International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 11 | Nov 2019 www.irjet.net p-ISSN: 2395-0072

Techniques for Analyzing Job Satisfaction in Working Employees – A Survey

Reshma J[1], Ankita Chatterjee[2], Kishan Kumar Jaiswal[3], Ashmita Roy[4]

[1] Assistant Professor, Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore, India
[2,3,4]BE Student, Department of Computer Science & Engineering, BNM Institute of Technology, Bangalore, India

---

Abstract – *Mental health disorders are a common issue among working IT professionals in the industry today. In this new lifestyle and work culture, there is a risk of increase in emotional disorder due to stress among the employees. Many industries and corporates provide mental health-related schemes and try to ease the workplace atmosphere but the issue is far from control. Employees are not satisfied with their working environment and work. To avoid these problems, human expressions can be detected and analyzed to predict whether the employees are happy or stressed out. For this, deep learning algorithms like CNN (Convolutional Neural Network) can be applied to analyze the emotions in working adults and to narrow down the factors that strongly determine the stress in adults and conclude if they are happy and satisfied with their jobs and the working environment.*

***Key Words*: Job satisfaction, working environment, stress, emotions, happy, human expressions, CNN (Convolutional Neural Network).**

1. INTRODUCTION

Mental Health issues and emotional disbalance is something which almost every person goes through. But no body discusses this publicly. Many time people don't even realize what they are going though. Due to this new lifestyle and work culture, there is a risk of increase in emotional disorder due to stress among the employees. Many industries and corporates provide mental health-related schemes and try to ease the workplace atmosphere but the issue is far from control. Towards this, several studies in the past have raised concerns over the same. According to a study by the industry association, Assocham, more than forty-two percentage of working professionals in the Indian private sector suffer from depression or general anxiety disorder due to long work hours and tight deadlines [1]. This portion of individuals is rising as stated in the 2018 Economic Times article based on the survey conducted by Optum that half of the working professionals in India suffer from stress [2]. The employees end up in a critical situation because of the job stress and they tend to go in a sad state. To avoid these problems, human expressions can be detected and analyzed to predict whether the employees are happy or stressed out. For this deep learning algorithms like CNN (Convolutional Neural Network) can be applied to analyze the emotions in working adults and to narrow down the factors that strongly determine the stress in adults and conclude if they are happy and satisfied with their jobs and the working environment.

2. OBJECTIVE

The objective of this survey is to identify the best method by which one can analyze the emotions of their employees and predict if they are satisfied with their jobs or not.

3. LITERATURE REVIEW

[3] proposes an analysis of social network data for the user's mental state (such as happiness, anger, anxiety, depression). They focused on four types of factors such as emotional process, temporal process, linguistic style and all (emotional, temporal, linguistic style) features together for the detection and processing of depressive data received as Facebook posts and an analysis was conducted using MATLAB 2016b by applying four popular classifiers: Support Vector Machine (SVM), Decision Tree, Ensemble and K-nearest neighbors (KNN) for prediction model for depression recognition. The LIWC (Linguistic Inquiry and Word Count) Software helps to differentiate amongst depressive and non-depressive posts. The analysis shows that the Decision tree gives the most astounding outcome in emotional process and linguistic style as well as for feature precision. But the article does not address the problems that every person does not share their feeling on social media which results in difficulty to predict their emotions.

[4] explains that Stress is one of the main factors that are affecting millions of lives. Based on Heartbeat it can be predicted whether a person is in Stress or not. Here Machine Learning Algorithms are used to predict the condition of the patient and IoT is used to communicate the patient about his/her acute stress condition. It is predicted whether a person is in stress or not using variability in his/her heart rate. Logistic Regression and Support Vector Machine (SVM) classifiers are used to improve the VF-15 supervised learning algorithm and Naïve Bayes algorithm performances to predict the stress. Among the two algorithms, Support Vector Machine shows better improvement in accuracy. The main problem faced is with respect to the data set i.e., heart beat rating for different individuals needs to be taken down to predict stress for those respective different individuals. More over the device is individual specific and needs to be calibrated to function properly.

[5] gives a comparative study of six Machine Learning Models namely Logistic Regression, K-nearest neighbors (KNN) Classifier, Decision Tree, Random Forest Classifier, boosting

and bagging is performed. The different parameters considered to evaluate the accuracy of the trained model are Classification Accuracy, False Positive Rate, Precision, AUC Score and Cross-validated AUC. Out of all the algorithms, boosting performed better than the other models in terms of accuracy, false positive rate and precision. However, in terms of cross-validated AUC score, random forest classifier scored higher indicating that it is more stable. It was also noted that both logistic regression and random forest classifier scored the same classification accuracy, but random forest outperforms the former in other parameters. K-nearest neighbors classifier has the highest false positive rate indicating that it is highly unreliable to be used in the given scenario.

[6] emphasizes on detection of emotion from speech. The objective of the emotion recognition system is to mimic human perception mechanisms. The steps towards the building of an emotion recognition system is that an emotional speech corpus is selected or implemented. Then, emotion specific features are extracted from those speeches and finally a classification model is used to recognize the emotions. CNN-LSTM architecture is used for classification. Berlin Database of Emotional Speech is taken as the speech corpus which consists of 535 utterances spoken by 10 different actors. Mel frequency cepstral coefficient (MFCC) method is used for feature extraction. 80% of data were used for training purpose and 20% data were used for validation purposes. After that MFCC features with velocity and acceleration for each files of training dataset and test data set also was computed. Those extracted features were provided as initial input for the convolution neural network. Convolutional Neural Network with three convolution layers having 32, 16, 8 filter respectively was used. 500 epochs were set for the network. LSTM network was provided with two hidden layers with 50 nodes in first layer and 20 nodes in the second layer. "Softmax" was used as an activation function for the final output nodes. After 500 epochs, training accuracy reached 96% and test accuracy reached 80%. But emotion cannot be detected for speech samples of different length. Moreover, human emotion is not only related to human voice but also other physical gestures like facial expression or body part moments.

[7] presents a new model that is capable of recognizing facial expression by using deep Convolutional Neural Network (CNN). The Convolutional Neural Network model is generated by using Caffe in Digits environment. Moreover, it is trained and tested on NVIDIA Tegra TX1 embedded development platform including a 250 Graphics Processing Unit (GPU) CUDA cores and Quadcore ARM Cortex A57 processor.

The proposed model is applied to two publicly available expression databases, the JAFFE database and the Cohn-Kanade datasets. In this article, a new facial expression recognition algorithm is proposed based on Convolutional Neural Network. An appropriate Convolutional Neural Network architecture is selected. Convolutional layer numbers, kernel and stride sizes and pooling structures is determined. Experiments were conducted on JAFFE database and the Cohn-Kanade database. The obtained results showed that the proposed system outperforms the geometric and appearance based method.

[8] is based on detection and classification of facial emotion expressions. At first, Viola-Jones detection algorithm is used to detect the face in the whole image. Gabor filter is then used to extract meaningful facial features. Finally, the facial expressions are classified. The extracted Gabor features of face image is used as an input to the Artificial Neural Network classifier. Finally, the Convolutional Neural Network classifier classifies the seven facial expressions using multi-layer feed-forward back propagation algorithm. The experimental results on database images of JAFFE show robustness and better recognition rates of the proposed approach. The recognition ratio is 85.7% using Gabor filter with the neural network which is higher compared to methods using Statistics, Spatial Features and neural network or Local Binary Patterns (LBP), Haar-like Feature and neural network.

4. METHODOLOGY

The methodology used to analyze satisfaction of a job is a deep learning approach to predict a person's emotion through different facial expressions like surprise, fear, disgust, anger, happiness and sadness using the method of Gabor filters and Convolutional Neural Network.

Figure 1 shows the methodology that is used for predicting facial expressions. Here, six images are captured at a time interval of one hour. These images are fed to the Gabor filters for feature extraction. The output from the Gabor filter is taken as an input to Convolutional Neural Network which further classifies each image into one of these emotion classes surprise, fear, disgust, anger, happiness and sadness. Among the six emotions, two are taken to be positive and the rest are negative. Therefore, the result from Convolutional Neural Network is used to compute the satisfaction percentage to analyze the state of the employee. If the percentage calculated is greater than threshold considered, the person is satisfied with his job [9].

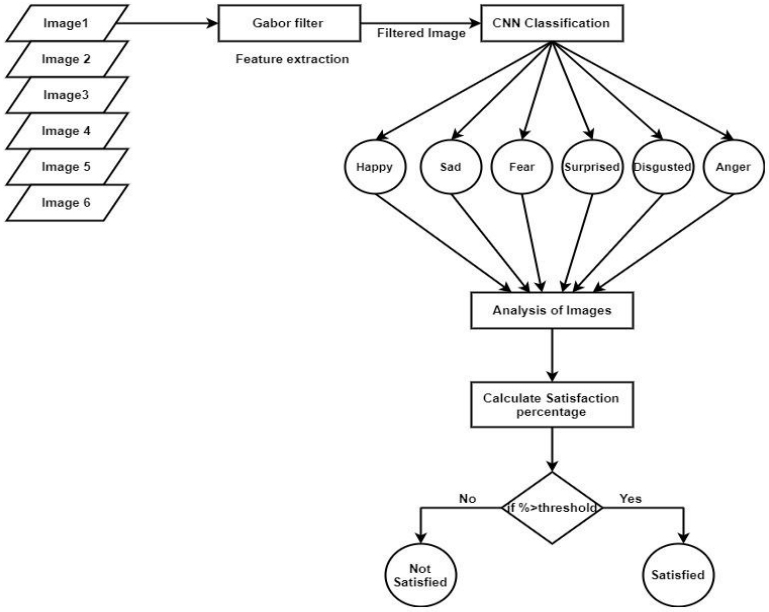

Fig -1: Methodology

5. CONCLUSION

Surveys conducted to analyze the work culture in IT Industry shows that there is an increase emotional disorder due to stress. Review papers suggest that the existing methods which analyze human emotions or mental health condition based on the speech, text or heart beat has its own limitations and hence there is a requirement for a more reliable method such as facial expression. Also, comparative study of six Machine Learning Models Namely Logistic Regression, K-nearest neighbors (KNN) Classifier, Decision Tree, Random Forest Classifier, boosting and bagging suggest that the use of deep learning technique such as Convolutional Neural Network to achieve higher accuracy. The limitations in the existing system motivates the work of the proposed system to consider facial expressions that aids in analyzing job satisfaction in working employees. Employees who have stress-related mental disorder can be identified by using computer vision and deep learning methods that are more accurate than the above mentioned machine learning approaches.

REFERENCES

[1] OSMI Mental Health in Tech Survey Dataset, 2017 from Kaggle

[2] Bhattacharyya, R., & Basu, S. (2018). India Inc looks to deal with rising stress in employees. Retrieved from 'The Economic Times'

[3] Md. Rafiqul Islam, Muhammad Ashad Kabir, Ashir Ahmed, Abu Raihan M. Kamal, Hua Wang and Anwaar Ulha, "Depression detection from social network data using machine learning techniques", Health Information Science and Systems, Springer Nature Switzerland AG 2018

[4] Mr. Purnendu Shekhar Pandey, "Machine Learning and IoT for Prediction and Detection of Stress", 17th International Conference on Computational Science and Applications (ICCSA), Trieste, Italy 2017

[5] U Srinivas Reddy, Aditya Vivek Thota, A Dharun, "Machine Learning Techniques for Stress Prediction in Working Employees", IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Tamil Nadu, India 2018

[6] Saikat Basu, Jaybrata Chakraborty, Md. Aftabuddin "Emotion Recognition from speech using Convolution Neural Network with Recurrent Neural Network Architecture" 2nd International Conference on Communication and Electronics Systems (ICCES), Tamil Nadu, India 2017

[7] Ayşegül Uçar, "Deep Convolutional Neural Networks for Facial Expression Recognition", IEEE International Conference on Innovations in Intelligent Systems and Applications (INISTA), Gdynia, Poland 2017

[8] Kunika Verma, Ajay Khunteta "Facial Expression Recognition using Gabor filter and Multi-layer Artificial Neural Network", International Conference on Information, Communication, Instrumentation and Control (ICICIC), Indore, India 2017

[9] Saad ALBAWI, Tareq Abed MOHAMMED, Saad AL-ZAWI "Understanding of a Convolutional Neural Network", The International Conference on Engineering and Technology, Antalya, Turkey 2017