Real Time Facial Recognition System Over Machine Learning

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Abstract-The proposed work is invented Face (facial) recognition is the identification of humans based real time surveillance framework. Implementation is resolved existing security problem. In existing work, different security and surveillance mechanism used. These techniques are insufficient to give noble solution over critical surveillance needs. So there was need of such technique which gives strong solution over physical level security by using face identification as well as age, gender identification. All these categories will definitely increase security factors make our system more reliable. In advance we had considered age, gender and emotional characteristics in real time facial expressions. Our approach is fully depends on machine learning and python libraries which great deals with accuracy problem in real time applications. The big challenge will come while working with real time face images for correctly estimating facial features.

Keywords-Open Computer Vision, Machine Learning, Convolutional Neural Network

1. INTRODUCTION

The real time facial recognition is one of those considerable challenges while working with real time face images. A lot of face recognition systems already worked for surveillance field which is an experimental area which is automatic machines to collects human-like characteristics. Among many non-verbal and involuntary channels through which humans express themselves, unique facial features holds paramount importance. By calculating human’s unique facial features we are used to invent facial recognition system for surveillance. There is big challenge to detect real time face and extract exact uniqueness contents to users which already trained with our train model. Face (facial) recognition is the identification of humans by the unique characteristics of their Faces. Face recognition technology is the least intrusive and fastest bio-metric technology. It works with the most obvious individual identifier the human face. With increasing security needs and with advancement in technology extracting information has become much simpler. This project aims on building an application based on face recognition using different algorithms and comparing the results. The basic purpose being to identify the face and retrieving information stored in database. It involves two main steps. First to identify the distinguishing factors in image n storing them and Second step to compare it with the existing images and returning the data related to that image.

The problem to be solved by this work is to present a work with the following characteristics:

1) To take input real time face image from open compute vision library of machine learning and image processing. A real time image is containing face features of human and output in the form of face recognition result.

2) To run in real-time application uses open-CV library functionality with CNN algorithmic solution.
3) This allows user to change their face features such as nose, mouth, eyes etc. and the user can see controlled face image in real time.

4) For the real time accuracy in the face feature recognition able regulations model creation process must be completely spontaneous. This feature is to make the system absolute alternative to unique face feature evaluation techniques, especially where an artistically untrained user is concerned.

II. LITERATURE SURVEY

Abhishek Tripathi et.al [1] states, EmoWare: A Context-Aware Framework for Personalized Video Recommendation Using Affective Video Sequences’ In this paper, the harness the potential of the said two techniques and propose Emo-Ware (emotion-aware), a personalized, emotionally intelligent video recommendation engine. They proposed Emo-Ware (emotion-aware), a personalized, emotionally intelligent video recommendation engine, employing a novel context-aware collaborative filtering approach, where the intensity of users’ spontaneous non-verbal emotional response toward the recommended videos captured through interactions and facial expressions analysis for decision-making and video corpus evolution with real-time feedback streams.

Paul Covington et.al [2] Deep Neural Networks for YouTube Recommendations, describe the system at a high level and focus on the dramatic performance improvements brought by deep learning. In this split according to the classic two-stage information retrieval dichotomy: first, we detail a deep candidate generation model and then describe a separate deep ranking model. The candidate generation network takes events from the user’s YouTube activity history as input and retrieves a small subset (hundreds) of videos from a large corpus.

Carlos a. Gomez-uribe et.al [3] proposed article discusses the various algorithms that make up the Netflix recommender system, and describes its business purpose. They explain the motivations behind and review the approach that they use to improve the recommendation algorithms. They are inventing Internet television. Their product and source of revenue is a subscription service that allows members to stream any video in our collection of movies and TV shows at any time on a wide range of Internet-connected devices. As of this writing, we have more than 65 million members who stream more than 100 million hours of movies and TV shows per day.

Shangfei Wang et.al [4] has been introduced a general framework for video affective content analysis, which includes video content, emotional descriptors. In this survey current research is in both direct and implicit video affective content analysis, with a focus on direct video affective content analysis. As a result of these developments, video affective content analysis is becoming increasingly important. The goal of video affective content analysis is to automatically tag each video clip by its affective content. Due to the difficulty in defining objective methods to automatically assess the emotions of a video, the research topic of video affective content analysis has not been thoroughly explored until recently.

Daniel McDuff et.al [5] states this subset consists of 242 facial videos (168,359 frames) recorded in real world conditions. They answered three self-report questions about their experience. A subset of viewers additionally gave consent for their data to be shared publicly with other researchers. Web-based framework that was used to crowd source the facial videos and the user experience. Visitors to the website opt-in to watch short videos while their facial expressions are being recorded and analyzed. Immediately following each video, visitors get
to see where they smiled and with what intensity. They can compare their “smile track” to the aggregate smile track. On the clientside, all that is needed is a browser with Flash support and a webcam.

M. Eckhardt et.al [6] Labeling videos for affect content such as facial expression is tedious and time consuming. Researchers often spend significant amounts of time annotating experimental data, or simply lack the time required to label their data. For these reasons we have developed VidL, an open source video labeling system that is able to harness the distributed people-power of the internet.

Markus Schedl et.al [7] The purpose of this trends and survey article is twofold. We first identify and shed light on what we believe are the most pressing challenges MRS research is facing, from both academic and industry perspectives. We review the state of the art towards solving these challenges and discuss its limitations. Second, we detail possible future directions and visions we contemplate for the further evolution of the field.

Oluwatobi Olabiyi et.al [8] The proposed system incorporates camera-based knowledge of the driving environment and the driver themselves, in addition to traditional vehicle dynamics. It then uses a deep bidirectional recurrent neural network (DBRNN) to learn the correlation between sensory inputs and impending driver behavior achieving accurate and high horizon action prediction. The proposed system performs better than other existing systems on driver action prediction tasks and can accurately predict key driver actions including acceleration, braking, lane change and turning at durations of 5sec before the action is executed by the driver.

Sheena C Vet.al [9] States that Key-frame extraction from video data is an active research problem in video object recognition and information retrieval. Key-frame refers to the image frame in the video sequence which is representative and able to reflect the summary of a video content. By using the key-frame it is able to express the main content of video data clearly and reduce the amount of memory needed for video data processing and complexity greatly.

Alexandre Schaeferet.al [10] Proposed that using emotional film clips is one of the most popular and effective methods of emotion elicitation. The main goal of the present study was to develop and test the effectiveness of a new and comprehensive set of emotional film excerpts. Fifty film experts were asked to remember specific film scenes that elicited fear, anger, sadness, disgust, amusement, tenderness, as well as emotionally neutral scenes. For each emotion, the 10 most frequently mentioned scenes were selected and cut into film clips. Next, 364 participants viewed the film clips in individual laboratory sessions and rated each film on multiple dimensions. Results showed that the film clips were effective with regard to several criteria such as emotional discreteness, arousal, positive and negative effect.

III.EXISTING SYSTEM APPROACH

In existing approaches to real time face recognition based on LBP classifier. Such system get recognized face images by recognition system is face detection which checks whether human face is present in the captured image or not. For this we use HAAR Cascade classifier which extracts the features from the captured image. For feature extraction we apply different haar features like edge features, line features. If face is detected then and then only next step that is face recognition starts otherwise process will be terminated.

After successful face detection next phase that is face recognition starts. There are many different face recognition algorithms are present. For example PCA, HMM AND AMM are some of popular algorithms. For face recognition Along with face detection Open-cv is best option.Open-cv is one of the best open source machine libraries. For face recognition we have used Local Binary pattern Histogram(LBPH) as it can be easily understand and computationally simple with minimum difficulties.This algorithm uses four
measures like GRID X, GRID Y, neighbours and radius. With the help of radius circular LBP is generated which denotes the radius around the central pixel and generally set to 1.

![Fig.1 Block Diagram of Existing System](image)

Fig. 1 Block Diagram of Existing System

The overall structure of existing system is illustrated in Figure 1. The system is comprised of LBP networks fails to achieve above 90% accuracy while working with real time face images. So there is need of strong system which will work on real time face recognition with high accuracy.

### IV. METHODOLOGY USED

**A. Image Processing :-**

Every image is formation of RGB colours. Each and every captured image has some noise, unwanted background. Thus there is need of process those captured image before assign to our recognition module. Pre-processing unit made up of noise removal, grey image conversion, binary image conversion of input images after that feature extraction done on those samples. In future extraction five steps applied in which finding the eccentricity. Next elongations of images are evaluated by calculating pixel segmentation as well as rotation of input images.

**B. Tensor-flow :-**

Machine learning is a complex discipline. The implementation in machine learning and creation of models is so much hard and difficult than it used to be, thanks to machine learning technologies and frameworks. Such as Google's Tensor Flow that makes our task simple. It is process of acquiring data, training models, serving predictions, and refining future results.

**C. Convolutional Neural Networks :-**

Brain-inspired systems are to replicate how humans learn. Consist of input, hidden and output layers that transform the input into something that the output layer can use. It is Excellent for finding patterns which are complex for humans to extract and teach the machine to recognize. CNN gathers their knowledge by detecting the patterns and relationships in data and learns (or is trained) through experience, not from programming. CNN takes in processed images as input.
V. PROPOSED SYSTEM APPROACH

In a proposed system, we are proposing real time facial features-based surveillance system which overcomes existing security issues.

![Block Diagram of Proposed System](image)

In a proposed system, we are going to overcome existing drawbacks and provide real time facial features based surveillance system by using open-cv python. Image processing done through algorithm and methods. Facial and age estimation done through inception modules created intensor flow python.

We are going to develop following modules:

1. **Face Image Acquisition**: Using open computer vision library. We are going to capture real time face images of user. After getting faces we are forwarding these images for feature extraction and image processing.

2. **Image processing**: After getting face images by using frontal face XML only faces get cropped and further used to process or deform.

3. **Feature Extraction**: Facial feature extraction is the step of getting face component features like eyes, nose, mouth, etc from real time face images. Facial feature extraction is very much important for the initialization of processing techniques like face detection, facial expression recognition or face recognition. Among all facial features, eye localization and detection is essential, from which locations of all other facial features are identified.

4. **Face Expression & Age Gender Identification**: The facial expression evaluation done by using trained inception model of face expression dataset like happy, sad, angry, confused etc. The Gender Prediction as a classification problem. The output layer in the gender prediction network is of type soft max with 2 nodes indicating the two classes “Male” and “Female”. Age Prediction should be introduces as a Regression problem since we are expecting a real number as the output. However, estimating age correctly using regression is challenging. Even humans cannot accurately predict the age based on looking at a person.

5. **Alert Generation**: Our main aim behind to develop this application is to give multi factor based surveillance system. Which overcomes existing security problem by our face recognition and age-gender based surveillancesystem. An un-authenticated person recognized then email alert will send to our system.
VI RESULTS

Fig. Accuracy comparisons graph

1. Age recognition

Generally, Age Prediction should be based as a Regression challenge since we are hoping a real number as the outcome. However, estimating age correctly using regression is complex. Even humans cannot correctly predict the age depends on looking at a person. The proposed work we are using age net inception work on 8 age categories. The facial dataset has 8 different classes classified into the following age classes [(0 – 2), (4 – 6), (8 – 12), (15 – 20), (25 – 32), (38 – 43), (48 – 53), (60 – 100)]. Thus, the age prediction model has 8 clusters in the final soft-max layer introducing the mentioned ages.

2. Gender recognition

They have developed Gender Prediction as a differentiation problem. The final layer in the gender prediction model is of type soft-max with 2 clusters indicating the two classes “Male” and “Female”.

3. Face recognition

The classifier will gives correct if the training and testing images are all of the resized. We must to find the face on every image, convert to grayscale, crop it and store the image to the dataset. We are used a HAAR classifier from OpenCV to correct face extraction. Actually, OpenCV gives 4 pre-trained classifiers. Get them from the OpenCV directory or from here and extract to the same file you have your python files. Create another folder called “dataset”, and in it create subfolders for each person. The dataset we can use will live in these folders.

4. Alert generation

Finally we come to our core outcome which is alert generation when wrong or unauthenticated person tries to enter in our home, office. The framework which we are used 3 main classifiers named age, gender and facial unique features of user. Based on age category we classified teen ager, younger ager and old ager. At point of gender based classification male and female classes. Third facial feature recognition used to estimation of authentication of person. Idea behind this implementation is to provide most secure solution for giving real time alert in the form of email.

VII CONCLUSION AND FUTURE WORK

We have invented facial features-based surveillance system which gives noble solution to security concerns. The proposed framework is based on multi factor authentication like face, age, gender identification and alert message generation in the form of email notification. Physical level security gives high level security as compare to other techniques evaluating with the help of face recognition and machine learning.
In future work we will work on human abnormal action recognition and facial expression evaluation framework can be created which can monitor users’ behavior through body language.

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