Facial Expression Detection using Machine Learning

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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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DHAKA, BANGLADESH

JANUARY, 2021

APPROVAL

This Project/internship titled **''Facial Expression Detection using Machine Learning''**, submitted by **Md. Tawhidul Islam, Id: 171-15-9191, Asma Sadia Akhi, Id: 171-15-8757, Nusrat jahan Eva, Id: 171-15-8937** 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 28 January, 2021

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DECLARATION

We hereby, declare that, this project has been done by us under the supervision of **Mr. Sheikh Abujar**, **Senior 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 the award of any degree or diploma.

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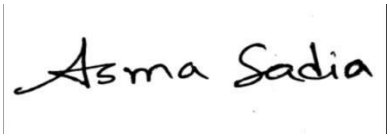

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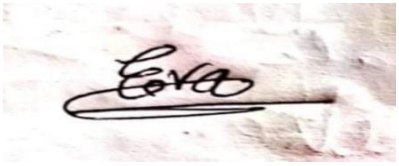

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ACKNOWLEDGEMENT

At first, we explicit gratitude to almighty Allah for his perfect gift to makes us conceivable to finish final year project phase successfully.

We would like to thanks our supervisor **Mr.Sheikh Abujar** for his proper advice to complete this excellent research work for the **Facial Expression Detection using Machine Learning**. His support and instruction provided us with the courage to complete this research project accurately. He served us all related resources and relevant information to do this research for the “Facial Expression Detection”.

We are truly a gratitude to our department head, **Proffesor Dr. Touhid Bhuiyan** for his valuable support to do such kinds of research work in the "Facial Expression Detection". Also, we like to thank other faculty members and the staff of our department for theirsupports.

We are very thankful to our **Machine Learning Research Lab**&**Machine Learning Boot camp** to provide us with instruments and gives facility to complete this research work.

Finally,we thank and gratitude to our family and friends fort heir suppor and the inspirationus to finish this research work successfully.

ABSTRACT

Now-a-days people are very much comfortable with images, anything in an image is representation of something. Also a human face is representation of a facial expression. From a human image we can find facial expression and emotion. A single person face can be detected easily in modern science. But it is difficult to find expression of emotion. Sometimes, it is hard to hard find exact facial expressions or emotions even from a still image. To solve this problem machine is the best solution. As a part of machine learning, facial expression detection is a large field of research. Our research work mainly focused on represent the facial expression or emotion of a human.If the object in a picture is a human being, it will read the facial expression of that human object and represents that expression in text like sad, happy or normal. In our work, we've tried to establish a system which can easily represent a facial expression from an image, if the object is human then read the facial expression. Facialexpression detection was a very challenging part of this research. The dataset used is collected from online platform. Machine Learning method is used to make our system, in this system we try to train the dataset and expect the output on facial expression detection.

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LIST OF ABBREVIATION

ML	Machine Learning
Mask-RCNN	Mask Regional Neural Network
CNN2D	Convolution Neural Network 2D

CHAPTER 1
Introduction

1.1 Introduction

The field of Computer Science is filled with so many sectors of working. Some fields are becoming famous gradually. Facial expression detection is one of the hyped one among them. Use of facial expression or emotion detection in computer science fieldis increasing at the current time.

Facial expression detection is something through which it is possible to understand easily, what the human is expressing. It is another version of understanding emotions. Because, human expresses their emotion through facial expressions. Machine is something which shows the things which is trained already. But human being is not like that. Different human being does different things to express same things.

Emotion detection is a big challenge. Emotion is one kind of human computer interaction. As, Computers are traditionally viewed as logical and rational tools, sometimes it founds illogical nature of emotions. We human can easily understand feelings. We are good at expressing and understand emotions. But also we are not sure about how to define it on the best way. So basically it's a great challenge to detect or recognize emotions technically and represent it through text.

Our research work can detect facial expressions of human from images from human reactions. And, then it will represent it through text. As it's a machine learning research work, no machine can give accurate 100% results every time. But we can obtain a maximum satisfactory result. Our system is also like that. As, it is hard to recognize for computer to understand all expressions of human. So it's not able to give 100% accuracy.But will give a satisfactory one.

1.2 Motivation

Text representation makes it easier to understand anything without seen it. In a single image we can find so many objects, sometimes human, and also different expression of human. For finding every expressions, we need to see images properly and very much carefully. And also if we want to find every expressions of human beingit is quite difficult.

And if in a image there is a human and he is giving some expression to telling his emotions, then it will be easier to find the exact expressions. People who have eye problems, especially old people or special child's can't see images properly. Then this text representation will help them to understand it easily. Facial expression understanding is also important. People who can't understand expressions or emotions easily this system will help them to understand this.In fact in robotis, understanding facial expression of human is important. Robots are unable to understand human expressions. Text representation is easier to find exact one.

In today's era image representation is very much popular. For many purpose we use images. But as said earlier not all people can understand every images. So, this tool will help them. Emotion detection will help to understand one person feelings easily.

ML will help to do all this research together. We get motivated for people who are unable to see images and find objects from images.

1.3 Rational of the study

Previously it was difficult to see everything in images, but now image is too much common for so many works. And to detect facial expression was very much rare. Some works are done previously but not with different types of expressions. Detecting various facial expression was way more difficult. ML tools and techniques makes it easier to detect every single emotions of human from image. But dataset for every facial expression for emotion of human is rare. There

are some available data, but these are not sufficient to for the work. And no work has been done on all expression or emotion of human. To find all possible expressions we need lot of data. So our first goal is to train the system with more and more data. And sorting them according to our needed work is second approach. As, very small amount of work has been done on this topic, our work is slightly different from others.

1.4 Research Questions

- What is Facial expression detection?
- How facial expression detection works?
- What are the benefits of facial expression detection system?
- What are the future works of detecting facial expression?
- How facial expression detection Model works?

1.5 Expected Output

As we are working on a research project, our main target is to publish the research paper related to this work. Working on a research paper is always a continuous process. For finding an effective and efficient solution, people analysis many specific research topic. Then developers work for tools to the related topic. The maximum number of research works and tools are developed for only finding face parts, as it use in face recognition. And also many researcher doesn't share dataset of their work. As a result, it is difficult to train all possible expressions to the system.Facial expression detection is kind a new work.Some research work had been done on this before in a small dataset. But the output of those systems was not satisfactory. The machine will be train with the datasets and then it will compare the targeted image and will show the text representation. In this research, we introduce a machine learning method for facial expression through text.

1.6 Report Layout

In this report have a total of 5 chapters. Chapter 1 contains an overview of the whole research work. It has some sections such as 1.1 Introductions of the work, 1.2 Motivation of this research, 1.3 Rational Study of the search, 1.4 Research Questions, 1.5 Expected Output and 1.6 Reports Layout of the research. In Chapter 2 we have discussed about Background Studies of the research and its subsections are 2.1 Introductions, 2.2 Related works, 2.3 Research Summary, 2.4 Scope of the Problem, 2.5 Challenges. In Chapter 3 we have discussed the whole Research Methodology with subsections 3.1 Introduction, 3.2 Research Subject and Instrumentation, 3.3 Data collection procedure, 3.4 Statistical Analysis of Datasets, 3.5 Implementation Requirements. In Chapter 4 Experiment and Results of the research are discussed and the subsection is 4.1 Introduction, 4.2 Experimental Results, 4.3 Descriptive Analysis. Chapter 5 contains the Conclusion and future works of the research with the subsections 5.1 Summary of the Study, 5.2 Conclusion, 5.4 Implication for Further Study. End of all section given the references which helped us in our research work.

CHAPTER 2

Background Studies

2.1 Introduction

Facial expression or emotion detection is kind of a new work. Because, before that there is a work of face recognition. Through, which only face was detected for security or log in or entry to somewhere. In fact now-a-days we use it for opening a smart phone lock screen. ButThrough this detection it will be easier to understand human's emotion properly and quickly. As humans are full of emotions and expressions it is quite obvious that there will be lot of images or we can say data's to find out the real one.Facial expression is not only a picture of something, but also it helps to understand what the opposite person is showing or thinking in their mind. In a still image, expression is captured of a sudden moment and it gives a expression of emotions. Every human being is filled with so many emotions.

Here, we are going to see some figures to understand it at a glance.

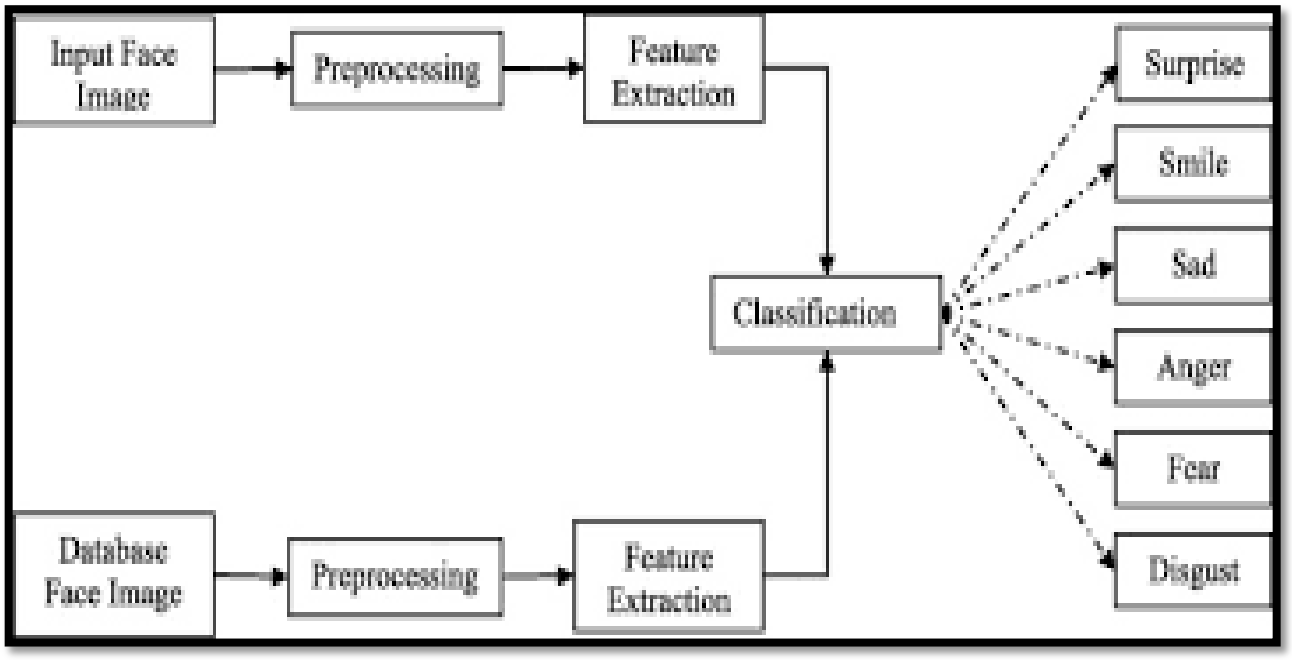


Fig: 2.1.1: Facial expression detection.

This is a figure for facial expression detection. We will see another one to get clear about it.

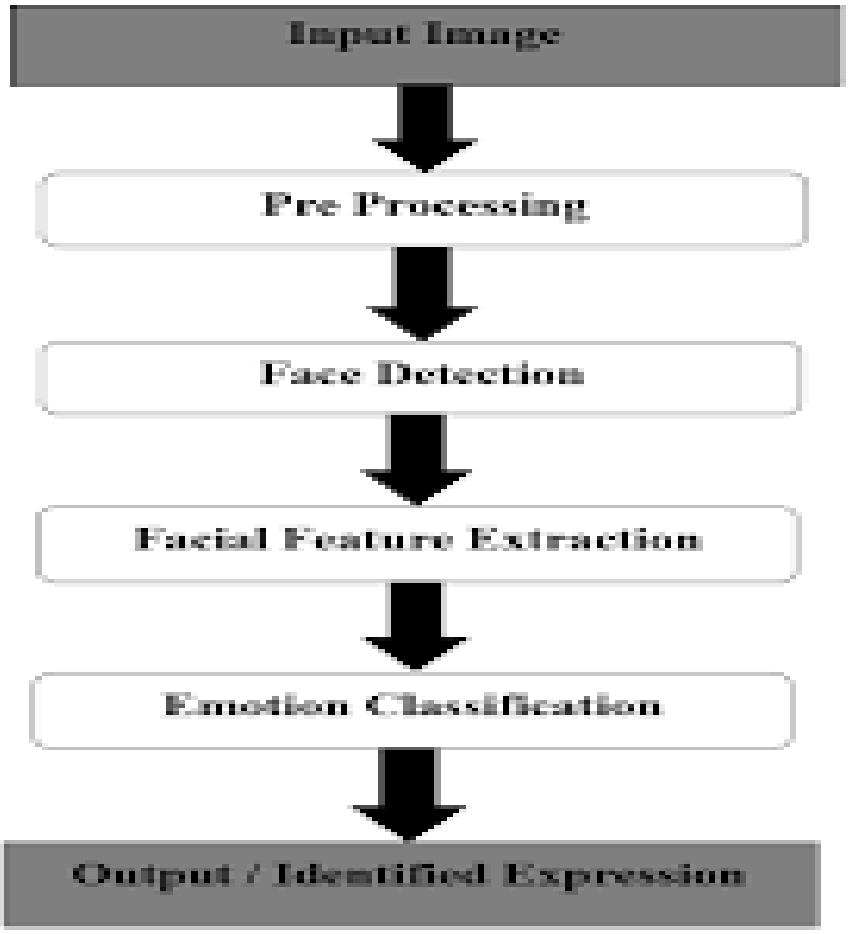


Figure 2.1.2: Process of facial expression detection.

We can say that facial expression detection is very important part of human emotion detection. Where it is difficult for human to find it machine will easily detect it with its train model.

2.2 Related Work

Text representation by detecting object is one of the famous subject of machine learning. In fact many research are held on facial expression detection also. Many noble works are done in this field. But most of the papers are done on single detection. In this section we will try to know about some noble work in this field.

Spontaneous emotional facial expression detection in 2006, Z Zeng work on human's emotion change when speaking with automatic recognition in human computer interaction [1]. Emotional Facial expression detection in the peripheral Visual field in 2011 by Dimitri J.Bayel where they work on gender emotion compared processing with facial expression processing [2].A human facial Express recognition based on face approach in 2015 by A De and team, worked on his proposed model with categorized facial feature of different faces [3]. Facial expression analysis, Fernando De la Torre and Jeffrey F. Cohn 2011, work with fundamental approaches to facial measurements by behavioral scientists [4].Object counting and instance segmentation with image level supervision in 2019, H Cholakkal and team predict the global object count and rely on additional instance level [5]

2.3 Research Summary

In our research, we tried to introduce a methodology for facial expression detection. We use machine learning to build a model. Firstly, we gathered data set from internet and also collected different pictures of different objects. Then we sorted data according to the wanted output. For example sorted images where there is a happy face and use it in the system. Before creating and applying the process of machine learning we processed all datasets.

In the preprocessing stage, at first we collect data add sort them and remove unusualdata from the dataset. After pre-processing,we can count the number data in the dataset. Then, we train our dataset. Apply the required algorithm. In this model, it is kind of an image processing work. So here we apply that type of algorithm. . Then we found a good reaction from the machine

2.4 Scope of the problem

Facial Express detection remains a challenging task. In machine learning there is so much new approaches. In face recognition Convolutional Neural Network were used. But in facial expression recognition it is important to find the emotion of that human. This research will help robot to understand the human emotion in future. In fact in computational simulations and animations where there will be facial expressions it will be also defined. This research aims is to find the solution of facial expression detection by dividing the problems into sub problems such as classification and specific facial feature. As, this solution will represent in text. If we talk about more scope then including facial expression it will be use for human face parts detection and more broadly human body parts. So this is another new helpful for the world.Mask Regional Convolutional Neural Network (R-CNN) is the new extension for object detection algorithm. This work is called Instance Segmentation. In fact Facebook AI are also working on tools and techniques of instance segmentation to identify each object from an image. And these techniques are improving day by day. In future business industries will also require this kind of tools and technologies.

2.5 Challenges

Structured data of face detection was slightly available and it depends on a single person picture. Facial Express detection data's were unstructured. So, collection of data was quite difficult in this research. There are some datasets but that are not enough to find enough possible expressions. So also need to search and click picture and structure them. Then we train the system with datasets. Facial expression detection datasets are not available properly. Human makes lot of expression. Every expression defined something new emotion. Different human being has different gestures. So train the system with this different sort of data was difficult. And for text representation we also process the data's in many categories. In small images it is quite hard to find the exact expression. And if there is so many people in one picture then it was also challenging.

CHAPTER 3

Research Methodology

3.1 Introduction

In this research methodology section, we are going to discuss about the complete methodology of our research work. Every research work has different problems and different and unique solving techniques. Methodology part is included with all approaches of applying. Here, we are going to going to discuss about the application and using of the model in detail, along with the short descriptions of each of the individual parts. In our research work, we used machine learning to train the system. Machine learning algorithms are used in the research. We will discuss it also.

For machine learning model we need proper dataset to find an exact result for the system. Before using all algorithms, we need to collect the dataset and it should be processed also.
Every methodology section will be discussed individually in full part. The all sections are followed for the completion of the research work. The efficiency and nobility of work increase when there is a better explanation of methodology. Graphical view and mathematical equation are used to make understand the whole model work easily. And also for further research good methodology explanation is needed.

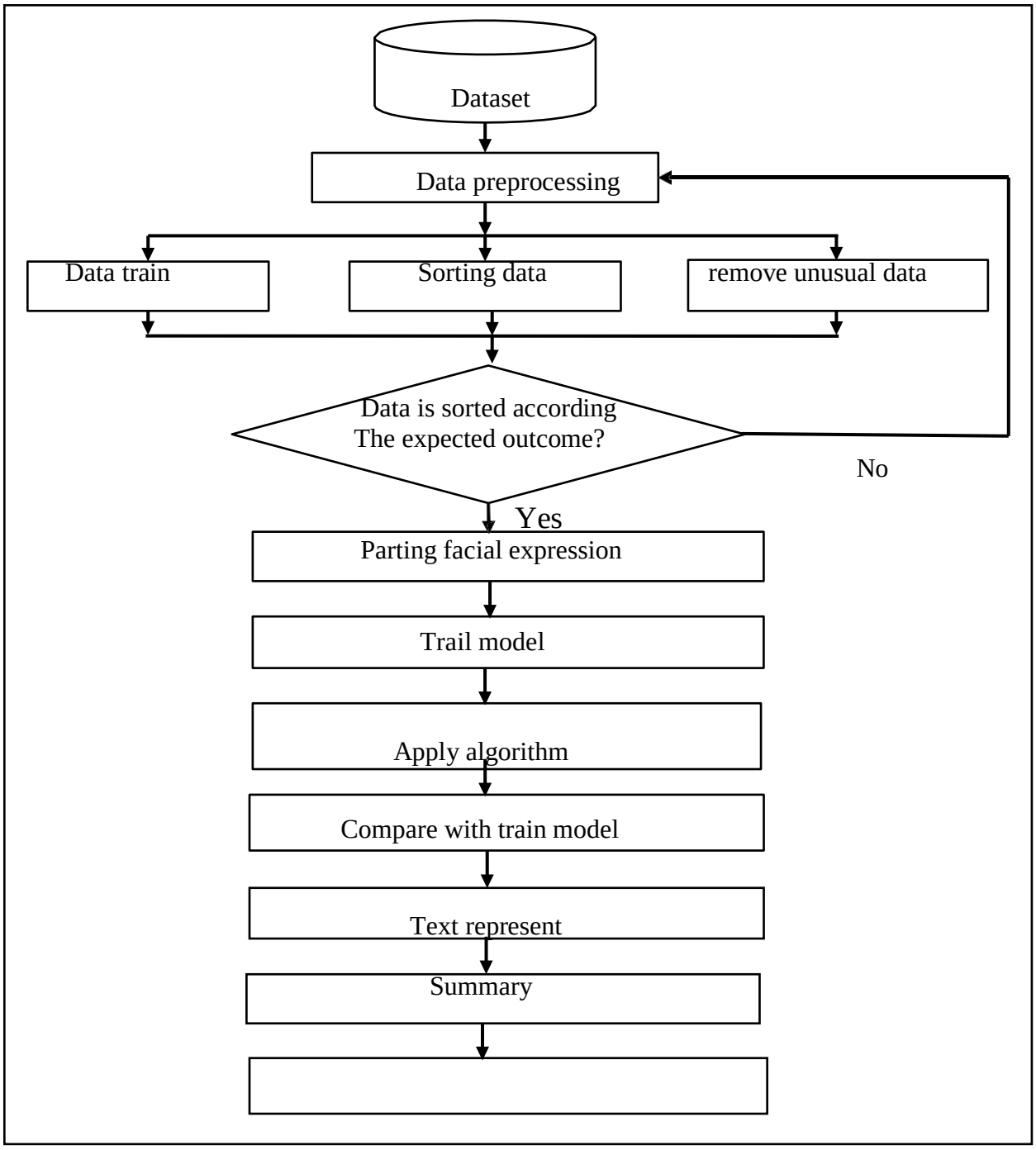


Figure 3.1.1 Working process of facial expression detection

3.2 Research Subject and Instrumentation

The name of our thesis topic is "Facial Expression Detection using Machine Learning". This is one of the key research field in Machine Learning. We already discussed the process for facial expression detection theoretical process techniques. A machine learning model needs high configuredPC and other instrument.

Here, we are giving a list of used instruments of this model.

Hardware and Software:

- Intel Core i7 7thGeneration
- 1 TB HDD
- Used GPU = Nvidia GTX1660 Super
- Cuda Core = 1408
- Gpu memory = 6GB
- Cuda Compatibilty = 7.5
- Ram = 8GB
- Google Colab with 12GB GPU and 350 GB RAM

Development Tools:

- Windows 10
- Python 3.8.3
- Tensorflow == 2.3.0 Backend Engine
- Matlab
- Pandas
- Numpy
- Keras
- Visual studio

3.3 Data collection and Data pre-processing

For this research purpose we used our own collected datasets. All data sets collected from different sides, google images, human faces, facial expressions images. But we faced some complexity with collected data's. So we used some data's which we collect personally. After collection of data we sort them according to various expressions. Then we preprocessed all dataset and produced a clean

one model to find result.

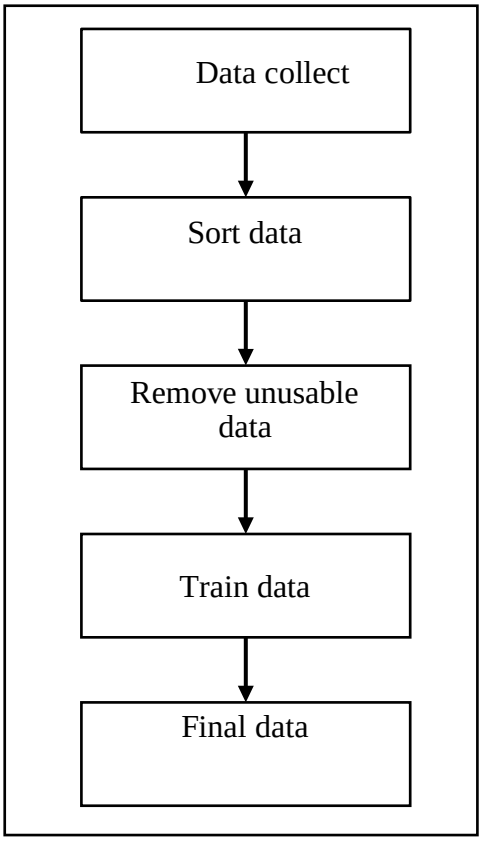


Figure 3.3.1 Dataset pre-processing

3.3.a Data Collection

All required data are firstly collected from different sources. And also used some google images and some data's are created by us. This dataset will be used by ML to make the model.

3.3.b Sort Data

Data which are collected from different sources are mostly unsorted. So we need to sort them according to our work purpose first. Otherwise system can't give the result.

3.3.c Remove Unusable Data

When we work with any dataset. maybe we collect it from different sources. But the data we collect, all are not usable for our work. So we need to delete them

3.3.d Train data

After doing previous work we done our train part. Here we will train dataset to model of our system. With this process model will train with the dataset.

3.3.e Final Data

After completing the previous steps, we will get our expected one.

3.4 Statistical Analysis

1. The total number of data was approximately 14300. 14300 data have 3 subsections such as facial expression.
2. CNN input size cell was 2304.
3. Neuron layer number was 6
4. Model Learning rate was 0.001
5. Dataset is image file and then convert it in numpy set and save as CSV.

3.5 Implementation Requirements

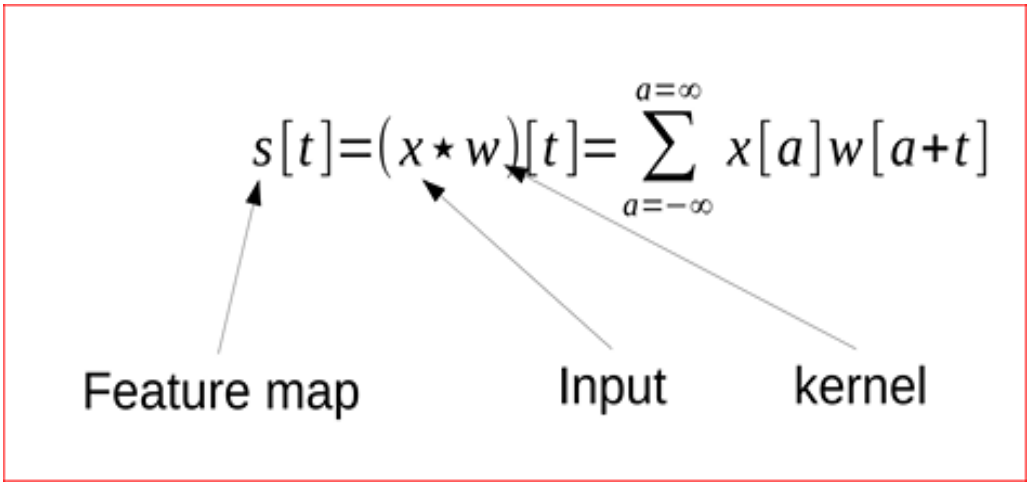
3.5.a. Problem discussion

In the dataset, there are many types of data. All for facial expression detection. But the expressions are different. This three types of data will give expected output. But here, expression is same kind of data. Because human expression are so many. In fact for a same expression individual human does individual act. So we need to classify all according to similarity.

3.5.b. CNN Algorithm

Here we used CNN algorithm for the datasets. Through this datasets we will train all data to the system. Thus the system will compare images with the train data. CNN helps to reduce the time for

train data. This is one of the classifications algorithm. It is convenient for its high accuracy.



3.5.c. CNN2D

Convolution Neural Network 2D which is perfect model for this facial expression detection. It can works with height width. So for facial expression it will compare with image. It is best possible solution for facial expression detection.

For a 2D image H and 2D Filter(kernel) F,

(1) Convolution Operation : G $= H * F$

$$G[i,j] = \sum_{u=-k}^{k} \sum_{u=-k}^{k} H[u,v]F[i-u,j-v]$$

(2) Correlation Operation : G $= H \oslash F$

$$G[i,j] = \sum_{u=-k}^{k} \sum_{u=-k}^{k} H[u,v]F[i+u,j+v]$$

CHAPTER 4

Experimental Results and Discussion

4.1 Introduction

Facial Expression Detection is quite Difficult and challenging portion in Machine Learning Sector. For lack of Dataset, average and similar type of data makes more complex this problem. We collect our data from various sources and quantity is near about fourteen thousand data. After that we process and modify our data by our self. Here we use "Jupyter Notebook" as a platform to implement our coding part. We use this platform to prepare, train and test data beside we need to install some library function also as like: opencv, numpy, sklearn, tqdm, tensonflow==2.3.0, python 3.8.3, keras, face recognition, pyppeteer, cmake, and some other library function. Here our data is in image format that why we use here keras and tensonflow.We train Data from Main Directory which is our Main Image and after train those data we store then into Train Directory which is train data. We processed data from all folder and store them in Train Directory, here have also specific name of folder. We convert it as a numpy set and save as CSV file. After generated a CSV file we try to analysis our dataset whether have any bugs or not. There must need to calculate the mean value of height and width because we need to set our train data's height and width. After that we convert our data in machine untestable format which binary (0, 1) Then we make a sequential model to implement our idea, and that model in CNN2D (Convolution Neural Network 2D) which is perfect model for this facial expression detection. Then we compile and save our model. Then we calculate our model accuracy and model loss. Here we work on a huge number dataset that's why we get better accuracy and less model loss. We use CNN algorithm which is best fast and reduce our train time. Value of the parameter which we used in the implementation portion:

Batch Size = 10

Epoch = 10

Set the CNN input cell size = 2304

Number of Neuron Layer = 6

Model Learning rate = 0.001

Probablity rate is = 0.95-0.98

4.2 Experimental Results:

We don’t get full accuracy from machine but we get a standard accuracy which is 98%. We get a good result from our model but it’s not good for other values. Here dataset is responsible for this problem because some facial expression are quite similar to other. Sometime it’s difficult to recognize whether it is disgust or angry, that’s why we couldn’t get the full accuracy.

For train our dataset we calculate our mean value of height and width, which is shown as a graph

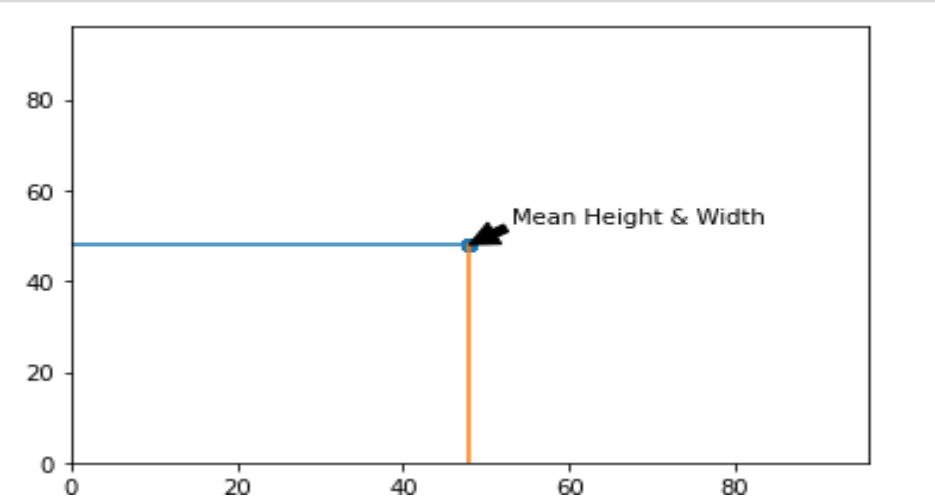


Fig 4.2.1: Mean height and width graph

By using CNN2D we build a sequential model, which is perfect for our experiment

```
model = Sequential()
model.add(Conv2D(64,(3,3),activation='relu',input_shape=x_train[0].shape,name='block1_conv1'))
model.add(Conv2D(64,(3,3),activation='relu'))
model.add(BatchNormalization())
model.add(MaxPooling2D((2, 2), strides=(2, 2), name='block1_pool'))
model.add(Dropout(0.2))
model.add(Conv2D(128, (3, 3), activation='relu', padding='same', name='block2_conv1'))
model.add(Conv2D(128, (3, 3), activation='relu', padding='same', name='block2_conv2'))
model.add(BatchNormalization())
model.add(MaxPooling2D((2, 2), strides=(2, 2), name='block2_pool'))
model.add(Dropout(0.2))
model.add(Conv2D(256, (3, 3), activation='relu', padding='same', name='block3_conv1'))
model.add(Conv2D(256, (3, 3), activation='relu', padding='same', name='block3_conv2'))
model.add(Conv2D(256, (3, 3), activation='relu', padding='same', name='block3_conv3'))
model.add(BatchNormalization())
model.add(MaxPooling2D((2, 2), strides=(2, 2), name='block3_pool'))
model.add(Dropout(0.2))
model.add(Conv2D(512, (3, 3), activation='relu', padding='same', name='block4_conv1'))
model.add(Conv2D(512, (3, 3), activation='relu', padding='same', name='block4_conv2'))
model.add(Conv2D(512, (3, 3), activation='relu', padding='same', name='block4_conv3'))
model.add(BatchNormalization())
model.add(MaxPooling2D((2, 2), strides=(2, 2), name='block4_pool'))
model.add(Dropout(0.2))
model.add(Conv2D(512, (3, 3), activation='relu', padding='same', name='block5_conv1'))
model.add(Conv2D(512, (3, 3), activation='relu', padding='same', name='block5_conv2'))
model.add(Conv2D(256, (3, 3), activation='relu', padding='same', name='block5_conv3'))
model.add(MaxPooling2D((2, 2), strides=(2, 2), name='block5_pool'))
model.add(Flatten())
model.add(Dense(128,activation='relu'))
model.add(BatchNormalization())
model.add(Dropout(0.5))
model.add(Dense(y_train.shape[1],activation='sigmoid'))
```

Fig 4.2.2: Sequential Model

Our model is train by 100 epoch that time we can reduce our lose 0.020

```
In [51]:

batch_size =10
epoch = 100
```

At the beginning of train our model the accuracy was low but loss is maximum, but after sometimes accuracy level increased and loss level decreased. At the starting moment accuracy was 20% and loss was 0.4473 after sometimes at mid-point of model accuracy was 905 and loss 0.0469. At the ending of the model we get near about 98% accuracy and loss 0.0202

```
Epoch 2/100
1149/1149 [==============================] - 34s 30ms/step - loss: 0.3988 - accuracy: 0.2262 - val_loss: 0.3894 - val_accurac
y: 0.2308
Epoch 3/100
1149/1149 [==============================] - 34s 30ms/step - loss: 0.3919 - accuracy: 0.2346 - val_loss: 0.4306 - val_accurac
y: 0.1431
Epoch 51/100
1149/1149 [==============================] - 35s 30ms/step - loss: 0.0399 - accuracy: 0.9676 - val_loss: 0.1714 - val_accurac
y: 0.8611
Epoch 52/100
1149/1149 [==============================] - 34s 30ms/step - loss: 0.0413 - accuracy: 0.9688 - val_loss: 0.1726 - val_accurac
y: 0.8632
```

```
Epoch 99/100
1149/1149 [==============================] - 34s 30ms/step - loss: 0.0190 - accuracy: 0.9872 - val_loss: 0.1878 - val_accurac
y: 0.8785
Epoch 100/100
1149/1149 [==============================] - 35s 30ms/step - loss: 0.0202 - accuracy: 0.9871 - val_loss: 0.1739 - val_accurac
y: 0.8875
```

We got model accuracy near about 98 %, which is shown in graphical chat:

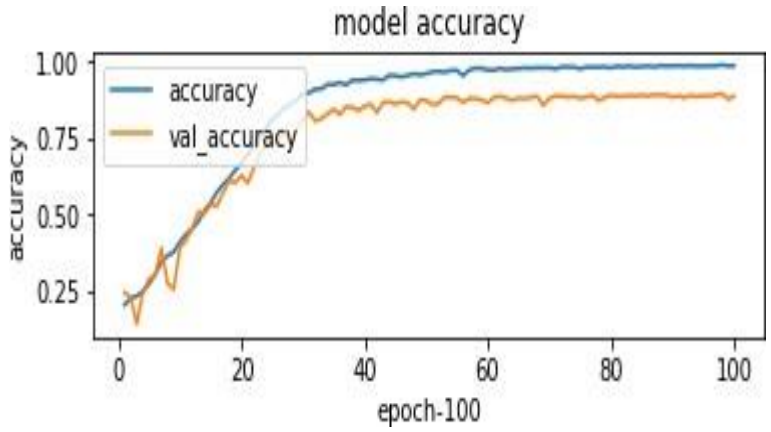


Fig 4.2.3: Model Accuracy Graph

We got a little bit model loss, which is also given below:

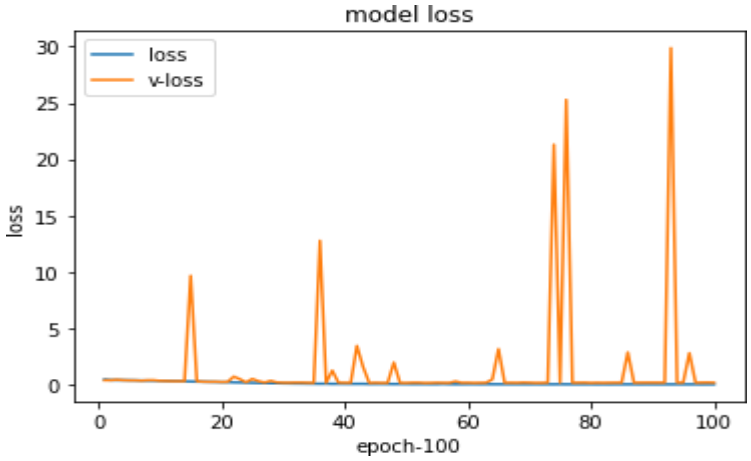
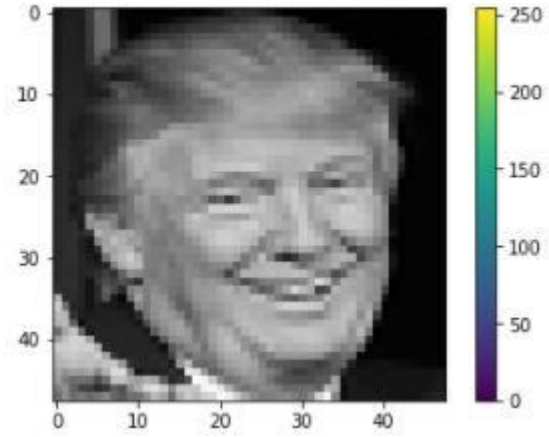


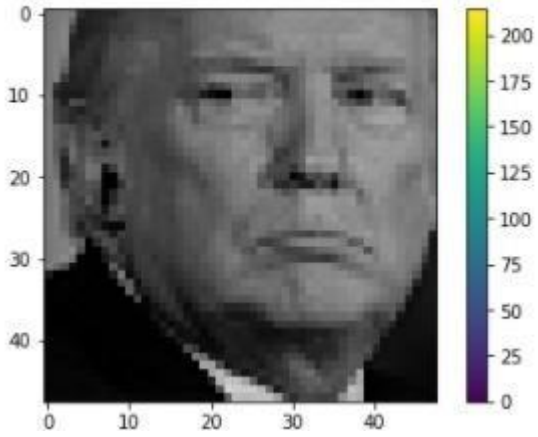
Fig 4.2.4: Model loss Graph

Now we give some test data to check our model is properly worked or not. Here we maximum used Donal Trump (ex-president of USA) image to test our model. Which is given below:

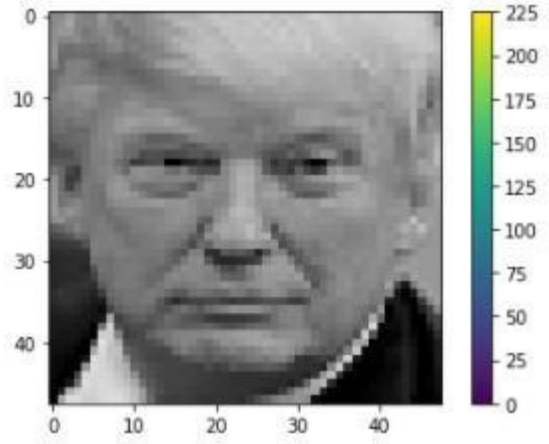
happy = 100.00%



sad = 77.01%

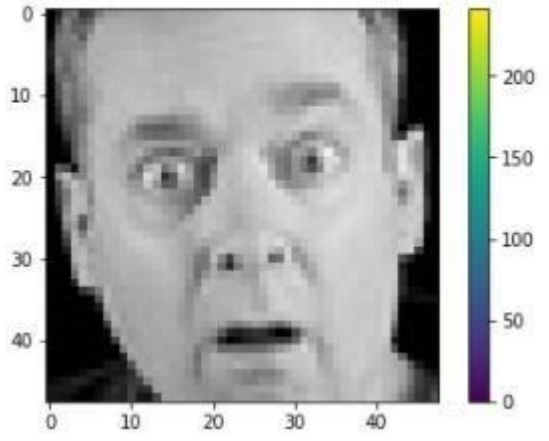


neutral = 77.58%

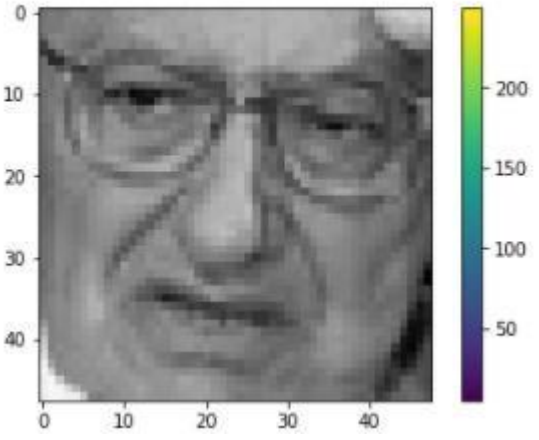


:

surprise = 99.97%



disgust = 100.00%



4.3 Descriptive Analysis

Before making the facial expression detection we tried to work with human images. We consider human in an image and try to find his facial expression from his face. Mode gives a good result. This model is created to reduce the problem see images too much closely and slowly. Through text representation it will easier to see what is in the picture at a glance.

CHAPTER 5

Conclusion and Future Work

5.1 Summary of the Study

Our research work is about facial expression detection. In our project we made a model of machine learning. Which is helpful for detecting facial expressions and represents through text. we had done our work by dividing our works into some parts. Summary of the whole work is in below:

Steps:

Number 1: Data collection from google images, google sites.

Number 2: Label the collected data

Number 3: Collection ofemotion expressing images.

Number4: Data pre-processing

Number 5: Divide into parts

Number6: Load pre-trained images

Number 7: compare

Number 8: train model

Number9: apply algorithm

Number 10: Check the result final result and also the machine response.

5.2 Conclusion

Thought of our research model is to develop a model for detection of facial expression and represent it through text. And make it easier for people. At first, we make the model for face expressions detection such as happy,sad,angry and etc and then represent it through text. Our dataset is not that large to find every single expressions and emotions of human. But the machine provides good result. This is also a limitation of our model. If the image size is too small and so many different type of expressions then it can't detect. We are working on only image, videos are not applicable here. Finding every expressions and detect each emotion is little bit difficult form others. Though our model have some limitations but it can does its work properly. And it creates a new scope for future work.

5.3 Recommendations

Perfection is all time a work in advancement, our proposed model is just at its beginning stages. Gradually, a great deal of works can be possible to it. To improve accuracy, efficiency and dependability of the study further collection of data is required. The more data is, the more dependable outcomes are. Now, we are working only on still images, but for working on videos we will try to build updated model.Some recommendations for this model is given below,

- work with small size images.
- Detection from videos.
- increase the data input for more emotion detection.
- use it onartificial intelligence.

5.4 Implication for Furthe Study

This research is about detection of facial expression of human from images. As we are detecting facial expressions, the collection of data we have is not sufficient. In future, this model will be developed. Any research and thesis work is always e continuous method. Consequently, we will developed this model for further related development works. And also for finding proper accuracy any model need more and more research. After that any research work can reach to its proper solution for specific problems. That's why every research work needs more future study, implementation and development. Every research work has some limitations. By solving this limitations future research work will grow and give more updated and efficient results from the previous work. In our research work, the future work will be detection of also emotions from videos and marking human body parts. Such as animation, 3D videos. Update version of this model will find more facial expressions and emotions from images and videos also. The model is quite complex. We are still dealing with the system and will keep on working on the system furthermore for a superior and more accurate system.

REFERENCES

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1 Z Zeng, Y Fu, GI Roisman, Z Wen, Y Hu…"Spontaneous emotional facial expression detection." -Journal of … academia.edu- 2006.

2. SW Chew, P Lucey, S Lucey, J Saragih"Person-independent facial expression detection using constrained local models"… - Face and Gesture … ieeexplore.ieee.org- 2011.

3. DJ Bayle, B Schoendorff, MA Hénaff, P Krolak-Salmon" Emotional facial expression detection in the peripheral visual field"- PloS one, journals.plos.or- 2011.

4. JL Raheja,"Human Facial Expression Detection from detected in captured image using back propagatiion neuralnetworK"U Kumar - researchgate.net- 2010.

13. K He, G Gkioxari, P Dollár"Mask r-cnn"… - Proceedings of the IEEE … openaccess.thecvf.com- 2017.

5. A De, A Saha, MC Pa"A human facial expression recognition model based on eigen face approach "l - Procedia Computer Science, cyberleninka.org- 2015 .

6.S Kumar, S Singh, J Kumar "Automatic live facial expression detection using genetic algorithm with haar wavelet features and SVM"... Wireless Personal Communications, Springer- 2018 .

7. GN Matre, SK Shah -" Facial expression detection"2013 IEEE International Conference on …, ieeexplore.ieee.org- 2013.

8. S Agrawal, P Khatri-"Facial expression detection techniques: based on Viola and Jones algorithm and principal component analysis"-2015 Fifth International Conference on-ieeexplore.ieee.org-2015

9. JJJ Lien, T Kanade, JF Cohn, CC Li-"Detection, tracking, and classification of action units in facial expression"-Robotics and Autonomous Systems, Elsevier-2000.

10. RS Smith, T Windeatt"Facial expression detection using filtered local binary pattern features with ECOC classifiers and platt scaling"-Proceedings of the first workshop on proceedings.mlr.press-2010.

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