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Research Paper

Facialexpression data Recognitionusing Backpropagationalgorithmvisualizationofit using python modules

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ABSTRACT: *The aim of Real-time Data Visualization of Facial Expression Data using Keras and Plotly is todetect and classify human facial expressions from image sequence this is also used to cope withemotional health problems caused due to our negativity in our day to day lives. This softwareuses biometric markers to detect emotions in human faces. The six expressions: happiness,sadness,anger,fear,surpriseandneutralcanbedetectedonthehumanfaceusingthistechnologyas it acts as a sentiment analysis tool. Emotional health plays very important role to improvepeople's quality of lives, especially for the elderly. This kind of improvement might beconsidered great progress in this era of artificial intelligence. Facials expressions plays a key rolein our daily communications. Due to their outstanding recognition accuracy after training withlarge amounts of data, many deep learning approaches have been applied by various researchersin the past few years. This can be done basically in here steps: Firstly, Locating faces in thescene, in an image or video footage. Secondly, extracting information about facial features fromdetectedfacesandfinallyanalyzingthemovementoffacialfeaturesorchangesintheappearance of facial features and classifying this information into expressioninterpretativecategories such as facial. It aims to improve one of the main issues that exists in our society,"Mental health". Our project offers the feature of helping out the user by presenting them with amessage when the program is executed and the result is a negative emotion or expression. Anaccuracy of 71.38% was achieved by training the FER2013 dataset using our proposed method.*

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I. INTRODUCTION

The use of technology in society has greatly increased in recent decades. Nowadays, machinesare used in many different industries. As their personal exposure grows, communication shouldalso be smooth and natural. To achieve this, machines must be empowered to understand theenvironment. Specifically, human intentions. When machines are sent, the term includescomputersandrobots.Thedifferencebetweenthetwoisthatrobotsincorporatecommunicationskillsatamuchhigherlevelbecausetheirdesigninvolvesacertaindegreeofautonomy.Whenmachines are able to appreciate the environment, it is a kind of machine understanding hasimproved. People use their senses to gain insight into their nature. Therefore, machineunderstanding aims to mimic human senses in order to meet their natural needs. Nowadays,machineshavemanywaystocapturecamerasandtheirnaturalsensors.Therefore,applyingthisinformation with appropriate algorithms allows to generate machine understanding. Over theyears, the use of in-depth learning algorithms has proven to be very effective in this regard. Forexample, Jeremy Howard demonstrated in his Brussels 2014 TEDx lecture how computers aretrained using in-depth learning techniques that can accomplish some amazing tasks. Theseactivities include the ability to learn Chinese language, visual aids and assist in medicaldiagnosis. The computer in question claims that sensory detection is needed to make

machineswork better. For example, the use of robots in places like adult care-givers or as hospital carriersseek a deeper understanding of nature. Facial expressions convey details about the inner state ofthe subject. If the machine is able to detect a sequence of facial images, then the use of in-depthreadingtechniquescan helpthemachines knowthefeelings ofits mediator.Inthis context,in-depth learning has the potential to be the key to building better communication betweenhumans and machines, while giving machines some form of self-awareness about their humanpeers, and how they can improve their connection to natural intelligence. In the following projectwe have also achieved one of the biggest milestones that the projects of facial recognition fail toachieve I.e., differentiating between the emotional state of being sad and fearful. Seeing that factthat these two expressions are very similar and are not distinguished very easily by systems alikeours but we have been able to achieve this. With the advent of modern technology our desireshave risen sharply and are not bound by restrictions. In the program. At present the great work ofresearch continues in the field of digital photography and photography processing. The wayforward has been an adjective and continues to expand. Considering the vast area of research inthe modern world and its widespread use widespread. Image editing is a signal processing fieldwhere input and output signals are present pictures. One of the most important aspects of the useof an image is facial expressions recognition. Our emotions are expressed by what is said on ourface. Face display is playable an important role in human communication. Facial expression is anon-verbal science an act expressed in our face according to our emotions. Automatic facialrecognition. The saying plays an important role in artificial intelligence and robots and istherefore a necessity of generation. Other applications related to this include personalidentificationandaccesscontrol,VideophoneandTeleconferencing,Forensicapp,

Human-Computer Interaction,Automatic Monitoring, Cosmetology and soon.The aim of thisproject is to improve the Automatic Facial Expression Recognition System which can takepictures of a person's face that contains other expressions such as insert and see again divide itinto six categories such as I . neutral II. Angry III. Fear IV. Happy V. Sad VI. Surprise Facialrecognition is a process performed by humans or computers, viz contains:

1. Finding a face at the scene (e.g., in a photo; this step is also referred to face detection).
2. Extract facial features from the obtained face region (e.g., shape detection parts of the face orthat describe the formation of skin in the area of the face; this step refers to the removal of theasfacial element).
3. Analyze the movement of facial features and / or changes in the appearance of facial featuresand separating thisinformation from other facial expressions that interpret meanings such asfacial muscle function such as a smile or a frown, emotions (touch) are areas such as happinessor anger, areas of attitude such as (dis) likes or dislikes, etc. (this step is also called facialexpressions translation). There are many projects already undertaken in these fields and our goalwillnotjustbeachievedbetoimprovetheAutomaticFacialExpressionRecognitionSystembutalso to improve the accuracy of this system compared to other existing systems.

Apart from the powerful reading ability for in-depth reading, problems are always applied toFER. First, deep neural networks it requires a large amount of training details to avoid overdoingit.However,the factualinformationavailable ontheface isnotenough traininganeural networkknown for its deep art that achieve the most promising results in object recognition activities. Inaddition, the high diversity of topics exists due to diversity personal qualities, such as age,gender, ethnic origin and expression level. In addition to topic discrimination, variations inposture, brightness and appearance are common unrestricted facial expressions. These items areout of line with the face and are therefore reinforcing the need for deeper networks to address thelarger intra-class flexibility and reading specific presentations. It is important to note that there isno specific formula to build a neural network that would guarantee to work well. Differentproblems would require different network architecture and a lot of trial and errors to producedesirablevalidationaccuracy.Thisisthe reasonwhyneuralnetsareoften perceivedas"blackbox algorithms.". In this project we got an accuracy of just about 70% which isn't bad in the leastcomparing allthe previousmodels. Butwe'dlike toenhance inspecific areaslike--> numberand configurationofconvolutionallayers-> numberandconfigurationofdense layers->dropout percentage in dense layers But because of lack of highly configured system we couldn'tgo deeper into dense neural network because the system gets very slow and we will attempt toimprove in these areas in future. We would also wish to train more databases into the system tocreate the model more and more accurate but again resources become a hindrance in the path andwealsoneedtoimproveinseveralareasinfuturetoresolvetheerrors andimprovetheaccuracy.Having examined techniques to deal with expression variation, in future it's going to beinvestigated in additional depth about the face classification problem and optimal fusion of colorand depth information. Further study may be laid down within the direction of allele of genematching to the geometric factors of the facial expressions. The genetic property evolutionframework for facial expressional system are often studied to suit the need of various securitymodels like criminal detection, governmental confidential security breaches etc.

II. OBJECTIVE

The objective of this project is to develop an algorithm to recognize the expression of the humanface accurately and to visualize the expression into six universal emotions using differentvisualizationtechniques.Recentyearshaveseenariseinthenumberofpaperspublishedthatusedeeplearningfor facialemotionrecognition.Thesepapersusedfreelyavailabledatasetswithstate of art models achieving an accuracy of 0.66. With this in mind, a number of differentmodels both new and old will be experimented with to arrive at a final model with comparableresults.

III. PROBLEM STATEMENT

Given a photo of a person, recognize different types of expression of the person by using deeplearningtechniquesandvisualizethetypesofexpressionbyusingdifferentvisualizationtools.

IV. FUNCTIONAL REQUIREMENTS

Code is written in python. Python Modules used are:

1. Plotly
2. Keras
3. TensorFlow
4. Pandas
5. Numpy
6. Skimage
7. Tkinter
8. Random

V. DATASET

The dataset consists of 48x48 pixel grayscale images of faces. The faces have beenautomatically registered so that the face is more or less centered and occupies about the sameamountofspaceineachimage.Thetaskistocategorizeeachfacebasedontheemotionshownin the facial expression in to one of seven categories (0=Angry, 1=Disgust, 2=Fear, 3=Happy,4=Sad, 5=Surprise, 6=Neutral).

The "emotion" column contains a numeric code ranging from 0 to 6, inclusive, for the emotionthatispresentintheimage.The"pixels"columncontainsastringsurroundedbyquotesforeachimage.The contentsof thisstring aspace-separated pixel valuesin row-majororder.

Thetrainingsetconsistsof28,709examples.Thepublictestsetusedfortheleaderboardconsistsof 3,589 examples. The final test set consists of another 3,589 examples. This dataset wasprepared by Pierre-Luc Carrier andAaron Courville, as part of a research project.

VI. DATA ABSTRACTION

The data set used in this project has 3 main attributes:

1. **Emotion:**Theprogramwilldetect7emotionsofhumans.Thisiscategoricaldataaseachemotion is given a number from 0 to 6. These emotions are: 0: Angry, 1: Disgust, 2: Fear,3:Happy, 4: Sad, 5:Surprised and 6: Neutral.

2. **Pixels:** This is quantitative data that stores the pixels which point towards the specificemotion.

3. **Usage:**Thisattributehighlightswhattheusageofthespecificitemis.ThisiscategoricaldatadividedintoTraini ng,PublicTesting andPrivateTesting.

VII. TASK ABSTRACTION

The task abstraction of the project is:

1. **Identify** the emotion or mix of emotions in the picture.

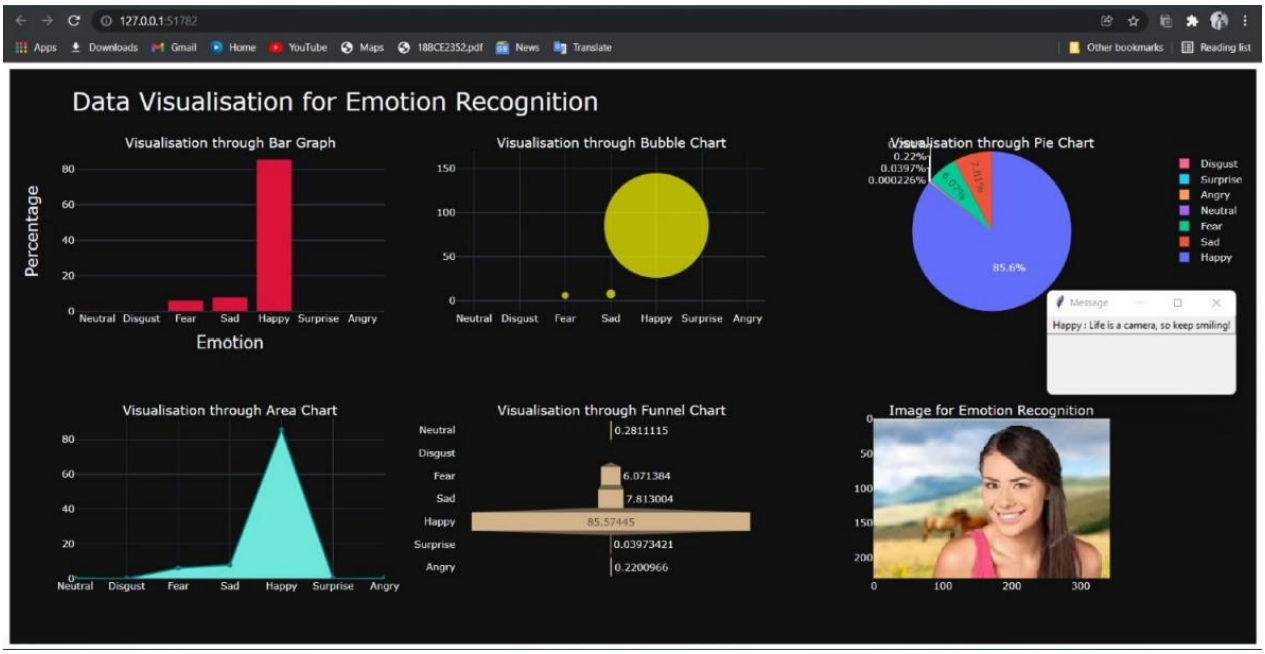
2. **Present**thepercentageofeachemotioninthepicturebasedonourCNNbasedbackpropogationalgorithm.

3. **Annotate** a message for the viewer based on the emption detected in the picture.

VIII. DESIGN OF THE PROPOSED SYSTEM

1. **Bar Graph:** A bar chart or bar graph is a chart or graph that presents categorical data withrectangular bars with heights or lengths proportional to the values that they represent. The barscan be plottedvertically orhorizontally.Avertical barchartis sometimescalled acolumnchart.
2. **Bubble Chart**: A bubble chart is primarily used to depict and show relationships betweennumeric variables. However, the addition of marker size as a dimension allows for thecomparison between three variables rather than just two.
3. **Area Chart:** An area chart or area graph displays graphically quantitative data. It is based onthe line chart. The area between axis and line are commonly emphasized with colors, texturesand hatchings.
4. **Pie Chart:** pie chart is a circular statistical graphic, which is divided into slices to illustratenumerical proportion. In a pie chart, the arc length of each slice, is proportional to the quantity itrepresents.
5. **Funnel Chart:** A type of chart often used to represent stages in a sales process and show theamount of potential revenue for each stage. This type of chart can also be useful in identifyingpotentialproblem areas inan organization's salesprocesses

IX. DASHBOARD IMPLEMENTATION

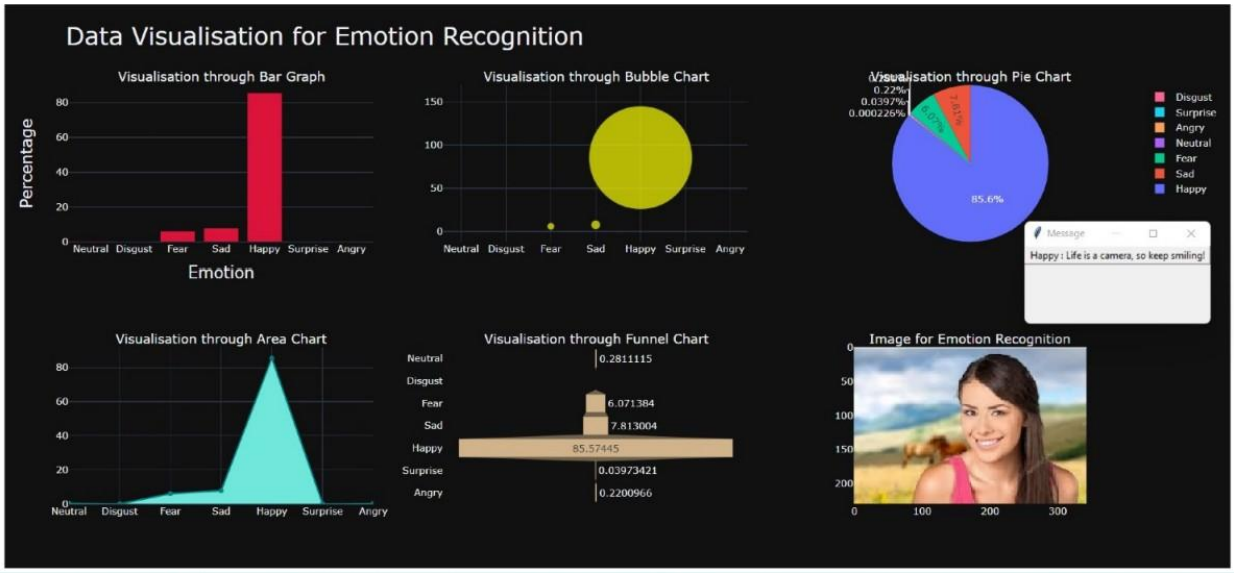


X. CONCLUSION

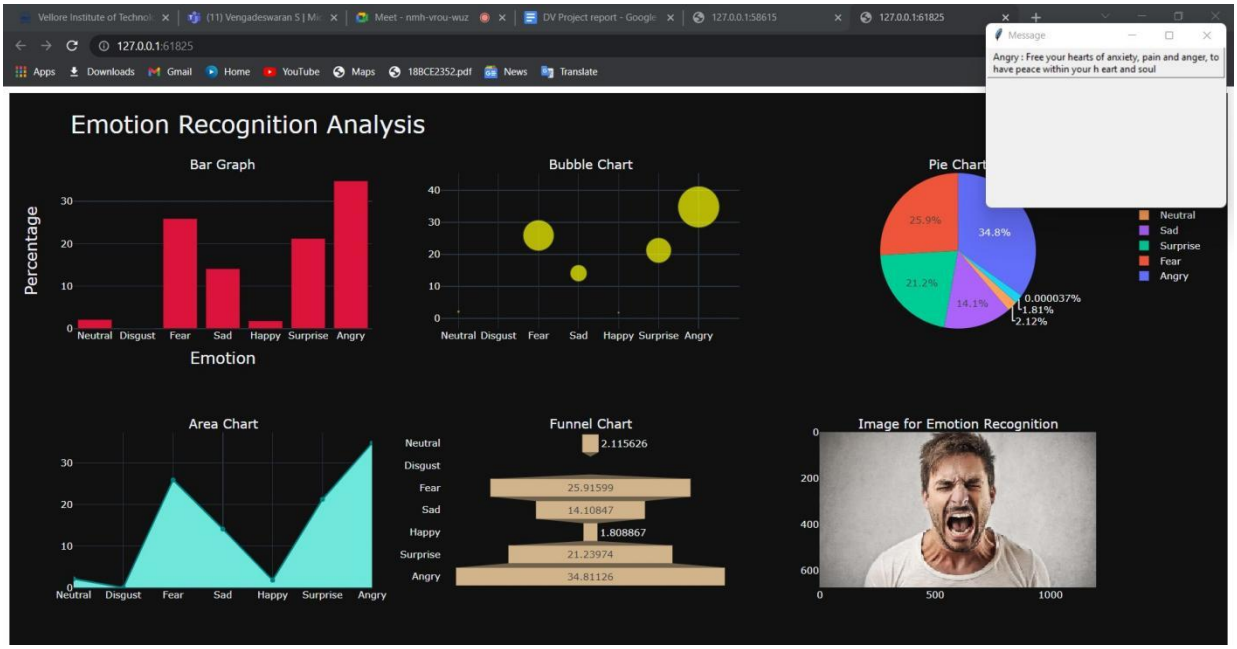
We were successfully able to differentiate between the six basic expressions happy, sad, angry,surprised, fear and neutral with an accuracy of 71.38%. It was observed that the size of thedataset used to train for the model is directly proportional to accuracy of the results. Theaccuracy of the results with which an expression can be detected successfully is also dependenton the number of epochs in total while training the dataset.

Appendix1:Screenshots

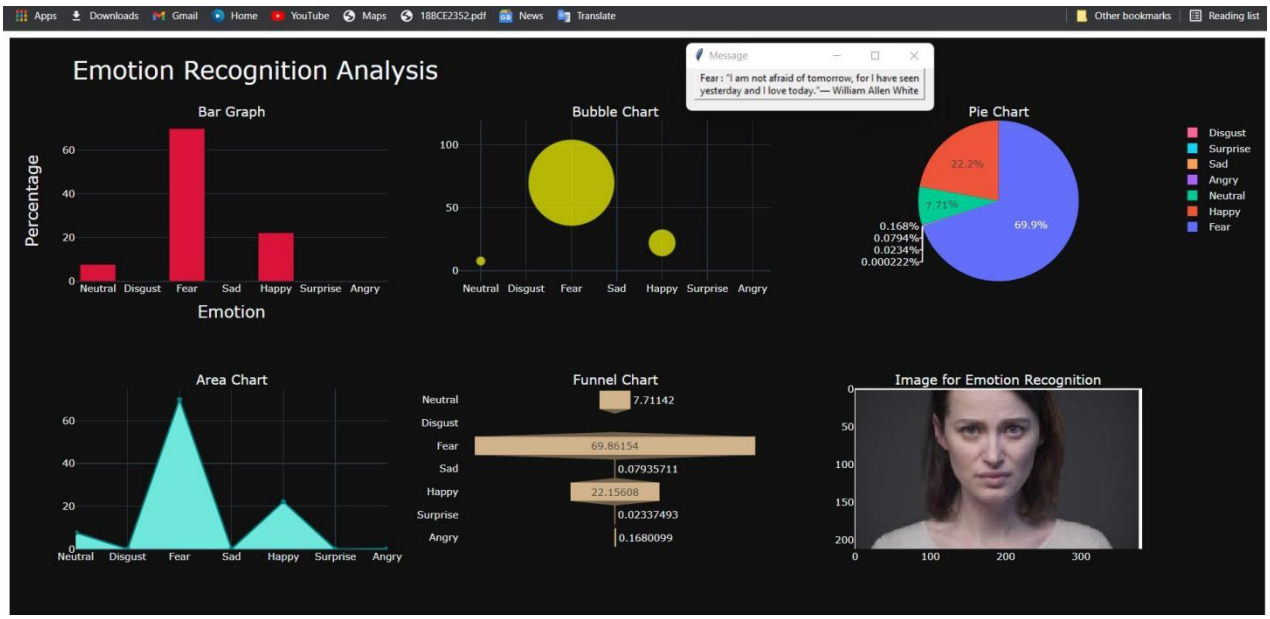
1) Happy



2) Angry



3) Fear


Apps
Downloads
Gmail
Home
YouTube
Maps
18BCE2352.pdf
News
Translate
Other bookmarks
Reading list
Emotion Recognition Analysis
Message
Fear : "I am not afraid of tomorrow, for I have seen yesterday and I love today."— William Allen White
Bar Graph
Percentage
Neutral Disgust Fear Sad Happy Surprise Angry
Emotion
Bubble Chart
Pie Chart
22.2%
7.71%
69.9%
0.168%
0.0794%
0.0234%
0.000222%
Disgust
Surprise
Sad
Angry
Neutral
Happy
Fear
Area Chart
Funnel Chart
Neutral 7.71142
Disgust
Fear 69.86154
Sad 0.07935711
Happy 22.15608
Surprise 0.02337493
Angry 0.1680099
Image for Emotion Recognition