iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VI **Month of publication:** June 2019

DOI: http://doi.org/10.22214/ijraset.2019.6083

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

Estimating Audience Engagement/Disengagement while Watching a Video

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Abstract: ***While watching movies, an audience may express both nice and vulgar gestures (emotion) like; smiles, head pose change, fidgeting, stretching which conveys sentiment in form of engaged or disengaged during feature-length movies. Such engaged or disengagement will help to predict movie rating. Observing these behaviors using computer vision systems is a very challenging task especially in a movie theatre environment. There needs to develop a system which can estimate audience engagement and give the correct prediction of movie rating.***
This paper gives the survey of different techniques used by the researcher for predicting the movie rating based on the different scenario and abstract view of the system which we are going implement with higher accuracy in movie rating prediction.
Keywords: Movie Ratings Prediction, Audience Engagement, Facial Expressions.

I. INTRODUCTION

Computer vision techniques are used in various fields such as traffic control, event monitoring, marketing, healthcare field, quality control, military technology, etc. One of the sub-areas of computer vision is facial expression identification. Facial expressions which can be classified fear, happiness, joy, sadness, aggressiveness is recognizable with computer vision techniques.
Nowadays it has become necessary to identify the facial recognition of human which helps the organization as well as individual to recognize the emotions of the person. It can apply to all different places where recognition plays an important role in identifying the emotion.
Facial emotion recognition is one of the explicit issues of computer vision. Emotions which can be categorized like fear, contentment, joy, sadness, aggressiveness are recognizable facial expressions using computer vision. Emotional expressions at face are related to the activities or positions of the muscles under the skin and are a form of nonverbal agreement.

Figure 1 (below) shows the normal steps involved in image processing.

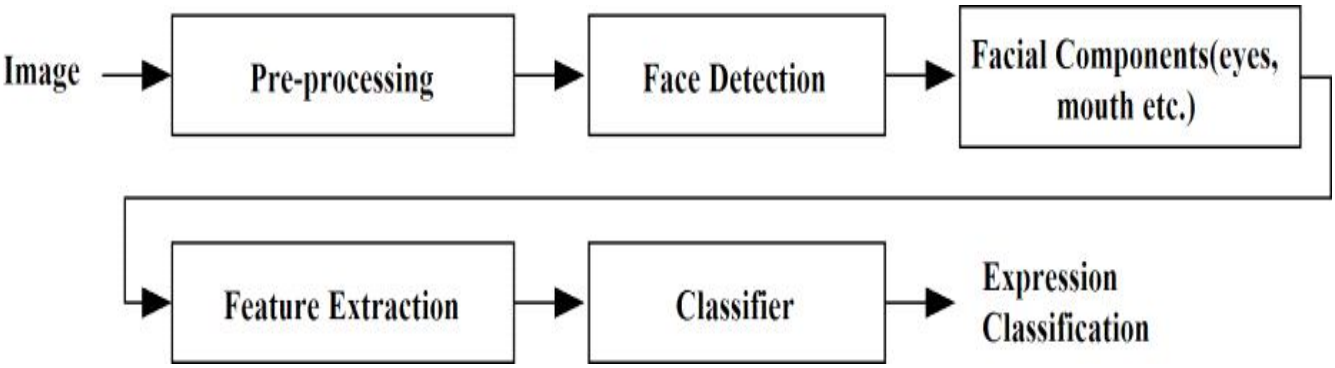

Figure 1: Steps in Image Processing for Expression Classification

Facial expression recognition is a process performed by humans or computers, which consist of:

1) Locating faces in the scene (e.g., in an image; this step is also referred to as face detection),
2) Extracting facial features from the detected face region (e.g., detecting the shape of facial components or describing the texture of the skin in a facial area; this step is referred to as facial feature extraction),
3) Analyzing the motion of facial features and/or the changes in the appearance of facial features and classifying this information into some facial expression-interpretative categories such as facial muscle activations like smile or frown, emotion (affect) categories like happiness or anger, attitude categories like (dis)liking or ambivalence, etc. (this step is also referred to as facial expression interpretation)

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II. LITERATURE SURVEY

Rajitha Navarathna et al. [1] propose a method of representing audience behavior through facial and body motions from a single video stream, and use these features to predict the rating for feature length movies. Method is used to learn individual and group behaviors; and by using these representations learning of movie rating classifier from crowd sourced ratings are collected by rottentomatoes.com.

Chen Cao, et al. [2] demonstrate the potential of Face Warehouse a 3D facial expression database for visual computing with four applications i.e. facial image manipulation, face component transfer, real-time performance-based facial image animation, and facial animation retargeting from video to image.

Jacob Whitehill, et al. [3] gives an Automatic Recognition of Student Engagement from Facial Expressions techniques for data annotation, including the timescale of labelling. By comparing state-of-the-art computer vision algorithms for automatic engagement detection; the correlations of engagement with task performance is estimated.

Mohammad Soleymani et al. [4] presents an approach in detecting video viewers' emotions from electroencephalogram (EEG) signals and facial expressions. A set of emotion inducing videos were shown to participants while their facial expressions and physiological responses were recorded Long-short-term-memory recurrent neural networks (LSTM-RNN) and Continuous Conditional Random Fields (CCRF) were utilized in detecting emotions automatically and continuously.

Hari Prasad Mal et al. [5] represents the various techniques used in facial expression detection along with system. For facial expression recognition the tensor perceptual color framework is used that has the highest recognition rate and has highest performance. SIFT flow technique is used for feature classification generates as it has higher classification rate.

Yang Zhong et al. [8] proposes the approach of predicting face attributes using CNNs trained for face recognition. Combining with conventional face localization techniques the CNNs is get with off-the-shelf architectures and publicly available models like Google's FaceNet with the conventional pipeline to study the prediction power of different representations from the trained CNNs. Here the face descriptors are constructed from different levels of the CNNs for different attributes to best facilitate face attribute prediction. By properly leveraging these off-the-shelf CNN representations, the system can achieve accurate attribute prediction with current state-of-the-art performance using the two datasets LFWA and CelebA.

Ramón Zatarain-Cabada et al.[10] presents the building and validating of a face expression database and a face expression recognizer. The face expression recognizer uses a geometric-based technique that measures distances between the central point on the face and other 68 facial landmark points. These measures are transformed into features to train a support vector machine. The database was built inside an educational context while students' program in Java code. The tests validate the accuracy of the recognizer applying a ten-fold cross-validation.

Ramon Zatarain et al. [11] uses A geometric- based recognizer that calculates coordinates, distances, and angles in different faces. The paper can detect 4 emotions having relation to educational contexts accuracy: 1. Frustration -55% 2. Boredom – 76% 3. Engagement – 91% 4. Excitement- 68%.

Barbu, et al. [12] is considered that Gabor filtering is one of the most vital feature extraction system in facial expression recognition. The basic limitation of Gabor filter is its bandwidth limitation i.e. Supreme bandwidth is limited to one octave. Gabor filters cost high and low frequency information since it is band pass in nature.

Ashwin T et al. [13] propose multiuser face detection-based eLearning system using support vector machine based supervised machine learning technique. Experimental results demonstrate that the proposed system provides the accuracy of 89% to 100% w.r.t different datasets (LFW, FDDB, and YFD).

III. PROPOSED SYSTEM

Nowadays many systems work on detecting face and facial emotion. To detect emotions only from the face is the more challenging task. The main task of the system is to generate an image block from the input video. The system analyzed facial expression using the features which extracted from the generated block. Detecting different and accurate facial expression is more difficult. So, we propose a new approach to facial expression detection in different emotions. Figure 2 shows the architecture of the proposed system. The Estimating Audience Engagement for Movie Rating System uses the SVM algorithm for detecting facial expression from the input image. Firstly, User uploads video/grabs images using a live camera on the application, the application then extracts frames from the video. Once we get the faces to apply the pre-processing to images like noise removal, normalization etc.

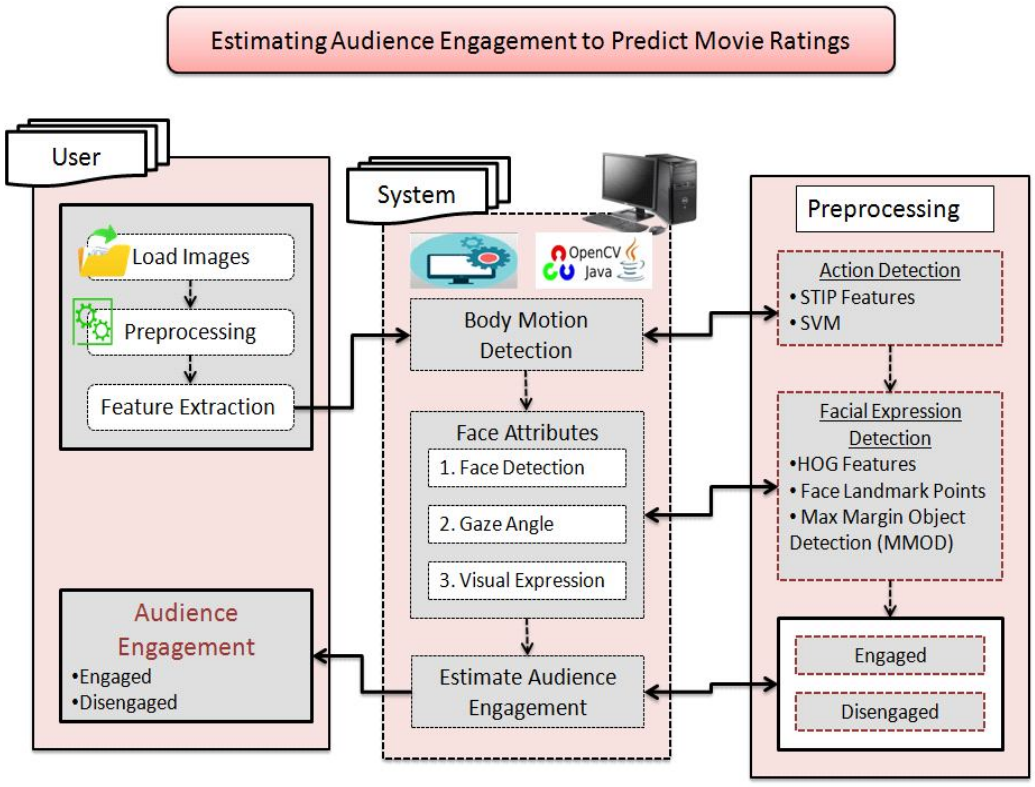
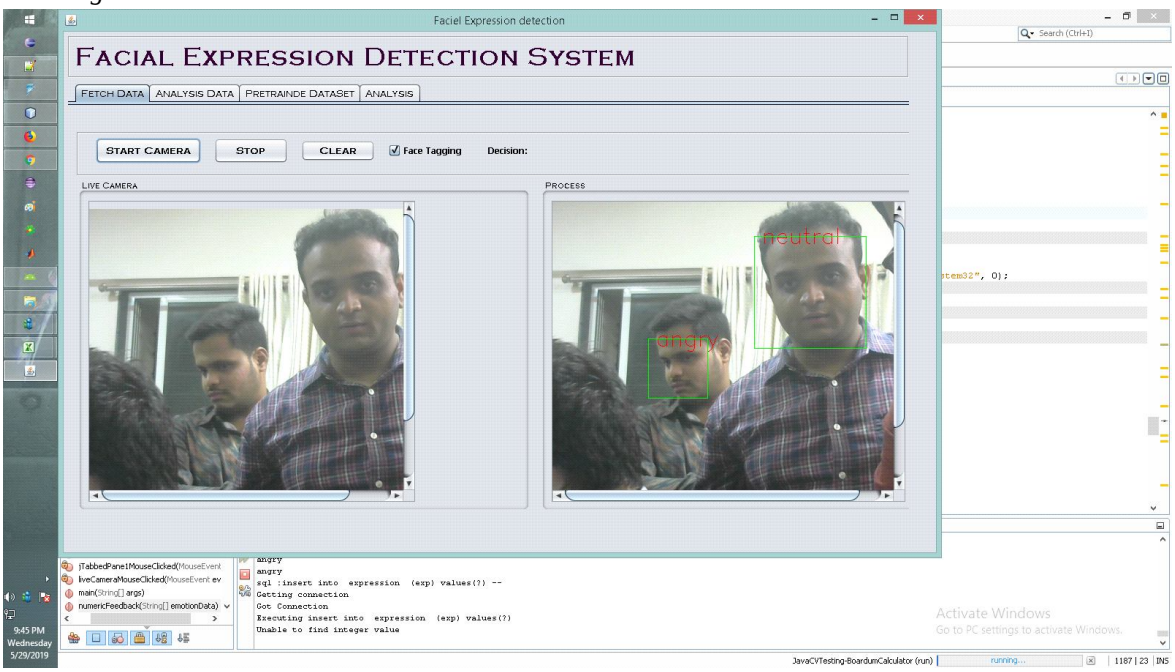


Figure 2: System Architecture

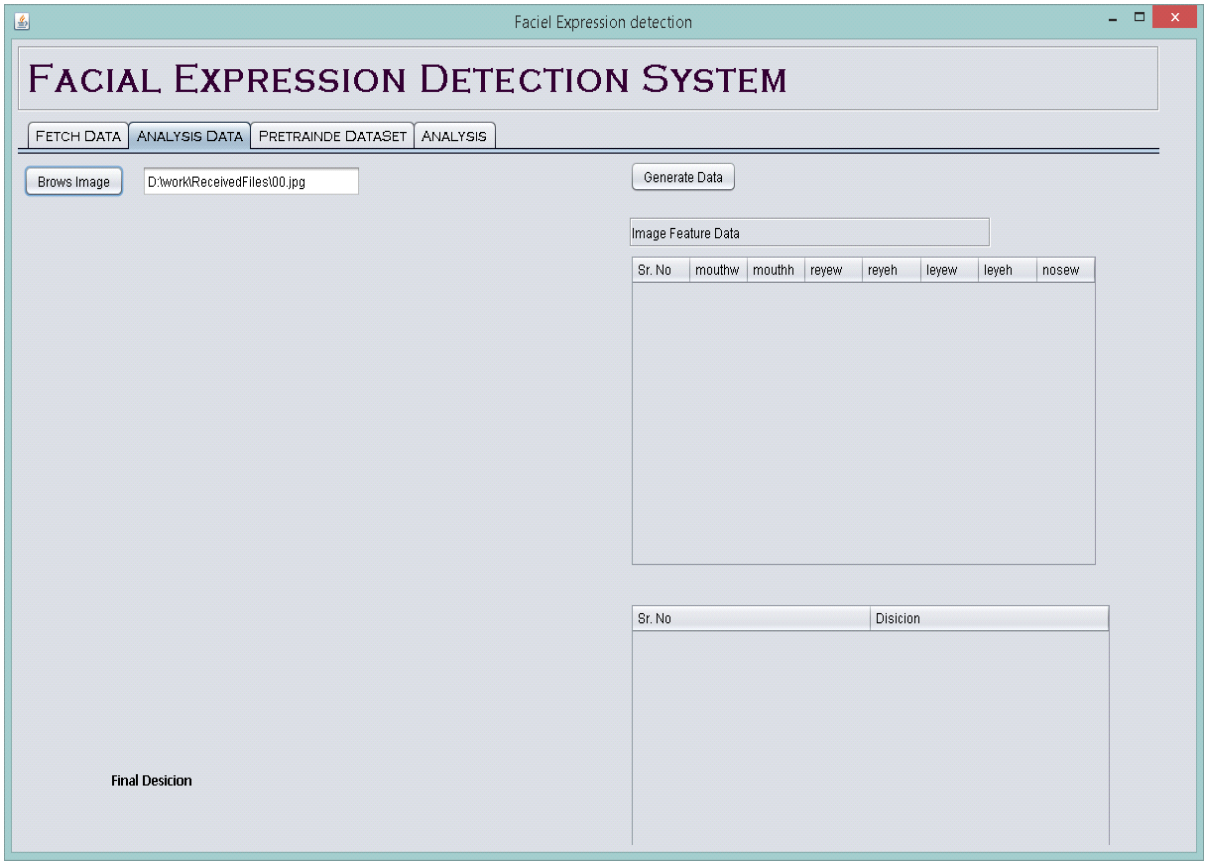
Once we get the faces to apply the pre-processing on images like noise removal, normalization etc. we can detect the person body motion using STIP features. Feature extraction is done with the help of STIP. the feature is extracted with the help of STIP. Visual appearance helps to estimate audience engagement during various segments of the movie. Audience engagement estimate using parameters like engaged and disengaged. Finally, movie rating prediction is done according to engagement analysis results.

IV. IMPLEMENTATION

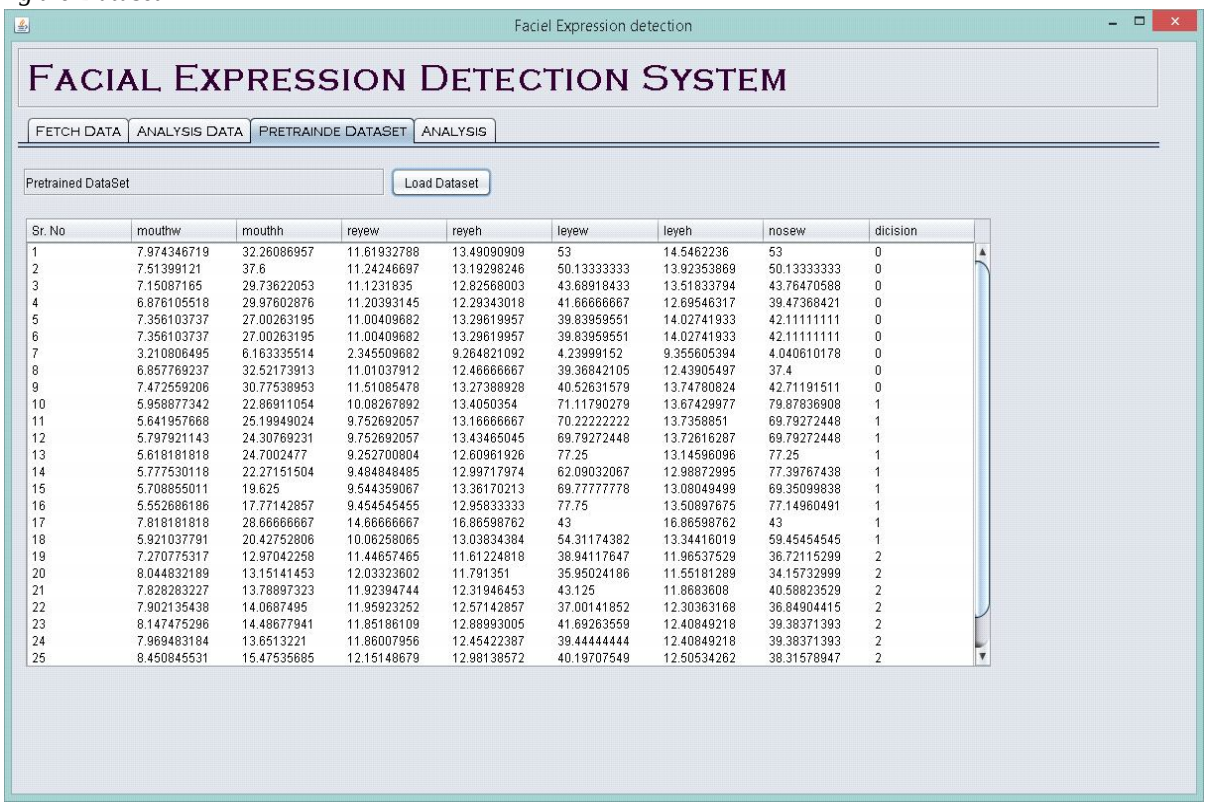
A. Data Gathering



B. Data Analysis

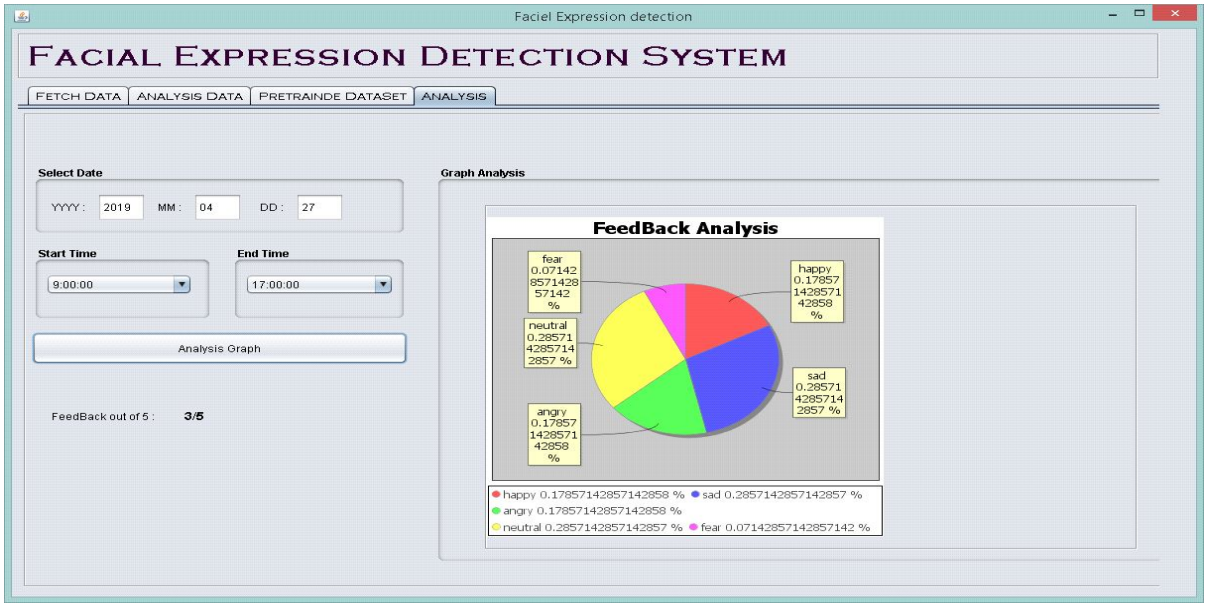


C. Loading the Dataset



Sr. No	mouthw	mouthh	reyew	reyeh	leyew	leyeh	nosew	dicision
1	7.974346719	32.26086957	11.61932788	13.49090909	53	14.5462236	53	0
2	7.51399121	37.6	11.24246697	13.19298246	50.13333333	13.92353869	50.13333333	0
3	7.15087165	29.73622053	11.1231835	12.82568003	43.68918433	13.51833794	43.76470588	0
4	6.876105518	29.97602876	11.20393145	12.29343018	41.66666667	12.69546317	39.47368421	0
5	7.356103737	27.00263195	11.00409682	13.29619957	39.83959551	14.02741933	42.11111111	0
6	7.356103737	27.00263195	11.00409682	13.29619957	39.83959551	14.02741933	42.11111111	0
7	3.210806495	6.163335514	2.345509682	9.264821092	4.23999152	9.355605394	4.040610178	0
8	6.857769237	32.52173913	11.01037912	12.46666667	39.36842105	12.43905497	37.4	0
9	7.472559206	30.77538953	11.51085478	13.27388928	40.52631579	13.74780824	42.71191511	0
10	5.958877342	22.86911054	10.08267892	13.4050354	71.11790279	13.67429977	79.87836908	1
11	5.641957668	25.19949024	9.752692057	13.16666667	70.22222222	13.7358851	69.79272448	1
12	5.797921143	24.30769231	9.752692057	13.43465045	69.79272448	13.72616287	69.79272448	1
13	5.618181818	24.7002477	9.252700804	12.60961926	77.25	13.14596096	77.25	1
14	5.777530118	22.27151504	9.484848485	12.99717974	62.09032067	12.98872995	77.39767438	1
15	5.708855011	19.625	9.544359067	13.36170213	69.77777778	13.08049499	69.35099838	1
16	5.552686186	17.77142857	9.454545455	12.95833333	77.75	13.50897675	77.14960491	1
17	7.818181818	28.66666667	14.66666667	16.86598762	43	16.86598762	43	1
18	5.921037791	20.42752806	10.06258065	13.03834384	54.31174382	13.34416019	59.45454545	1
19	7.270775317	12.97042258	11.44657465	11.61224818	38.94117647	11.96537529	36.72115299	2
20	8.044832189	13.15141453	12.03323602	11.791351	35.95024186	11.55181289	34.15732999	2
21	7.828283227	13.78897323	11.92394744	12.31946453	43.125	11.8683608	40.58823529	2
22	7.902135438	14.0687495	11.95923252	12.57142857	37.00141852	12.30363168	36.84904415	2
23	8.147475296	14.48677941	11.85186109	12.88993005	41.69263559	12.40849218	39.38371393	2
24	7.969483184	13.6513221	11.86007956	12.45422387	39.44444444	12.40849218	39.38371393	2
25	8.450845531	15.47535685	12.15148679	12.98138572	40.19707549	12.50534262	38.31578947	2

D. Plotting the Result



V. CONCLUSION

Nowadays many systems work on detecting face and facial emotion. To detect emotions only from the face is the more challenging task. This paper represents the survey of various techniques used by the researcher in facial expression detection and demonstrates its sentiment predictive capability.

An approach to estimating audience engagement for movie rating has been proposed using an SVM classification algorithm. The audience engagement is based on the audience facial expression and body movement. And the movie rating is predicted based on the audience engagement level. The proposed system used the image for estimating the audience engagement and for predicting the movie rating. In the future, we would use the live video while watching the movie for estimating audience engagement & predicting movie rating

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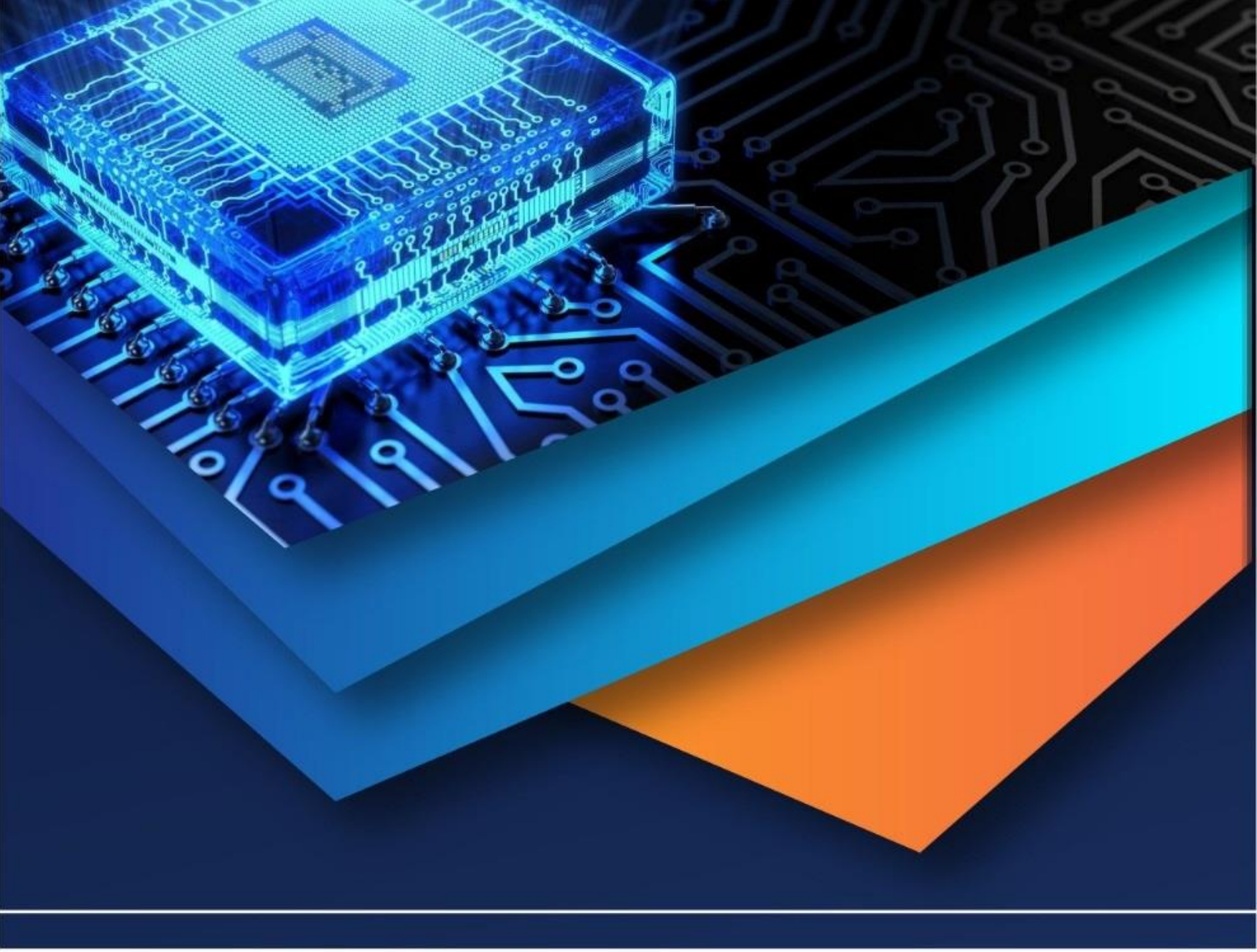

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