reader knows the concept of Neural Network.

When it comes to Machine Learning, Artificial Neural Networks perform really well. Artificial Neural Networks are used in various classification task like image, audio, words. Different types of Neural Networks are used for different purposes, for example for predicting the sequence of words we use Recurrent Neural Networks more precisely an LSTM, similarly for image classification we use Convolution Neural Network. In this blog, we are going to build basic building block for CNN. Before diving into the Convolution Neural Network, let us first revisit some concepts of Neural Network. In a regular Neural Network there are three types of layers:

Input Layers: It's the layer in which we give input to our model. The number of neurons in this layer is equal to total number of features in our data (number of pixels incase of an image).

Hidden Layer: The input from Input layer is then feed into the hidden layer. There can be many hidden layers depending upon our model and data size. Each hidden layers can have different numbers of neurons which are generally greater than the number of features. The output from each layer is computed by matrix multiplication of output of the previous layer with learnable weights of that layer and then by addition of learnable biases followed by activation function which makes the network nonlinear.

Output Layer: The output from the hidden layer is then fed into a logistic function like sigmoid or softmax which converts the output of each class into probability score of each class. The data is then fed into the model and output from each layer is obtained this step is called feedforward, we then calculate the error using an error function, some common error functions are cross entropy, square loss error etc. After that, we backpropagate into the model by calculating the derivatives.

input layer   hidden layer 1   hidden layer 2   output layer
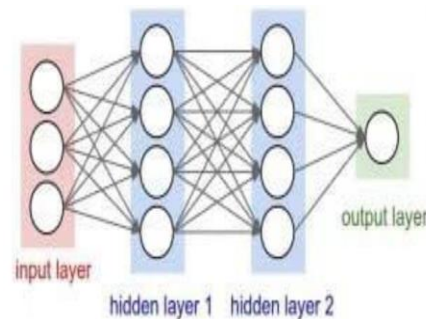
4. IMPLEMENTATION
4.1 Logistic Regression:
The logistic regression formula is derived from the standard linear equation for a straight line. The standard linear formula is transformed to the logistic regression formula.

$$f(z) = \frac{1}{1 + e^{-(z)}} \quad (2)$$

The logistic regression function is useful for predicting the class a binomial target feature.

4.2 Neural Network:

In proposed method we have used neural network with the logistic algorithm. Both algorithms provide individual accuracy of UCI dataset then we have applied voting on both algorithm result. In proposed method we have used following parameters for neural network implementation.

Lbfgs: It is optimizer in the family of quasi-Newton methods.

Hidden layer: we have used 15 neurons in hidden layer.

Activation Relu: The rectified linear unit functions.

Tiredness is characterized as a diminished degree of mindfulness depicted by languor and issue in staying alert however the individual stirs with basic energy by boosts. It may be brought about by a nonappearance of rest, medication, substance abuse, or a cerebral issue. It is for the most part the aftereffect of weariness which can be both mental and physical. Physical weakness, or muscle exhaustion, is the impermanent physical disappointment of a muscle to perform in a perfect world. Mental weakness is an impermanent disappointment to keep up perfect mental execution. The beginning of mental weariness in the midst of any learned activity is dynamic, and depends on a person's mental limit, besides upon various components, for instance, absence of rest and general prosperity. Mental depletion has furthermore been seemed to reduce physical execution. It can appear as drowsiness, lethargy, or composed thought shortcoming.

In the previous years as indicated by accessible information driver tiredness has been able to be one of the genuine purposes behind road incidents inciting destruction and extraordinary physical wounds and loss of economy. A driver who nods off is in an edge of losing power over the vehicle inciting crash with other vehicle or stationary bodies. Remembering to stop or decrease the quantity of mishaps, as it were, the state of drowsiness of the driver ought to be watched consistently.

5. Measures for detection of Drowsiness

The study states that the reason for a mishap can be categorized as one of the accompanying Primary classes: (1) human, (2) vehicular, and (3) surrounding factor. The driver's error Represented 91% of the accidents. The other two classes of causative elements were referred to as 4% for the type of vehicle used and 5% for surrounding factors. Several measures are available for the measurement of drowsiness which includes the following:

1. Vehicle based measures.
2. Physiological measures.
3. Behavioral measures
Vehicle based measures.
Vehicle-based measures survey path position, which monitors the vehicle's position as it identifies with path markings, to determine driver weakness, and accumulate steering wheel movement information to characterize the fatigue from low level to high level. In many research projects, researchers have used this method to detect fatigue, highlighting the continuous nature of this non-intrusive and cost-effective monitoring technique. This is done by:

1. Sudden deviation of vehicle from lane position.
2. Sudden movement of steering wheels.
3. Pressure on acceleration paddles.
For each measures threshold values are decided which when crossed indicated that driver is drowsy.

Advantages:
1. It is noninvasive in nature.
2. Provides almost accurate result.

Disadvantages:
- Vehicle based measures mostly affected by the geometry of road which sometimesunnecessarily activates the alarming system.
- The driving style of the current driver needs to be learned and modeled for the system to beefficient.
- The condition like micro sleeping which mostly happens in straight highways cannot bedetected.

Physiological measures. Physiological measures are the objective measures of the physical changes that occur in our body because of fatigue. These physiological changes can be simply measure by their respective instruments as follows:

**ECG (electro cardiogram)**

EMG (electromyogram)
EOG (electro occulogram) EEG (electroencephalogram) Behavioral measures.

Certain behavioral changes take place during drowsing like

1. Yawning
2. Amount of eye closure
3. Eye blinking
4. Head position

Among all these four strategies, the most precise technique depends on human physiological measures This procedure is executed in two ways: measuring changes in physiological signs, for example, brain waves, heart rate, and eye flickering; and measuring physical changes, for example, sagging posture, inclining of the driver's head and the open/shut conditions of the eyes In spite of the fact that this procedure is most precise, it is not reasonable, since detecting electrodes would need to be put straightforward onto the driver's body, and thus be irritating and diverting to the driver. Also, long time driving would bring about sweat on the sensors, reducing their capacity to screen precisely. Hence this approach will be mostly focusing on amount of eye closure also called (PERCLOS) percentage of closure as it provides the most accurate information on drowsiness. It is also non-intrusive in nature, hence does not affect the state of the driver and also the driver feels totally comfortable with this system. Environmental factors like road condition do not affect this system. The case of micro nap is also detected according the given threshold value. The development of this system includes face identification and tracking, detection and location of the human eye, human eye tracking, eye state detection, and driver fatigue testing. The key parts of the detection framework fused the detection and location of human eyes and driver fatigue testing. The improved technique for measuring the PERCLOS estimation of the driver was to compute the proportion of the eyes being open and shut with the aggregate number of frames for a given period.
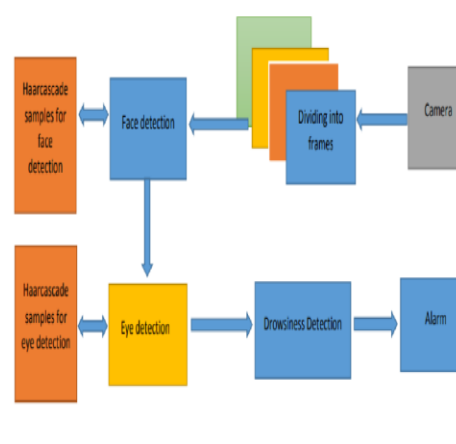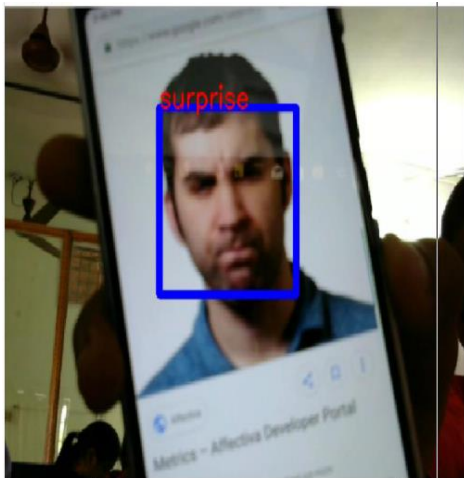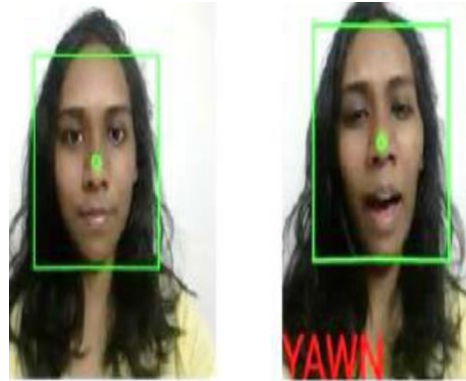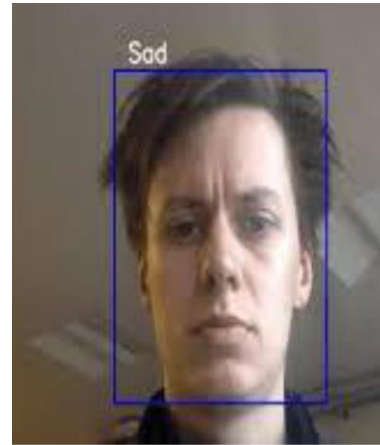
architecture

6. Result:

Table for different value of k

Method	k	Number of distance calculations	Time in PC clocks
VQ-KNN	for all	512	22832
Proposed algorithm	5	71.19	1972
	10	81.38	2503
	15	89.21	2954
	20	95.95	3384
	25	102.34	3795

Rate e for calculation errpr and their computing

	kNN (r=9216)	fast kNN (t=9216)	VQ-kNN (r=768)	fast VQ-kNN (r=768)	VQ-kNN (t=1536)	fast VQ-kNN (t=1536)
T[s]	471.02	60.93	40.68	8.47	79.01	12.37
E	5.44%	5.44%	6.51%	6.51%	5.63%	5.63%

7. CONCLUSION

The conventional kNN algorithm finds out the k-nearest neighbors of each given sample. The improved version of kNN algorithm not only finds the present nearest neighbors, but also the neighbors of the unknown test objects. The performance of face recognition technique can be enhanced much better by mixing of Tensorflow and deep leering the K Nearest Neighbor and Sparse Representation Classifier (KNN-SRC) for classification. The assessing procedure through the given technique gives all the time more good results and the accuracy obtain the taken the researchers positive results for the models to be made in future of computer based emotion recognition system. The expressions on a face of determine the current state, moods and current feelings of a person through the state of nonverbal communication. To understand a person's emotion if we are able to analyze it at different stages identifying. In different stages the emotions of a person are significantly varying.

To view the eye region it finds the shape of the frame and to this from side to side convex hull which finds if a curve is convex. On each frame to check if the calculated eye aspect ratio is less than the given threshold value, if its additional it saves the result. If it gets the eye aspect ratio as more than threshold for consecutive three frames, the person into consideration is declared to be drowsy in addition to a warning signal is generated in the project.

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