



# Customer Satisfaction Recognition using Facial Features

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**Abstract:** Facial Emotion, Age and Gender are important factors in Human Computer Interaction. According to different surveys, non-verbal components convey two thirds of human communication. Among non-verbal components, facial features are one of the main information channels. Hence, we are proposing a CNN Model to recognize the facial Emotions, Age and Gender to recognize Customer Satisfaction. The technology used is Convolutional Neural Networks from Machine Learning. The dataset consisting of pixel sets of images of people with different Emotions, Age and Gender is used to train the model. The proposed model is a real time model used to detect the face using live video stream and determine the Emotion, Age and Gender and hence in turn determine if the customer is satisfied or not. The main advantage of the proposed system is that it uses real time live video stream through webcam. The key concept of this system is to use Machine Learning algorithm to determine Emotion, Age and Gender of Customer.

**Key Words:** Customer Satisfaction Recognition, Convolutional Neural Network, OpenCV, Emotion, Age, Gender, Machine learning.

## I. INTRODUCTION

Emotion, Age and Gender recognition from faces is one of the basic capabilities of the human beings. Extending this capability to machines is of great interest in many application areas. Ubiquitous and universal use of computational systems requires improved Human Computer Interaction.

Customer Satisfaction is one of the important factors for checking the suitability of the product or service with customer expectations. Today, many companies compete with each other to improve the quality of products and services by conducting customer satisfaction surveys such as questionnaires, telephone surveys, etc. But not every customer gives feedback to the survey. Also, there is no any guarantee that the given survey is genuine. Hence, we are introducing a solution to this problem.

In our proposed system, Customer satisfaction will be recognized by using facial features. Two datasets are used to train the Convolutional Neural Network models for recognizing the Emotion, Age and Gender of the customer. Based on the emotion, the Customer satisfaction will be determined. Whereas, Age and Gender are determined as an additional information.

In this system, the algorithm used will be Convolutional Neural Network. VGG (Visual Geometry Group) architecture will be used. The live video stream through webcam will be taken as input and OpenCV will be used to detect the face.

The proposed system will help to enhance the accuracy and efficiency of the customer satisfaction recognition.

## II. LITERATURE SURVEY

1. **Title:** Supervised Committee of Convolutional Neural Networks in Automated Facial Expression Analysis.

**Author name:** Gerard Pons and David Masip

**Description:** This paper gives a clear idea about Convolutional Neural Network for training the data. This paper presents a framework for emotion recognition and compares VGG and CNN-4L. VGG performs better.

2. **Title:** An Ensemble of VGG Networks for Video based Facial Expression Recognition.

**Author name:** Zirujirao, FengchunQiao, NaimingYao, ZhihaoLi, HuiChen, Hongan Wang.

**Description:** This paper discusses Ensemble VGG and bi-directional LSTM and GRU models in terms of accuracy and Macro Average precision (MAP).



3. **Title:** Age and Gender Prediction using Deep Convolutional Neural Networks.

**Author name:** Insha Rafique, Awais Hamid, Sheraz Naseer, Muhammad Asad, Muhammad Awais, Talha Yasir.

**Description:** In this paper, the Deep CNN is used to train the model to extent the accuracy of age and gender up to 79%.

### III. DATASET USED

The datasets used for the proposed project are:

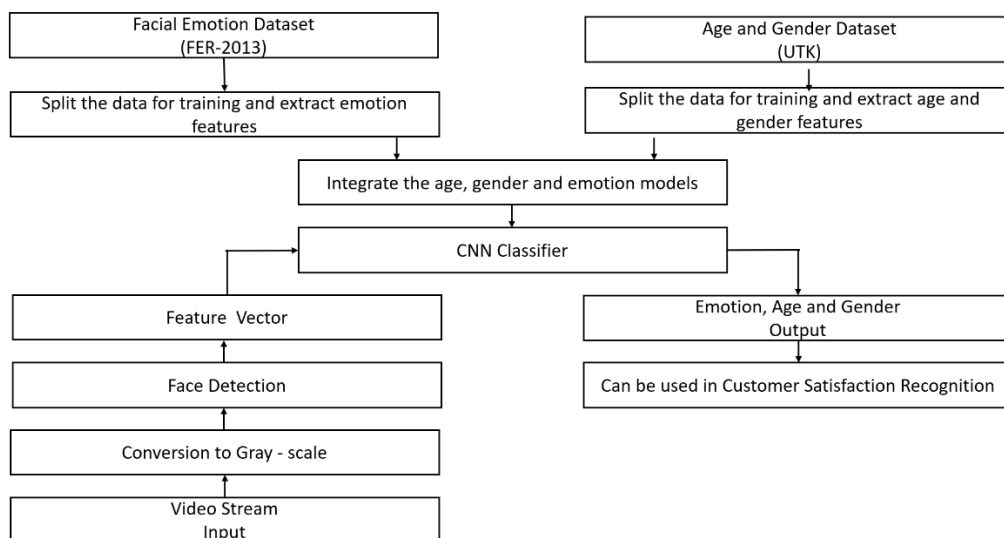
1. FER-2013 for Facial Emotion Recognition – The size of the FER-2013 dataset is 294 MB which consists of 48 x 48 grayscale images. The training set consists of 28,709 examples and the public test set consists of 3589 examples.
2. UTK dataset for Age and Gender Recognition – The UTK dataset consists of 27305 images. The size of the dataset is 195MB

### IV. SYSTEM ARCHTECHTURE

The project implementation is divided into two phases: Training and Deployment.

In training phase, the FER-2013 dataset is loaded. This dataset is used to train the Emotion Classifier model. Similarly, the UTK dataset is loaded. This dataset is used to train the Age and Gender Classifier model using CNN algorithm. VGG-16 (Visual Geometric Group) architecture will be used to train the CNN classifier. Also, Activation function used will be Relu. Store the trained Emotion, Age, Gender Classifier models on the disk. In the deployment phase, first the trained Emotion , Age and Gender Classifier models are loaded. Then customer's face is detected from the live video stream taken as input through the webcam. Haar cascade classifier from OpenCV is used to detect the face. OpenCV is a library of different models and it already contains many pre-trained classifiers for detecting face. For detecting faces, OpenCV requires grayscale frames and the video frames that is captured from the webcam is in RGB scheme. So, each RGB scheme frame will be converted into Grayscale frame. Next the region of interest (ROI) will be extracted i.e., the detected face. From Region of Interest, the feature vector is extracted which is further passed on to the CNN classifier. The trained Emotion , Age and Gender Classifier models are applied to the extracted feature vector which then determines the respective Emotion (Happy, Surprise, Angry, Sad, Neutral, Disgust, Fear) , Age and Gender(Male or Female) of the customer.

Emotion is used to determine if the customer is satisfied or not. If the emotion of the customer is Happy or surprised then the customer is satisfied. If the customer's emotion is sad, disgust, angry or fear then the customer is not satisfied. And if the emotion of the customer is neutral then customer satisfaction is also neutral. Age and Gender of the customer is recognized as an additional information.



SYSTEM ARCHTECHTURE



### V. CONCLUSION

Facial Features are one of the most potent channels for Emotion, Age and Gender recognition. We have developed a computer vision system that performs face detection, age and gender classification and emotion classification in a single integrated module. Convolutional Neural Networks (CNN) can be used as a solution in recognizing Emotion, Age and Gender and hence recognizing Customer Satisfaction. Different techniques like VGG and OpenCV are studied and are used to implement the customer satisfaction recognition model.

### VI. REFERENCES

- [1] Gerard Pons and David Masip, Supervised Committee of Convolutional Neural Networks in Automated Facial Expression Analysis, IEEE Transaction 2017.
- [2] Zirujirao, FengchunQiao, NaimingYao, ZhihaoLi, HuiChen, Hongan Wang, An Ensemble of VGG Networks for Video-Based Facial Expression Recognition, First Asian Conference on Affective Computing and Intelligent Interaction (ACII Asia),2018
- [3] Insha Rafique, Awais Hamid, Sheraz Naseer, Muhammad Asad, Muhammad Awais, Talha Yasir, Age and Gender Prediction using Deep Convolutional Neural Networks, International Conference on Innovative Computing (ICIC),2019