FACIAL SENTIMENT RECOGNITION USING CONVOLUTIONAL NEWRAL NETWORK

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"FACIAL SENTIMENT RECOGNITION USING CONVOLUTIONAL NEURAL NETWORK"**, submitted by Md.Nasiruddin Ahmmed, ID No: 162-15-8088 and Md.Shoriful Islam, ID No: 162-15-7976 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 12 September.

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We hereby declare that, this project has been done by us under the supervision of **Sheikh Abujar, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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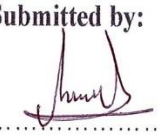

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ABSTRACT

In this paper, we apprise seven feelings and poor and nice emotion consciousness manners using facial pictures and the improvement of software program-based totally on the method. In previous researches, there are emotion-based facial expressions to recognized thoughts by used the deep-learning technology. There is current software that posted six emotions, but we apprehend seven emotions and terrible and positives in graphs and percentages. Thus, we identified seven emotions such as Happy, Angry, Fear, Disgust, Sad, Neutral and shock and additionally calculate emotion-recognition ratings into positive, poor and impartial emotions. Then we carried out a software program that presents the person with seven emotions scored and superb and negative emotions.

Emotion is a key aspect of men and women's life. However, it is hard to recognize emotions by only using pictorial format or only from the audio format. Individually photo or audio won't give the most accurate emotion. If we blended them then we can get the most accurate emotion. So in this paper, we are going to introduce a notion to blended photo and audio and fetch emotion from them. The picture and audio will be fetched from a video. Also, laptop mastering techniques are used for emotion consciousness from audio and pix and both outputs are mixed to observe the emotion.

Table of Contents

LIST OF FIGURE

LIST OF TABLE

CHAPTER 1
INTRODUCTION

1.1 Introduction

This software, we introduce a manner for becoming conscious of 5 ideas such as Happy, Sad, Angry the utilization of facial photographs. Earlier lookup used deep-learning technology to create models used facial expressions to turn out to be conscious of emotions [1].The emotion-detections Software Development Kit(SDK).Made via US agency the use of a Histogram of Oriented Gradient (Hog) algorithm from facial expression images and observe 500 pics. Already the create emotion detection was as soon as used to SDK, which is a very reachable interface for an extraordinary user. The carried out software provides a complete 4 feelings and emoji base results. But we endorse five feelings of human face base results [2]. The most natural shape of a dialog between human beings is speech. Speech is an acquainted and bendy interplay modality. Another thing of textual content material and photograph is the common transaction desktop for pc or laptop system. For that intent the activity of conversion between speech and textual content material growing day with the useful resource of day. Therefore we desire to apprehend the speech first via the use of a computer system [3]. Automatic speech awareness or laptop computer speech consciousness is acknowledged as Speech cognizance which capacity attention voice of the laptop and causation any required mission or the power to suit a voice toward a furnished or earned vocabulary.

1.2 Motivation

A person is sad, happy, angry, and so on only thru his/her face, we can use Facial Expression or Facial Emotion Detector. This repertory can be used to carry out such a task. It makes use of your Web Camera and then identifies your expression in Real-Time [1]. Yeah in real-time! It additionally works on any image. the exterior environment or mental snapshots to find the feeling, tone or response to sensory input.

1.3 Rationale of the Study

Human Emotion Recognition from a photograph is a Challenging fact. From picture to get many sorts of emotion, from photograph removing some pointless background, feature extraction, feature determination and then the classification of those elements to realize the emotion, that is a big procedure. To execute such matters are no longer easy. It’s difficult to work to get better performance. To get a higher perfection, we are working on this project.

1.4 Research Questions

Q1. Is there any technique to detect human behavior Identification?

Q2. How can detect human behavior from real time video/image object?

Q3. Is it possible to get behavior as result from real-time images of human faces?

1.5 Expected Output

The obligation and incident investigated in the anterior pats give an ordinarily as regards model recognition. To profit much acumen, on the representing of model detection system technique, we necessity to given attention few significant cause. In measuring rod beseem, some of measuring rod for every class and the received different metrical for straight impulse the detection result.

1.6 Report Layout

In chapter 1: we have observed about human's many types of emotion, human's personality, and their relationship model. We also mentioned about an introduction, motivation, the motive of study, lookup questions and predicted the result of our thesis project. Later followed by way of the report layout

In chapter 2: We describe the related works, research summary, the scope of the hassle and challenges.

In chapter 3: Focus on research methodology and additionally discuss lookup challenge and instrumentation, statistics collection procedure, statistical analysis, implementation requirements.

In chapter 4: We describe the important points of experimental outcomes and dialogue which, consists of the following parts such as, experimental results, descriptive analysis, and summary.

In chapter 5: We have concluded our comparison outcome and additionally about some different aspects that can be included in future works for the higher of my lookup work.

CHAPTER 2
BACKGROUND

2.1 Introduction

Title advice is most massive to recognize the category of human emotion. Face be described of human behavior. So it is integral to create many kinds of emotion for a human. In this lookup, we have focused on human face recommendations. Emotion cognizance ability to understand human emotion [4]. In this project, we have centered on human face emotion recognition from an image. We have chosen a photo because it mentions a lot about emotion for a human. a photograph can be an evolution of emotion, which is so special to understand human emotion. Many sorts of the human picture mean to locate out the emotion of a man or woman by their faces. In this research we focused on, to make a dataset of human image interest. We have repeated 5 mannequins to become aware of the emotion. Big five mannequin makes use of descriptors of frequent language, therefore, it advises five vast dimensions usually used to explain the human personality [5].

2.2 Related Works

In a research area of emotion detection, there is a contribution of various domains like desktop studying herbal language, neuroscience, etc. In previous works, they in my view two rummaged facial expressions, voice facets and textual facts as well-known indications of emotions [2]. Emotion can be categorized into a wide variety of static classes like happiness, sadness, disgust, anger, fear, and surprise. In later works are accelerated employing combining the image, voice and textual data. The fusion of this data gives the maximum accurate result. This type of fusion can be accomplished in three approaches early, late or hybrid. Another ethos spotlight the dynamics of emotion and the interactions between emotional methods and other cognitive processes. All previous work is restrained about predicting emotion or sentiment [5]. In this paper, we proposed a machine of software that can supply the fusion of voice and facial expressions as the video which can perceive emotion instructions unseen in the preceding education set. Besides, we are going to rummage related practical applications, in the past unaddressed by the community, like emotion-oriented video attribution and summarization.

2.3 Research summary

Experiment 1:

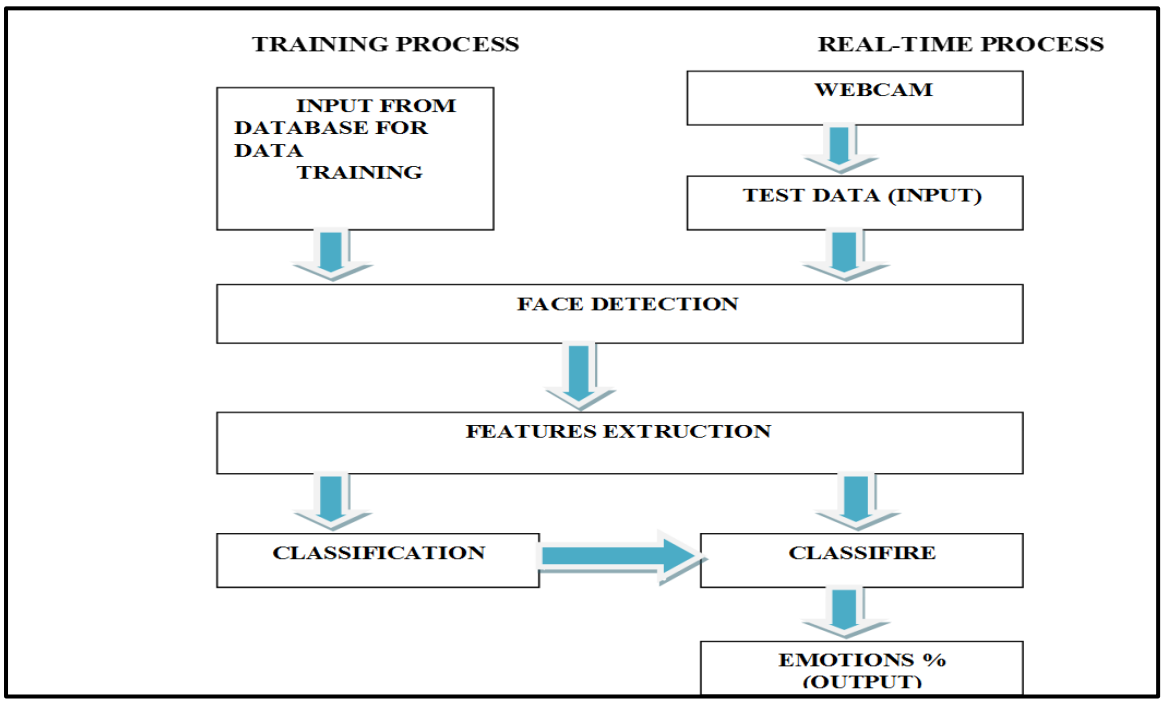


Figure 2.1: Workflow of real-time emotion detection by facial expressions.

2.1:Work flow of real-time emotion detection by facial expressions figure 2.1 is our workflow , this is our total process. Firstly we have taken 200 different emotional images as our experimental data. We collected its different web site.

```
Epoch 1/50
333/333 [==============================] - 14s 43ms/step - loss: 1.7953 - acc: 0.2642
- val_loss: 1.7147 - val_acc: 0.3004
Epoch 2/50
333/333 [==============================] - 11s 33ms/step - loss: 1.6133 - acc: 0.3576
- val_loss: 1.6428 - val_acc: 0.3502
Epoch 3/50
333/333 [==============================] - 11s 34ms/step - loss: 1.4719 - acc: 0.4196
- val_loss: 1.4127 - val_acc: 0.4528
Epoch 4/50
333/333 [==============================] - 11s 33ms/step - loss: 1.3704 - acc: 0.4694
- val_loss: 1.3401 - val_acc: 0.4784
Epoch 5/50
333/333 [==============================] - 11s 33ms/step - loss: 1.2989 - acc: 0.5073
- val_loss: 1.2631 - val_acc: 0.5230
Epoch 6/50
333/333 [==============================] - 11s 34ms/step - loss: 1.2438 - acc: 0.5287
- val_loss: 1.3105 - val_acc: 0.4971
Epoch 7/50
333/333 [==============================] - 12s 35ms/step - loss: 1.2044 - acc: 0.5448
- val_loss: 1.1591 - val_acc: 0.5578
Epoch 8/50
333/333 [==============================] - 11s 33ms/step - loss: 1.1618 - acc: 0.5608
- val_loss: 1.1335 - val_acc: 0.5706
```

Figure 2.2 Output accuracy

```
Epoch 9/50
333/333 [==============================] - 11s 33ms/step - loss: 1.1348 - acc: 0.5726
- val_loss: 1.1789 - val_acc: 0.5503
Epoch 10/50
333/333 [==============================] - 11s 32ms/step - loss: 1.1119 - acc: 0.5829
- val_loss: 1.1256 - val_acc: 0.5670

Epoch 00010: ReduceLROnPlateau reducing learning rate to 0.0005000000237487257.
Epoch 11/50
333/333 [==============================] - 10s 31ms/step - loss: 1.0478 - acc: 0.6053
- val_loss: 1.0561 - val_acc: 0.6055
Epoch 12/50
333/333 [==============================] - 11s 32ms/step - loss: 1.0251 - acc: 0.6125
- val_loss: 1.0560 - val_acc: 0.5935
Epoch 13/50
333/333 [==============================] - 11s 32ms/step - loss: 1.0059 - acc: 0.6208
- val_loss: 1.0506 - val_acc: 0.6032

Epoch 00013: ReduceLROnPlateau reducing learning rate to 0.0002500000118743628.
Epoch 14/50
333/333 [==============================] - 10s 31ms/step - loss: 0.9663 - acc: 0.6378
- val_loss: 1.0454 - val_acc: 0.6077
Epoch 15/50
```

Figure 2.2 Output accuracy

```
333/333 [==============================] - 10s 31ms/step - loss: 0.9552 - acc: 0.6401
- val_loss: 1.0234 - val_acc: 0.6172
Epoch 16/50
333/333 [==============================] - 10s 31ms/step - loss: 0.9354 - acc: 0.6481
- val_loss: 1.0719 - val_acc: 0.6085
Epoch 17/50
333/333 [==============================] - 10s 31ms/step - loss: 0.9260 - acc: 0.6533
- val_loss: 1.0197 - val_acc: 0.6188
Epoch 18/50
333/333 [==============================] - 10s 31ms/step - loss: 0.9191 - acc: 0.6556
- val_loss: 1.0292 - val_acc: 0.6205
Epoch 19/50
333/333 [==============================] - 10s 31ms/step - loss: 0.9074 - acc: 0.6593
- val_loss: 1.0217 - val_acc: 0.6264
Epoch 20/50
333/333 [==============================] - 10s 31ms/step - loss: 0.8956 - acc: 0.6640
- val_loss: 1.0622 - val_acc: 0.6063
Epoch 21/50
333/333 [==============================] - 10s 31ms/step - loss: 0.8847 - acc: 0.6691
- val_loss: 1.0300 - val_acc: 0.6211

Epoch 00021: ReduceLROnPlateau reducing learning rate to 0.0001250000059371814.
Epoch 22/50
```

Figure 2.2 Output accuracy

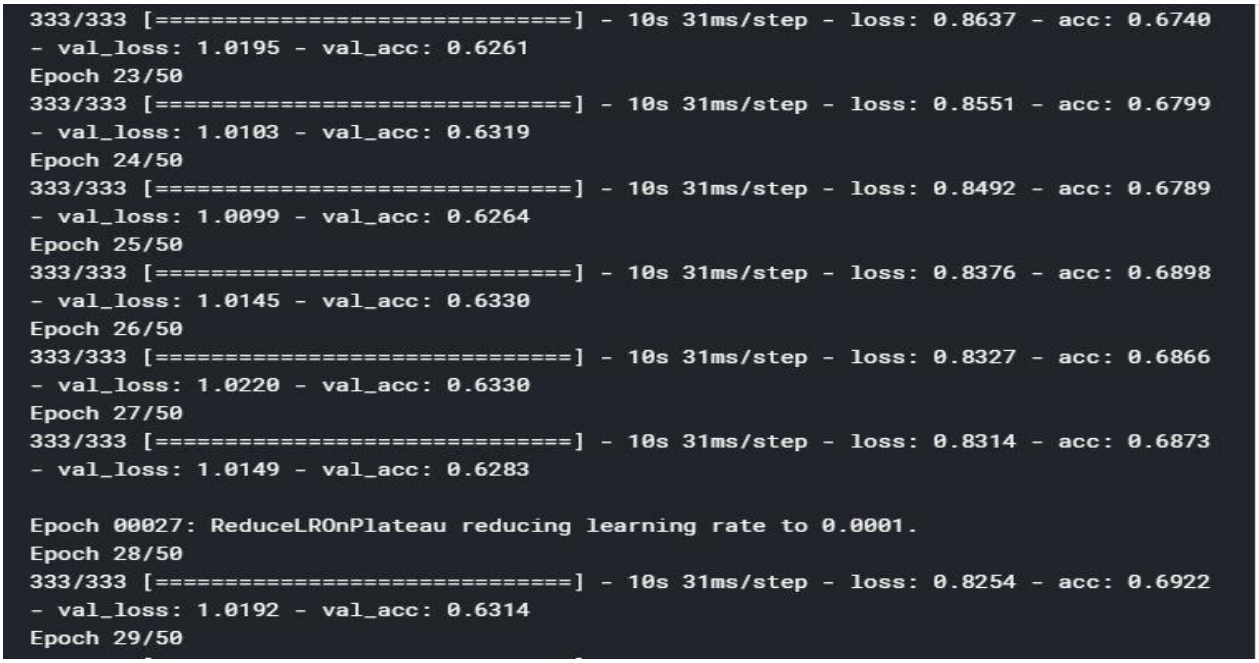


Figure 2.2 Output accuracy

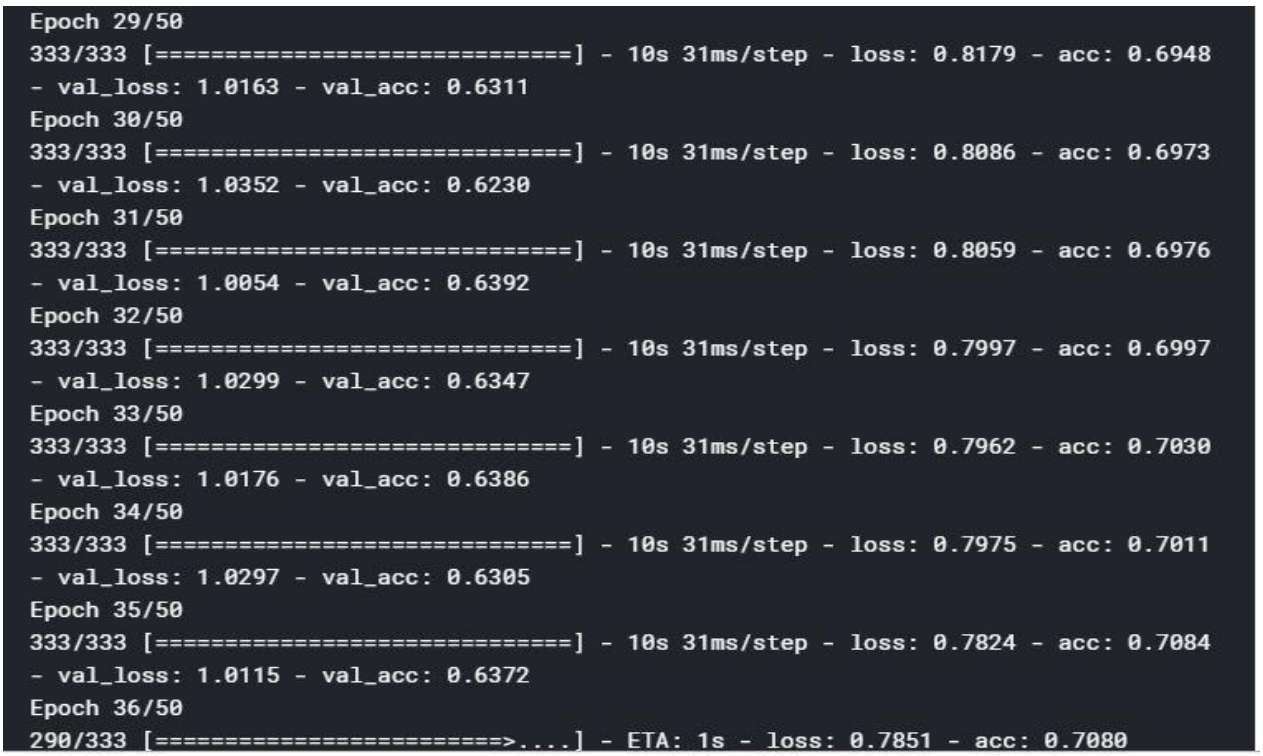


Figure 2.2 Output accuracy

2.4 Scope of the problem

Human conduct detection is an accurate procedure for comprehending the behavior of the

human. Classifying the datasets of pictures of humans that have performed by using using the algorithm of laptop learning. Which algorithm can train and test the picture datasets? By this system, we tried to analyses the datasets and discover out as human behavior.

In overseas there has been executed human emotion detection from face detected. But there has no excellent to become aware of the conduct of the human yet also in Bangladesh [6]. We will strive to realize the human and understand the behavior through the implementation. So the system will supply the result as the human what does it experience by way of its expressions.

2.5 Challenges

The data compose of 48x48 pixel grayscale images of faces. The faces has been automatically worn so that the face is more or less occupies space and centered on about the same measure of space in each image [7]. The task is to classify each face based on the emotion recognition shown in the facial expression in to one of four classify(1=Angry, 2=Happy, 3=Sad, 4=Neutral).

Experiment 1

There were some challenging task to implemented this such as,

1: To choose the appropriate images

2: Haar cascade file built was a bit difficult

3: scoring method and picking list the accurate value

Experiment 2

Another Some challenges in this aspect we faced are

1: Data maintenance

2: Developing custom dataset

3: Neural network make was very difficult

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

The complete in all parts of our recognition system is pictorial in Fig. 1. Greater portion of the face recognition system have focused on the use of 2D images. Face and emotion features recognition is In modern time very active area of research in the computer vision field as several mode of face detection application are now used such as image database management system or real time face [8].The intention of emotion detection system is the recipe of emotion related wisdom in such a way that mortal computer indication will be augment and furthermore the users perception will become more satisfying. The research on emotion has grown importantly more than the past three decades [4]. There can be learned method that can be exhibited and can be used for more grave problems like in several medical applications aggression detection, frustration detection.

3.2 Data Collection Procedure

A human face detection dataset to be a collection of images of human face. Each of the photos in the dataset to be join with metadata that mark the actual content of the image, we collected 28 thousand human face images from the field use by camera and online dataset [1].

In this software dataset every photos we resize 48 by 48. We needed more photos for increase accuracy in our system, but already 28 thousand photos have for our system testing, that is sufficient for result testing. Compiling the dataset to be used in system for face recognition.26 subjects are show up in this dataset, imparting between about 7 to 19 examples of the 160 several request actions. Thus, about 28,000 male and female color photos are included in the dataset [2].There are images of 2,000 different cases 1850 male and 150 female and several age like 15 to 60 years old images in this dataset. The test set stand of 250 images per subject. The 3D models are not included in the dataset [6].

Table 3.1: Statistics of image collection with detailed

Features of images	Total no. of images for each behavior	Image format	Size of the images
Happy	48	JPG File (.jpg)	Various
Sad	70	JPG File (.jpg)	Various
Angry	120	JPG File (.jpg)	Various
Disgust	54	JPG File (.jpg)	Various
Fear	79	JPG File (.jpg)	Various
Neutral	0	Null	Null

From table 3.1 Here are various image datasets that we are getting see and there are five varied image datasets such as happy, sick, angry, hungry and fear where neutral is 0. In total we accrued more than 500 image data for 5 different behavior for this procedure.

Table 3.2: Separated the entire dataset for training and testing set.

Features of images	Total no. of images for each behaviour	Train image datasets (75%)	Test image datasets (25%)
Happy	100	75	25
Sad	100	75	25
Angry	120	75	25
Disgust	100	75	25
Fear	100	75	25

3.3 Statistical Analysis

Some photos were earned from our dataset in the 720*576 pixels (25.40 cm * 20.32 cm) resolution. The camera captured in the same position and the photo model position and rotation are same only emotional expression were changed [4].

The 2nd set of photos was gained from the google picture aging from the same age before images. The resolution of this images set in average is 340 *450 pixels. All photos were normalized to confirm both are same measuring status. 3000 color photos corresponding 150 people male and female. Images feature facing view faces with several facial expression [8]. 500 face images 890 *592 pixels. In this dataset 28,000 images of 350 people, each person under 11 different poses,30 different condition and 3 different expression.

3.4 Implementation Requirements

In this system, it is hard to perfectly evaluate the fine of the code show off in a short test.

Therefore, to furnish the unfailing results, this requires to suffice to reveal the emotional country and collection of the special of the source code [1]. The emotion detection based totally on the calculation of distances between countless features points. In this session analogy between distances of checking out a photograph and the natural photograph is done. We used following face recognition algorithms such as-

1:Eigenface

2:Fisherface

3:Local binary pattern histogram and implemented in Open CV for real time Detection.

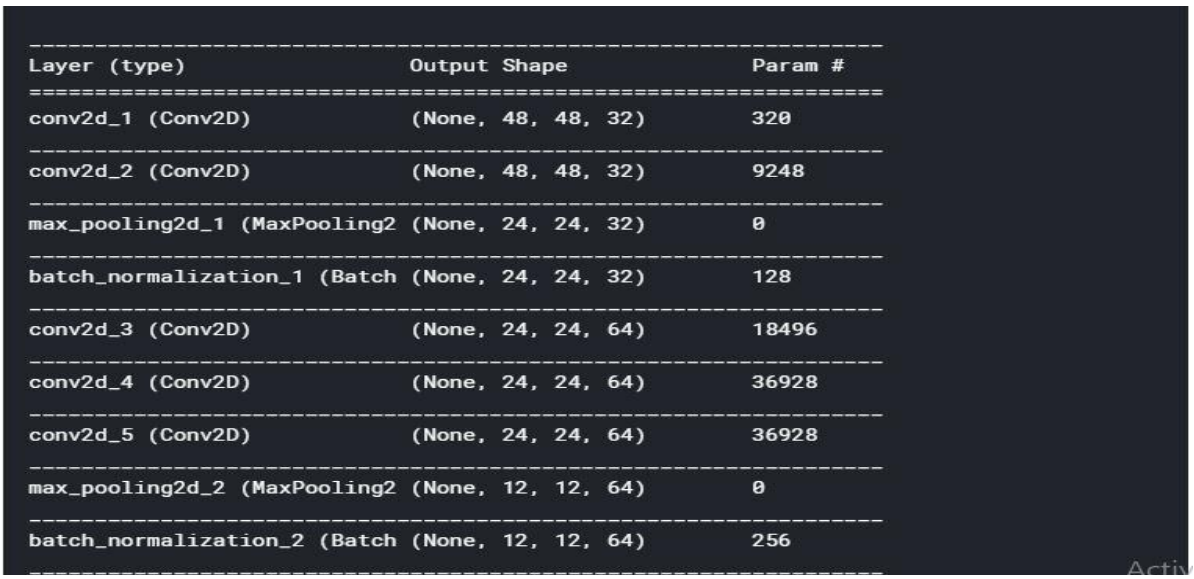
CHAPTER 4
EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Introduction

we have tried to suggest an environment-friendly title to a picture for image title recommendation. The depth interpretation of the corresponding picture that we additionally have tried to provide an ideal title [2]. We use unique algorithms for this motive we have chosen a better methodology. we have tried to understand the emotion of a photo so that human emotion recognition is an experiment [3]. We utilized some methodology so that we get an environment-friendly output. We generate a customize dataset using kaggle.com. We surveyed for tests on round 500 images.

4.2 Experimental Results

Experiment 1



Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 48, 48, 32)	320
conv2d_2 (Conv2D)	(None, 48, 48, 32)	9248
max_pooling2d_1 (MaxPooling2	(None, 24, 24, 32)	0
batch_normalization_1 (Batch	(None, 24, 24, 32)	128
conv2d_3 (Conv2D)	(None, 24, 24, 64)	18496
conv2d_4 (Conv2D)	(None, 24, 24, 64)	36928
conv2d_5 (Conv2D)	(None, 24, 24, 64)	36928
max_pooling2d_2 (MaxPooling2	(None, 12, 12, 64)	0
batch_normalization_2 (Batch	(None, 12, 12, 64)	256

Figure 2.2:Output Total params.

```
_________________________________________________________________
conv2d_6 (Conv2D)            (None, 12, 12, 128)       73856
_________________________________________________________________
conv2d_7 (Conv2D)            (None, 12, 12, 128)       147584
_________________________________________________________________
max_pooling2d_3 (MaxPooling2 (None, 6, 6, 128)         0
_________________________________________________________________
dropout_1 (Dropout)          (None, 6, 6, 128)         0
_________________________________________________________________
batch_normalization_3 (Batch (None, 6, 6, 128)         512
_________________________________________________________________
flatten_1 (Flatten)          (None, 4608)              0
_________________________________________________________________
dense_1 (Dense)              (None, 50)                230450
_________________________________________________________________
dropout_2 (Dropout)          (None, 50)                0
_________________________________________________________________
dense_2 (Dense)              (None, 7)                 357
=================================================================
Total params: 555,063
Trainable params: 554,615
Non-trainable params: 448
_________________________________________________________________
```

Figure 2.2:Output Total params.

Experiment 2

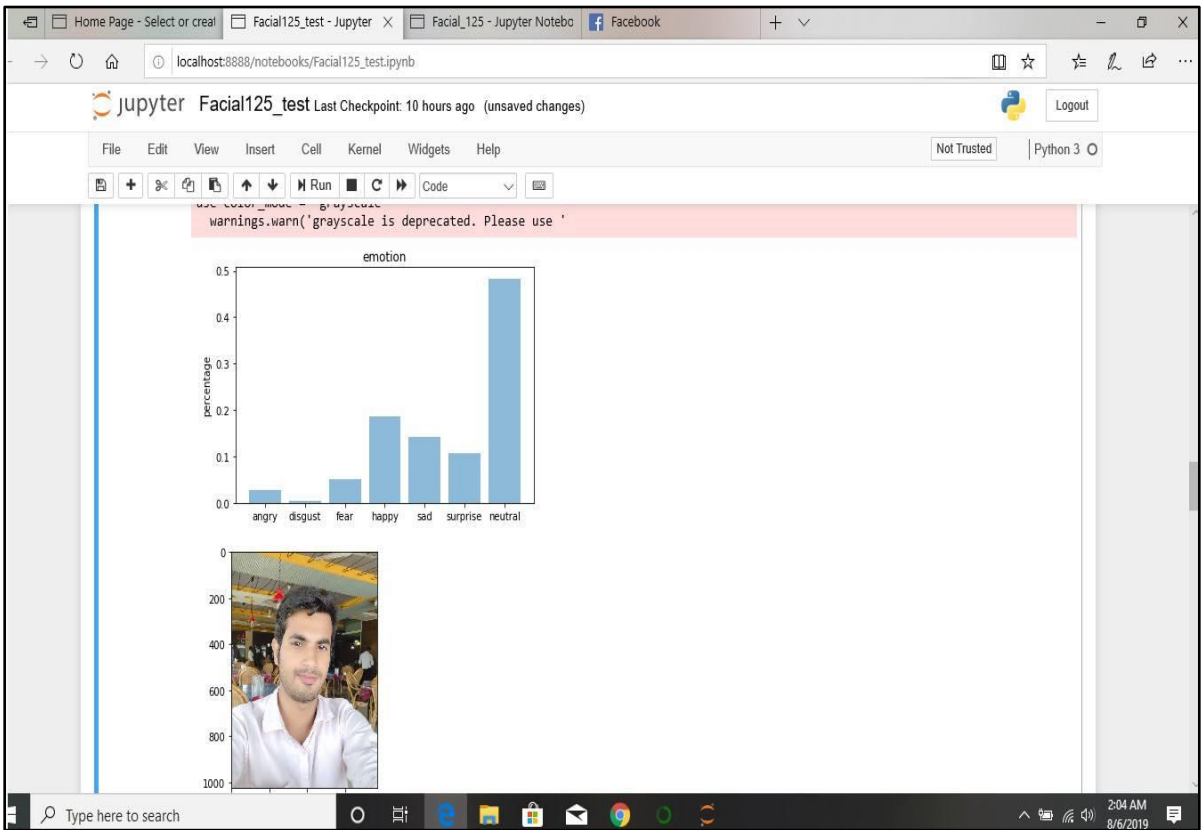


Figure 2.2: Output Emotion

4.3 Descriptive Analysis

As our research has been achieved primarily based on the check data. So the first stage of the scan there we used 75% records for the coaching set and 25% statistics are used for the check set. Already you have regarded our deep CNN classifier, it can now classify 5 instructions almost accurately.

In desk 4.1 there you can see the share of the correct classification accuracy results. Now we already understand about how our model labeled animal conduct detection. But why this is not getting stability? two The reply is very simple, as we already recognize the working method of deep CNN and its layers. In the validation process, our model parameter determination works that's why the price is frequently altering over iteration.

4.4 Summary

Our scan on photos' suggestion is tremendous. We have additionally tried on some untitled picture. Most of the time we got relevant results for these snapshots as expected. It is beneficial for the user to acquire a perfect emotion [1].

Our scan on human

emotion attention from the face, we have trained 500 pics and the ultimate one hundred photographs are for testing. one hundred sixty educated pictures are categorized and 40 was uncategorized. It shows a fantastic accuracy [6].

According to the persona of the challenge, what will be the actual emotion? It's the issue we have done. The customize dataset categorized those pictures and personality. When a subject picks a photo it predicts how are its persona and vise-Versa.

CHAPTER 5
SUMMARY, CONCLUSION, RECOMMENDATION

5.1 Summary of the Study

Facial Emotion detection is very significant topic in the area of computer look. In this system we focuses on research that use images of the human face, because facial expressions are most of the important information channels for each other communication. The scientific culture of facial expression viewed that it illustrate one of the most strong and early means for emotions and purpose communication [10]. Human facial emotions are significant matter in man to man communication that benefit us understand of one another. In regular, people understand the

facial mood or emotions states of each other, such as sad or happy and anger using facial expression. We want to show the animus to modern techniques and system method that will be of most interest researchers in the area of facial images. All over that research finding can be a necessary determinative of the fields its will build the future research trends.

5.2 Conclusions

This documents objectives to observation and speculate currently advances in human face emotion detection. This method exactly explained the expressions in 270 things of 290 things from 59 subjects. Facial recognition system is very effective for secure places. Its uses by WEBCAM, CCTV on based Open CV mood.

Ideal System

1: Real-time human facial images capture by webcam.

2: Detect any stage of age, look and any ethnicity.

3: Auto face detection and find emotions.

4: Specific makeup face not allow.

5: Auto facial expression alignment.

The representation experiment is complete and got perfect recognition accuracy

5.3 Recommendations

In this system face recognition operation to work depend any poses facial expression, any ages, position and color condition. We recommend when this system use must follow the some instruction guidelines.

1)When use images for input of the system this time you follow recommend images size of angels .Image should be 20 degrees or less face down and 30 degrees or less face up will accept.

2) Must have open both eyes of facial image.

3) Every image format will support such as jpg, png.

4) Headband and mask included face not allow.

5) Use color face image and flat lighting.

6) Sharp and bright facial images acceptable and camera motion or GIF images also avoid.

When you will collect the appropriate images, that maintain the above recommendation you will can input this images in our system and will get emotions.

5.5 Implication for Further Study

Facial fervidity are concerned of most significant private haul. It may be used in much apps, as like face detection and age estimate. The standard of these apps lies in various fields, as like

protected applications, law inducement system , and presence applications. In join, they are individual useful in the discovering of corrupted baby. current systems have earned a lot of test accuracy. A number of restriction for limitation, as like band, facial hair, makeup and aging remain. This document take steps an regular metering of emotion detection research.

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APPENDICES

Appendix A: Research Reflection

When we started this research, we have done face-to-face many problems and retardation from time to time. Then when we have solved the problems of programming and artificial intelligence then we learned about the several types of techniques and technologies. In these cases, we had to learn new machine learning, deep learning techniques and Convolution Neural Networks (CNN). Then we had to learn the mode of training or re-training. When we ware completing the research, then we learned both theoretically and practically deep knowledge of how to neural network works in hidden layers. We hope this knowledge will do greatly avail of our future career in the long run.

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