Customer Feedback Analysis Using Facial Emotion Recognition

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***Abstract*-Our lives are being significantly impacted by the rapid development of wireless technology and mobile gadgets on this day. The digital economy demands that services be developed almost instantly while also paying close attention to client feedback. It becomes difficult to manage and analyze the information gathered about products from customers. Also, everyone is not intended to provide clear feedback whether the product was satisfactory or not. It is a very difficult and time-consuming task to analyze the data collected manually. To proceed with the problem and through much research we came across a solution, an emotion recognition system which can overcome this situation in real time.**

***Keywords*:**CNN, Machine Learning, NaiveBayes.

1. INTRODUCTION

Facial expression recognition (FER) systems are currently advanced in terms of human capability in detecting and responding to facial expressions while interacting with each other. These approaches are used to develop applications mainly used in the airport, market, shopping mall etc. By observing customer's facial expressions and analyzing them, the provider can offer the best service suitable for the customers. Consumer's feelings can be observed from their facial expressions. Through face-to-face communication, a service provider can find an affective state by using facial expressions. Many researchers have illustrated that facial expressions are an imperative marker of feeling. Researchers have discovered that disappointed consumers always undergo negative emotions. Both complaint and non complaint consumers have experienced the same negative emotions that cause service failure.

2. LITERATURESURVEY

In this section, various Machine Learning techniques are described.

In [1] proposed a method for assessing public acceptability of products based on facial expressions, crucial in product evaluation and brand perception. Their approach involves real-time video processing to extract facial features and analyze emotions using deep learning neural networks. The work provides potential for expanding beyond emotions to include factors like consumer attention The work offers potential for expanding product evaluation and online product reviews.

In [2] proposed a method for analyzing customer feedback using facial emotion recognition by extracting geometric features from facial landmarks. They evaluate their approach using various classifiers and achieve high accuracy, with SVM performing the best. The method involves classifying facial expressions based on muscle movements using SVM and CNN.

In [3] propose a novel method, MFER, for predicting customer satisfaction through facial expression recognition. The framework involves face recognition, facial feature extraction, and expression characterization to determine customer sentiment utilizing Deep CNN and Haar Cascade Classifier.

In[4]propose a framework for classifying user satisfaction based on facial expression recognition and machine learning. The framework involves collecting facial expression, gender, and age data, building classification models using machine learning algorithms, and evaluating model accuracy. With an accuracy score of 84%, the framework demonstrates the ability to classify user satisfaction from facial expression data, offering a simple yet effective approach to user satisfaction evaluation.

In [5] propose a method for recognizing facial expressions using neural networks, achieving high accuracy even under challenging conditions like extreme illumination and low image quality. Their approach extracts location and shape features from images, processes them through edge detection and segmentation, and classifies them using a three-layer fully connected neural network

In[6]propose a model for classifying customer feedback sentences into different categories using CNN and RNN (GRU). The model predicts the most probable feedback class along with confidence scores, utilizing fixed-length inputs and padding for efficient batch training.

In [7] propose utilizing facial expression recognition for measuring customer satisfaction. Their work focuses on capturing facial expressions, particularly mouth and eye features, to evaluate customer satisfaction in real-time, offering an alternative to conventional methods. The approach aims to provide a holistic understanding of customer satisfaction and can benefit enterprises seeking to improve supply chain management.

In[8] proposed an end-to-end method for facial emotion detection to measure customer satisfaction. Six new characteristic features were introduced, focusing on significant emotions like "Happy," "Surprised," and "Neutral." The method is invariant to camera position and utilizes open-source systems like OpenFace for facial behavior analysis.

In [9] propose emotion-based user modeling strategies by constructing a separate emoticon space and analyzing approaches for emotion detection in Amazon product reviews. They evaluate the performance of emotion detection approaches using SVM and design an Emotion-Semantic Enhanced Convolutional Neural Network (ECNN) model.

In [10] proposed a novel quality function deployment (QFD) methodology based on customers' emotions conveyed by facial expressions, integrating advanced emotional design techniques. The methodology involves interviewing users, acquiring their facial expressions with a depth camera, clustering the expressions into emotions, and assigning weights to customers' needs based on detected facial expressions

In [11] developed a system for authenticating reviewers based on facial emotion recognition and facial recognition algorithms. The system distinguishes between employees and visitors, capturing only visitor reviews through implicit facial emotions. Leveraging Haar feature-based cascade classifier and Local Binary Pattern Histogram (LBPH) algorithm, the model accurately detects faces and classifies emotions, achieving compatibility and ease of deployment for generating genuine customer reviews.

In [12] proposed a method for reviewing public acceptance of products based on their brand by analyzing customer facial expressions in supermarkets or hypermarkets. They introduced a modified Harris algorithm for faster feature point extraction, enabling real-time facial expression detection. The method uses feature points from the mouth and eyes to identify expressions like curiousness, satisfaction, and excitement, helping to determine product reviews.

In [13] developed a customer service system using a CNN trained to detect happy, sad, and neutral facial expressions of customers observing products. The system achieved an average success rate of 82.9% and utilized two classifiers, SVM and Softmax, in its proposed models. The experiment recorded spontaneous expressions of 53 subjects observing product slideshows in different conditions, with future work aimed at recognizing additional facial expressions.

In [14] proposed a novel quality function deployment (QFD) methodology based on customers' emotions conveyed by facial expressions, integrating advanced emotional design techniques. The methodology involves interviewing users, acquiring their facial expressions with a depth camera, clustering the expressions into emotions, and assigning weights to customers' needs based on detected facial expressions.

In [15] propose a method for recognizing facial expressions using neural networks. Their approach extracts location and shape features from images, processes them through edge detection and segmentation, and classifies them .

Authors	Researchfocus	Remarks
Chirag Bera, Prathamesh Adhav et.,al[1],2022	The research focuses on acceptance of products based on brand by analyzing facial expressions..	The research provides a recognition to assess consumer acceptance of products based on brand, for further expansion.
Moulay Smail,Abdelalim Sadiq et.,al[2],2020	Facial emotion recognition using geometric features analysis.	The research proposes a method for facial emotion recognition based on landmark points and geometric features
DNVSLS Indira, L Sumalatha et.,al[3],2023	Facial emotion recognition for customer satisfaction.	The article introduces MFER for estimating customer satisfaction via facial expressions

Kitti Koonsanit, Nobuyuki Nishiuchiet.,al[4] ,2020	Facial expression recognition for user satisfaction classification.	Classifying user satisfaction based on facial expression recognition
A S Sebyakin, A. V. Zolotaryuk Et.,al.[5],2019	Facial expression recognition using neural networks for real-time applications.	SVM achieves good customer satisfaction prediction via facial emotion.
Deepak Gupta et., al[6],2019	Customer feedback classification using CNN and RNN models with error analysis.	The study proposes a model using CNN and RNN for customer feedback classification.
ZolidahKasiran[7], 2021	Facial expression recognition for customer satisfaction measurement.	Study emphasizes capturing mouth and eyes for expression recognition.
Mariem Slim [8], 2018	End-to-end facial emotion detection for customer satisfaction measurement.	Method achieves high accuracy, outperforms existing techniques.
Miss.Preeti Thakre[9],2020	Emotion detection in Amazon product reviews using enhanced CNN model.	Study employs Emotion-Semantic Enhanced CNN Model.
Ayush Kumar Bar[10], 2023	Facial emotion recognition for product evaluation in consumer science.	Facial expression recognition vital for product evaluation, future scope explored.
Himanshu Sharma et.,al[11], 2020	Authenticity judgment through facial emotion recognition and classification.	The system effectively authenticate reviewers, providing genuine and reliable reviews for various locations.
Vikrant Chaguleet.,al[12], 2021	Facial expression-based product review analysis with modified Harris algorithm.	Method offers a novel approach to analyzing customer sentiments, with potential applications in both offline and online shopping environments.
Golam Morshed[13], 2021	Facial expression recognition for consumer science using CNN-based models.	Facial expression recognition system achieves high accuracy with CNN models.
Maria Grazia Violante[14],2019	Facial expression-based quality function deployment for product design.	QFD methodology integrates facial expression recognition for customer feedback.
Shail Kumar Shah et.,al[15], 2023	The research focuses on developing Emotica.AI, an emotion recognition system, to automate customer feedback processing in real-time.	The research focuses on developing an emotion recognition system using CNN and Haar-Cascade Algorithm.

Table -1: Summarization of Various Authors

3. CONCLUSION

Thefacial expression recognition system presents a robust face recognition model based on the mapping of behavioral and physiological biometric variables. The physiological properties of the human face that are relevant to various expressions such as pleasure, sorrow, fear, anger, surprise, and disgust are linked to geometrical structures that are reconstituted as the recognition system's basis matching template. This work focuses on analyzing live facial expressions of consumers who are viewing a certain product, allowing us to conduct a real-time assessment of that product and score it based on the customer's facial expression analysis results.This product rating will assist the business owner in increasing product sales while also ensuring that the top items are available for his clients. This feature is significantly more accurate and quicker than previous techniques, which had a greater margin of error..

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