

Application of Face recognition using ML in Employee Emotion Detection

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Abstract—Face recognition has application in recognition of emotion from an employee's face. As most of the people in the world spend their time in the office. So, it becomes very important to analyze their health. People normally feel some amount of stress but some people may also feel very high stress due to workload and that becomes traumatic for them.

It is important for a company to know if their employees are in good mental health condition or not. Also, an organization can only take counseling or medical steps and do changes in the workload plan if they know the actual stress and mental health of the employees.

We can recognize the emotions of the employees from their faces and determine what they are feeling i.e., whether they are stressed or not. This research paper is focused on emotion recognition using machine learning techniques.

As we know emotion is a very complicated instruction produced by our brain. Emotion is generally observed from the changes in different facial features like eye and mouth regions. So, we can use different facial features to train the machine learning model and these facial features can be used to detect our emotions.

We can detect the major type of the emotions like anger, sadness, happiness, and neutrality on a daily basis. Pictures of the employees are captured at regular intervals like 5 minutes from the webcam of the employee's laptop or computer.

These pictures will be used to detect the emotions of the employees at regular intervals. Any employee who is not happy or neutral for a longer amount of time can be detected and will be suggested for counseling. By this highly stressed and skilled employees can be recognised.

Keywords—Emotion detection, mental illness, face recognition.

I. INTRODUCTION

In today's world when we talk about working people, then we find out that people who are working daily and doing their 8 hours 9 to 5 jobs. They are getting sad and no longer interested in their work. They are only working for the money and didn't actually like the work.

But people who are managers of the company never know that their employees are sad or their employees are no longer interested in the job. If they know that they might have provided that employee with some different options. But that is no longer an option as employers can never be able to know if their employees are happy with their job or not. This is the paper to discuss and make an approach to solve this problem.

To analyze the health of employees in organizations we need a details study of their emotional health. We can do this by capturing photos of their face at certain intervals. We can capture the photos of each employee every 15 minutes.

An employee will only know that his or her photo is getting captured but he does know when his or her photo is getting captured. After capturing the photos we will put the photos through the detection mechanism which will first detect the feature of the different areas of the face and we can detect by the features that what is the emotion of that person.

We will store the past one month's data about the emotion of that person in our database and by that, we will decide whether that person is suffered from mental illness or not. If the person is suffered with mental illness then we will be assigned a counselor for that person.

It's a very high chance that if a person is not happy for so long then he might be suffering from high stress or anxiety in the work environment and we can find out that and resolve the issue around the working environment.

By doing that not only we will be able to resolve the issue of that person but also we will improve the condition and environment of our surroundings.

And we will ensure that the working conditions for the next employee will be better than what it is now. In the short

term, any organization may not get benefited from this methodology but in the long term, its effect can be seen. It would highly benefit any organization and improve the working culture of the organization. If the working culture of any company would get improved it will automatically affect the revenue and efficiency of the company.

This project also has hidden benefits and contributions to the overall society, as we improve the quality of life of the employees. We are indirectly improving the quality of life in their home and that will contribute to the quality of life of the society they are living in.

II. METHODOLOGY

It is important to discuss the algorithm we are using to detect emotion when we are talking about emotion detection. We will be using the convolution neural network for detecting and analyzing the important features of the face because it does not require any type of manual interference and it can automatically detect all the important features present in the human face.

Before talking about the main algorithm for detecting faces let's discuss the overall high-level implementation of the project.

First of all, we need an interface by which we can take images of the employees at certain intervals, there are two ways to do that one is to take images from the public camera present in the offices and the other way is to take images from the webcam present in the laptop. And second way is better as it provides accurate images and has a high chance of getting the facial features in the image.

After that, we need a software interface to capture the image of the employee regularly at a certain interval. We can make any native software or we can make web applications.

This software will get automatically executed at the power on of the computer and start capturing images of the employee during office hours. This software will be installed on the laptops or computers of each and every employee in the company and collect data from them.

For this project, we are using simple HTML javascript for making the software and capturing the faces at regular intervals. Here, HTML is used for making the structure of our web page and javascript is used as a programming language.

We would be using MongoDB as the database which will store the information about the image that we capture and it will also store the processing result of our pictures.

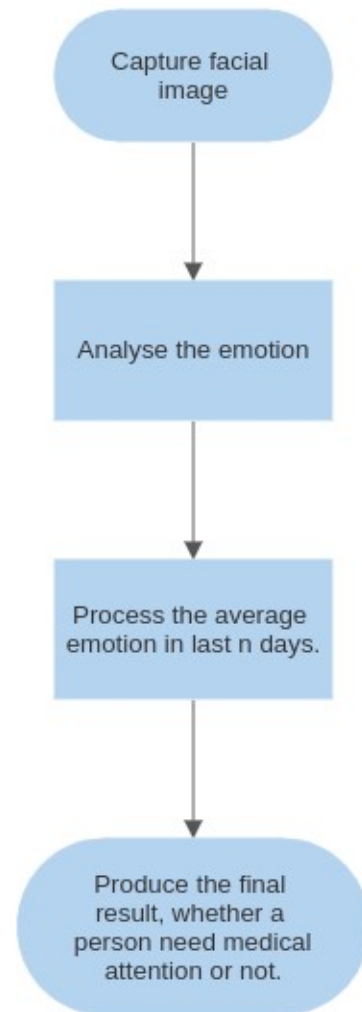
We will be using the CSS for styling purposes to make the software interface user welcoming. At the interface, the user will be able to see the overall emotions of the current day and the overall emotions of the last week and last month.

By this users will be able to self-analysis what is going wrong or right. And he has changed to make things go in the right direction.

We will make API (Application programming interface) interact with our frontend interface. We will be using Python for making the API. One API will be made which will receive the image from the front end and process the image with the help of the CNN.

And respond with the emotion on their face. It will also store the emotion information along with the timestamp in that particular user's collection.

One API would be for handling the request for getting information about the user's average emotion. This API response with the details that are shown to the user.



There will be another API and user interface for the admin user. Which will contain details of all the employees, admin user can monitor all the users and plan the overall benefit of the employee according to their emotions.

For example, if the average organization emotion gets sad after a certain change in the company then it means that employees are not in favor of that change.

The overall flow of the application will be like this, there will be two interfaces one is for the normal employee that can be accessed by each employee by their username and password and there is another interface that admin interface can require an admin user name and password which can only be accessed by the person who has higher authority in the organization.

Every employee's first thing is to turn on their laptop when starting the day. and when they will start their laptop the software will automatically get started. And web page will be rendered in their browser. And start capturing images of their faces with the webcam.

Here, we will use the set timeout function in the javascript in the frontend interface to capture the images after every 15 minutes. We captured the images then we make a request to the backend API with the image of the face. This API will detect the image and store the emotion information in the database for that particular user. And it will send the emotion

state to the frontend as well to show the current information to the user.

At the end of each day, a cron job will run and it will make the average calculation of the emotions. If emotion comes out to be concerning then an email will be sent to the admin user as well as to that employee. Based on the average emotional state of the employee a company can set the meeting and it can be decided why a particular employee is not happy.

Counseling can be arranged by the company for that particular employee for the treading and proper roadmap to deal with the emotional stress. And By doing this We also have a chance to analyze any wrong decision made by the company we are affecting the health of all the employees. In this application admin user will always be able to see every data about all the employees.

In addition to these, we can also set up additional steps which will ensure the privacy of an employee in the organization. We can set up a strong authentication system by implementing the 2-step authentication.

And we can also anonymize the data of employees on a daily basis which can enable the admin user to not see the day-to-day information about the employee. We can also automate the counseling process for emotionally imbalanced employees by setting up automated counseling with the counselors. By doing that, we can save a lot of time.

As we are using CNN currently, in the future we may invent a better version of CNN for high efficiency. We can also improve the overall architecture of the project. We can use single-page applications in the front end for a better user interface experience.

When the size of an organization is huge then we need load balance and scalability of our database. Furthermore, the collected data from the employees can be used for the research purposes of the human behavior toward the work culture and we can know and find ways to improve our work culture.

III. OPPORTUNITY

Cost-effective installation in an organization, as most of the organizations allow the use of the option nearly all the employees have their professional computer or laptop for their work. Installation only required the setup and giving required permission to capture the images from their laptops like webcam permission.

Easy installation, as we only need to set up a startup script to run the web application. When the computer started this script will run and start the execution of the web application. This script will run whenever the computer will restart or gets powered on.

Improve the environment in an organization, as we came to know by this software what area of the organization is getting affected. We have an opportunity to improve the environment of that particular area. Thereby benefiting the organization.

Hidden growth in the organization, as stress in an organization decreases means that employees are no longer in stress or depressed. It concludes that employees are enjoying their work. And if that is true, the efficiency of the organization will automatically improve.

Contributes to the overall society, as the employees are living in the different societies and we have detected the reason for

their stress and anxiety and treat them. Their home environment will also get positively affected by the improvement.

IV. CONCLUSION

In conclusion, the proposed method of facial emotion recognition using machine learning has the potential to assist companies in analyzing the mental health of their employees. The two-level CNN framework proposed in this research has achieved high accuracy in detecting emotions from facial features. By capturing images at regular

intervals, employees with prolonged stress can be identified, and necessary counseling or medical steps can be taken. The FERC model is unique and has a keyframe extraction method that makes it more efficient with video input. However, training a large neural network is a time-consuming job, and more datasets are required to increase the accuracy of the algorithm.

In the future, this method can be extended to identify more emotions and can be used in various applications such as healthcare and entertainment. By integrating this technology with wearable devices, real-time monitoring of emotions can be possible, providing immediate help to people with high-stress levels. This technology can also be utilized in customer service, where the facial expressions of customers can be analyzed to improve customer satisfaction. Overall, the future scope of facial emotion recognition using machine learning is vast and promising.

Talk about the future scope of this project we can implement complex systems and sensors which can be useful to detect different features and diseases that can be stopped if treated at the right time.

This is a very vast area to explore because there are lots of things that can be done that can improve the lifestyle of the people just by pre-analysis of the diseases. Which can be used to avoid the disease from actually occurring.

We can use different software and ML and AI techniques to achieve that. This software can also be modified to be used in schools for small children as nowadays children also sometimes feel alone and sad. We can identify that and help them and make their state of mind better by talking to them.

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