

Human Face Recognition to Target Commercial on Digital Display via Gender

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Abstract. Emotion recognition has been applied in many fields such as Medical, Security, and Business etc. There are many complications in evolving a good emotion recognition scheme for the human face in real time. Since most of the time facial features of expression and the style of presentation emotion to the outside world is dissimilar from person to person. Thus, it is very problematic to build a precise scheme for real time emotion recognition. This paper is to distinguish human facial expressions to predict the current emotional state. The system specially focused on reducing fatal road accidents due to drivers' state of emotion. Initially it is built to recognize the human emotion through facial expressions and then evaluated to detect drowsiness using facial landmarks to ensure the safety of the driver. Training has been done with Kaggle dataset for seven emotional states (Neutral, Happy, Angry, Sad, Scared, Surprised and Disgust) called universal emotions. In order to predict drowsiness, it uses specific twelve points on face (six points on each eye) in shape predictor sixty face landmarks. Evaluated system has given 71% accuracy in testing and drowsiness alert also showed a very good success rate.

Keywords: Highways Traffic Surveillance System, IP camera, OpenCV

1 Introduction

If the advertisements that are visible in Digital advertisement boards in towns, such as at bus stops, at the train station, in the places where people are in, can visible for particular human who look at the billboard. Then the value of the advertisement is further increased. Then I can increase the number of people who are attracted to the advertisement. Then the sales volumes of each business will increase. Also, when there are no people look at these advertisements, energy is wasted due in that time. It is not a good sign of an energy crisis.

The researchers tend to find most effective and optimized methods for Face, age and gender -Recognition, in order to provide better quality systems for different purpose.

A study is conducted about A Comparative Analysis of Gender Classification Techniques in 2003, which describes an automated classification of gender has gained enormous significance and has become an active area of research. According to them many researchers have put a lot of effort and have produced quality research in this area. They give a comprehensive comparison of state-of -the-art research techniques. They are divided the classification process into three stages which are Pre-Processing, Feature Extraction, and Classification [1].

In 2011, research discussed method and system for selectively execution content on a display based on the predefined characteristics. In this system only can identify single person

how is in behind the billboard. They give an invention detects the images of individual from captured images and compare attributes like height, skin color, hair color and the number of people in the scene. There used database for store predefined characteristics. But cannot given a best advertisement by using identified attributes. [2].

In 2015, a study explores the Economics of Successful Billboard Advertising. The main objective of the explains the economics of billboard advertising, specifically pertaining to the internal and external elements that make them effective for both consumers and the brand. This research determines which internal and external elements for a billboard to be considered effective. They are not given a billboard system.[3].

Face Behaviour Recognition through Support Vector Machines detailed in 2016, In this paper, the aforementioned works are studied and analyzed and in view of that, a new approach is proposed for recognizing facial expressions from still pictures of two different sets of facial expression which would be extracted via the facial feature point extraction technique. In here face behaviour recognition system divided into five main stages: Facial Database, Pre-Processing, Feature Extraction, Feature Selection, and Classification. there used 15 face landmarks to determine facial expression. [4].

Another research, bridge the divide between a purely technical and a purely socio-political analysis of facial recognition technology. that talks in detail about the technical capabilities and features of Feature Recognition Tool (FRT) but does not really connect well with the challenges of real-world installations, actual user requirements, or the background considerations. The main findings and recommendations of the research are broken down into five broad categories: performance, evaluation, operation, policy concerns, and moral and political considerations. [5].

In 2017, a paper describes an experimental work executed by Carabinieri Forensic Investigation Department to explore the performance of the automatic face recognition systems in forensic domain. The main goal of the research is to survey the recognition ability and identification performance of these tools. The experiments are carried out using three commercial automatic facial recognition platforms. They compare the difference between the way of manual facial comparison techniques. [6].

In the same year, is mainly focus on a comparative analysis of two feature extraction technique of face recognition PCA and LDA on different criteria like facial expression, illumination variant and glass – nonglass for frontal face images. According to them the face recognition accuracy is depends on two procedures which are human face detection and a feature extraction method [7].

Increasing world competition has created several corporations need to seek out a lot of innovative ways that of promoting their product and services. This has contributed to the increased use of sign advertisement (an example of outside advertisement) as a communication tool to enhance the promotional efforts of several organizations and by extension sales revenue in many industries. Sign advertising used organizations to extend sales and ultimately produce awareness of their product. The research indicates that 42% of respondents were male and 58% were female. Its means females are more attracted to billboards than men. [8].

Ideal face features are expected to have smaller maximal intra-class distance than minimal inter-class distance under a suitably chosen metric space. However, few existing algorithms can effectively achieve this criterion. Researchers proposed the angular software that enables convolutional neural networks to learn angularly discriminative features. They used convolutional neural networks (CNNs) in face recognition [9].

Researchers given an algorithm for simultaneous face detection, landmarks localization, pose estimation and gender recognition using deep convolutional neural networks (CNN). This technique known as HyperFace fuses the intermediate layers of a deep CNN employing

a separate CNN followed by a multi-task learning algorithmic program that operates on the consolidated options. It exploits the natural action among the tasks that boosts up their individual performances. They propose two variants of HyperFace, (1) HyperFace-ResNet that builds on the ResNet model and achieves significant improvement in performance, and (2) Fast-HyperFace that uses a high recall fast face detector for generating region proposals to improve the speed of the algorithm. [10].

Most commonly, the underlying algorithms analyze the facial appearance for clues of gender. Researchers proposed a novel method for gender estimation, which exploits dynamic features gleaned from smiles and they proceed to show that: a) facial dynamics incorporate clues for gender dimorphism and b) while for adult individual's appearance features are more accurate than dynamic features, for under 18 years' facial dynamics can outperform appearance features. [11] In here week point is not more accuracy under 18 years faces. In our proposed method used facial feature points and it perform more accuracy for all ages.

Researchers presents a comprehensive survey of facial feature point detection with the assistance of abundant manually labelled images. In this method used only 68 facial feature points [12] and not given gender or age identification. In our method I used 70 feature points and use age and gender generator. The method I used gives how much confident people gender and age using feature points.

Face alignment or facial feature points, also known as facial landmark localization, seeks to localize pre-defined landmarks on human faces. Face alignment plays an essential role in many face related applications. Researchers introduce boundary prediction and CoordConv with boundary coordinates to improve face alignment accuracy. They also propose Weighted Loss Map, which assigns high weights on foreground and difficult background pixels to help training process focus more on pixels that are crucial to landmark localization. [13].

Researchers introduce a large-scale face detection dataset called WIDER FACE. They give WIDER FACE through proposing a multi-scale two-stage cascade framework, which uses divide and conquer strategy to deal with large scale variations. Within this framework, a set of convolutional networks with various size of input are trained to deal with faces with a specific range of scale. [14] But this research gives a method for only recognize the faces not gives age or gender identification method.

A multi-view detection approach featuring score re-ranking and detection adjustment. Following the learning pipelines in Viola-Jones framework, the multi-view face detector using aggregate channel features. the most influential work should be the face detection framework proposed by Viola and Jones. The Viola-Jones framework uses rectangular Haar-like features and learns the hypothesis using Adaboost algorithm. Combined with the attentional cascade structure, the VJ detector achieved real-time face detection at that time. These methods mainly get the performance gains in two aspects, more complicated features and (or) more powerful learning algorithms. The above method limited the performance of the algorithm. [15]. Multi-view face detection is most important in face detection. In most of research not achieve the detect multiple faces. While there has been significant research on this problem, current state-of-the-art approaches for this task require annotation of facial landmarks [16]. Another research used novel deep convolutional network (DCN) that achieves outstanding performance on multiple face detection. In the state-of-the-art method [16] have a large margin of 2.91% high recall rate. [17].

Increasing international competition has created several firms wish to search out more innovative ways in which of promoting their goods and services. For that they increased use of billboard advertisement to enhance their sales revenue. So our aim is given AI base billboard system for archive target advertisement.

Energy wastage also has been identified when none of the people watch these advertisements. Therefore, a solution is introduced to save energy as well. Main objective of

this research is to develop a software for more productive-based advertising to overcome the above critical points using artificial intelligence to detect faces, gender and the age from a camera.

Our main goal is to create software for more productivity-based advertising. The main objective here is to overcome the two above points. Here artificial intelligence is used to identify faces, gender and age by vision of camera. (Image Processing). This research study focuses on the identify faces, gender and age by vision of camera in artificial intelligence. And this research provides a system which is can identify human gender, range of age and show the show the most likely attracting advertisements to different people, which is based on human's age and gender. Other side power saving mood activate when no anyone behind the billboard.

Our works objectives are can defined as display advertisement to target group, give a chance to improve company's profit and power saves.

Finally, our research provides to user a real time intelligent system for targeted advertising systems, Increase the number of people who are attracted to the advertisement, Value of the advertisement is increased, Organizational profit increase, Power saving when none of the people watch these advertisements.

This paper consists specified the methodology that I went through. Results of this research, conclusion and future works will take a part at the end of the paper respectively.

2 METHODOLOGY:

I used the Robust Algorithm for Face Detection in color video. Robust Algorithm is existing for frontal face detection in color images. Face detection is an essential task in facial analysis systems in order to have a priori localized faces in a given image. Applications such as facial expression recognition, face tracking, gesture recognition, etc., Facial features such as eyes, nose and mouth are automatically detected based on properties of the related image regions. On detecting a mouth, a nose and two eyes, a face verification step based on Eigen face theory is applied to a normalized search space in the image relative to the distance between the eye feature points.

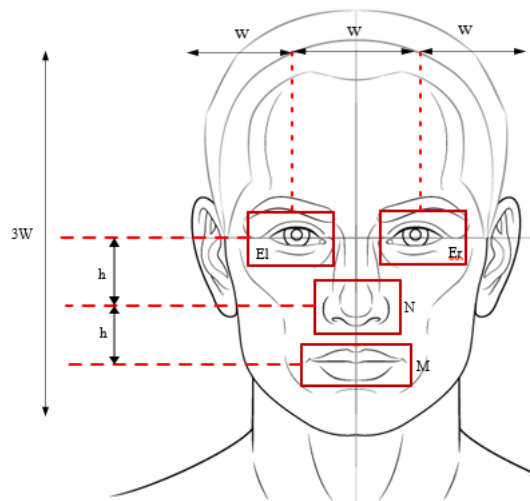


Fig. 1. Frontal Face Image

Most of a frontal face image containing a mouth, nose and two eyes is shown in Fig. 1. E_l and E_r represent left and right eyes respectively, while N represents the nose feature and M also represents the mouth feature. The distance between the two eyes is w , and the distance from the mouth to the nose is h and the distance from nose to the two eyes is also h .

In frontal face images, structural relationships such as the Euclidean distance between the mouth, the nose and the left and right eye, the angle between the eyes, the nose and the mouth, provide useful information about the appearance of a face. These structural relationships of the facial features are generally useful to constrain the facial feature detection process.

System Diagram

The face recognize part recognize faces using camera. After it will recognize age and gender. In this system depend on age ranges so it has more accuracy. Then system will create an advertisement queue using information which are comes from people detection system. Then finally system will run advertisement on media player and it will telecast on display which is placed. This system flow will explain in Fig. 2.

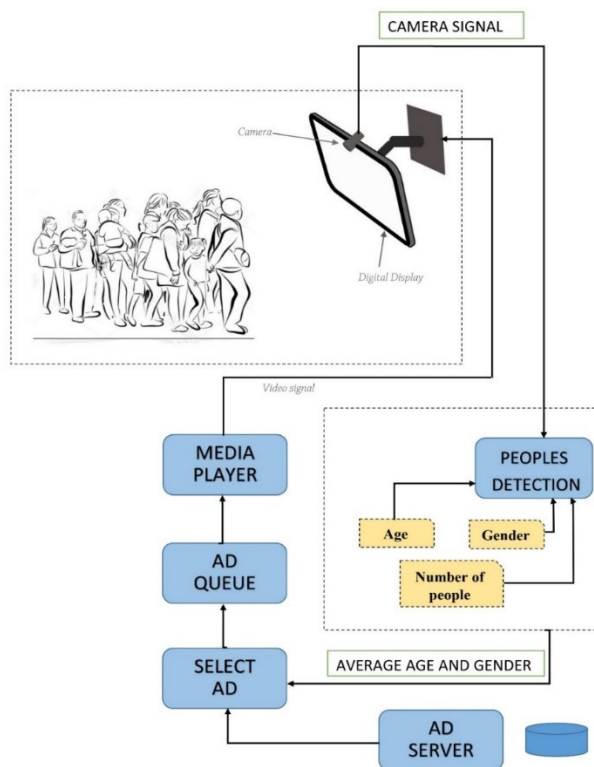


Fig. 2. System Flow

The diagram of the face detection system is shown in Fig. 2. The first task is skin detection which is carried out using a statistical skin detection model by color video. Next Identify facial features based on image pixels and the corresponding color segmentation regions. After first

detect the eye and another T points relative to the position of the eye. detected 70 facial feature points containing a mouth, a nose and two eyes, are store in the array. Fig. 3 shows facial feature points that are detailed in discussion.

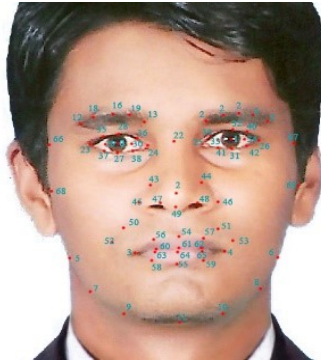


Fig. 3. Facial Features

3. RESULT AND DISCUSSION:

The API allows for identifying gender and age of a face by using the Facial Attribute function. The perform returns confidence levels for every gender (male and female) within the output string. The confidence level for each attribute returned by the function, varies from 0 to 1. And the function return age confidence in float data type. In this system, Gender recognize have 94% accuracy and age recognize has 90% is shown in table 01. But in this system will work by age range, so it will increase system accuracy. Sample result are given below in Fig. 4.

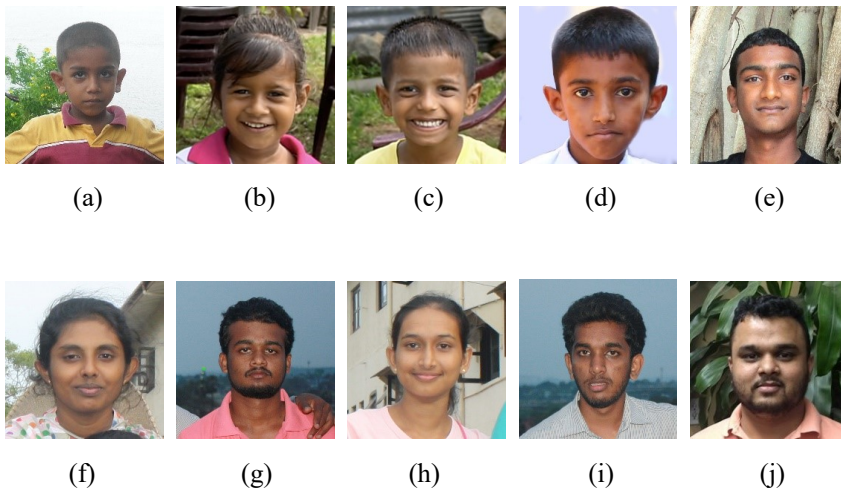


Fig. 4. Sample Figures

Table-01

	Age		Gender		Age Group
	Prediction	Expected	Prediction	Expected	
a	6	6	Male	Male	0 – 12
b	10	11	Female	Female	0 – 12
c	13	14	Male	Male	13 – 17
d	15	16	Male	Male	13 – 17
e	16	17	Male	Male	13 – 17
f	20	22	Female	Female	18 – 24
g	23	22	Male	Male	18 – 24
h	24	24	Female	Female	18 – 24
i	25	24	Male	Male	25 – 34

4. CONCLUSION

This paper given an AI base targeted advertising system that providing a good advertising experience for advertising. The AI base advertising system consists of face detection, including gender and age recognition. The multiple face detection technology provides the capabilities of detection and recognition of human faces, gender and age based on facial features. The system provides highly accurate results and better performance. The system ability to display targeted advertisement content provide benefits to the advertisers from reduce their promotional costs and can offer products and services that customers require. Other benefit is saving the total power usage than normal digital advertising billboard.

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