International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Special Issue: 1 Volume No.7 April – 2023
DOI:10.46647/ijetms.2023.v07si01.078 ISSN: 2581-4621

Face Recognition Based Attendance System Using Deep Learning Methods

V SAMBASIVA[1], D.MOUNIKA[2], B.PAVAN KUMAR YADHAV[3], R.ALEKYA[4], SHAIK AKBAR[5], P.MANOJ KUMAR[6]
Professor, student, Department of CSE, AITS, Tirupati

Abstract
The use of recognition systems for human-computer interaction has become more desirable, and one such system is face recognition. Face recognition involves identifying a person based on their facial features. This is achieved through the use of a networked video surveillance system that collects videos from different surveillance cameras and stores them in a centralized server. Facial features can be used in various computer vision algorithms, such as face and expression detection, to recognize a person once the model has been trained. Researchers are increasingly interested in face recognition systems, with SVM, KNN, and CNN being commonly used classification algorithms. CNN models consist of convolution and pooling layers, which are the most efficient in producing accurate results.
Keywords: Facial features, SVM, KNN, CNN, pooling layers

Introduction

Today's organizations and institutions are facing significant security challenges in attendance management, requiring highly trained personnel to achieve the desired level of security. However, as humans, these personnel are prone to making mistakes that may compromise security. To address this issue, researchers have turned to biometric identifiers, with face recognition being a natural choice due to its universality, uniqueness, permanence, measurability, and performance.

Face recognition plays a critical role in user authentication and is essential in many userbased systems. In recent years, there has been rapid development in face recognition technology across various fields. The complexity of the task depends on the number of cameras used in the surveillance process. Deep learning-based video analytics can automate this identification task, with convolutional neural networks being a reliable tool for image classification. The goal of this research is to implement and develop a face recognition algorithm using OpenCV 2.4.8. While every biometric identifier has its unique positive attributes, no single trait has been identified as fully stable or distinctive.

This is where multimodal biometrics comes into play, as it combines multiple biometric systems to create a more secure and robust system. The research will also explore the use of face recognition as part of a future multimodal biometric application, with an attendance system serving as a case study. By doing so, the research aims to improve the security and accuracy of attendance management, and contribute to the development of a more advanced biometric authentication system.

Related Work

K. James Mathai was among the first researchers to conduct a study on facial recognition. Their study focused on comparing the performance of intrusion detection systems using the DBN algorithm and the SPELM algorithm. The researchers utilized the SPELM algorithm to conduct experiments in various areas such as face recognition, pedestrian detection, and network intrusion detection for cybersecurity purposes. In a separate study, Xiaoguang Lu proposed multiple algorithms categorized into model-based and appearance-based approaches. The appearancebased methods included three linear subspace analyses, while non-linear manifold analysis was explained for face recognition.

1.Person re-identification using face detection and classification

Previous studies have explored person re-identification using various methods such as face shape analysis, distance-metric learning, body crop and face verification. However, there is a gap in the literature when it comes to person reidentification using face detection and classification.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Special Issue: 1 Volume No.7 April – 2023
DOI:10.46647/ijetms.2023.v07si01.078 ISSN: 2581-4621

Existing literature has not extensively covered the use of powerful algorithms such as multitasking Convolutional Neural Networks for face detection

1. Approach for face pose problem for recognition of face

Anil Kumar Sao et al. proposed a template matching algorithm for face recognition that addresses the issue of pose variation. In this approach, the faces are represented in an edge view, and then template matching is applied to the image. The edge-based approach represents the image in one dimension, and person identification is performed based on the matching score.

2.Feature extraction methods

Sujata G. Bhele presents a review of face detection systems, with a focus on soft computing methods such as SVM and ANN. These approaches may yield better results than other methods. The paper also discusses various feature extraction algorithms such as PCA, LDA, and ICA. However, the paper notes several issues that can reduce accuracy, such as poor image quality, pose variations, and changes in illumination.

3.Neural Networks for face recognition Deep neural networks or convolutional neural networks have become a popular technique for face recognition, offering higher accuracy and precision than previous methods. Notable examples of this technique include Facebook's DeepFace and Google's FaceNet. Additionally, the open-source project Openface provides a Python-based API for face recognition. The idea of generating embeddings using convolutional neural networks was first introduced in 2005, and since then, there have been many other studies on producing embeddings using this method, including the Visual Geometry Group (VGG) Face Descriptor and Lightened Convolutional Neural Networks (CNNs), each with their own implemented system. Training a neural network to generate embeddings requires a large amount of face data, and companies like Facebook and Google have their own datasets. Openface also releases some pre-trained neural networks trained on open facial datasets.

4.DESIGN

The model development involves two steps which is shown combined in fig4.1. Collect face images from training videos for model development using face detection algorithms and develop face classifier models to predict the identity of a person appearing in the videos. The sequence of tasks adopted in person identification from the videos process contains two steps collecting data and recognizing face.

4. Result:

The output is also checked by taking real time video input through the mobile camera. Fig.5.1 shows real time output of SVM and CNN classifiers respectively. It displays name of recognized person at the top left corner in face image. In general, it is very hard to get 100% accuracy in any machine learning algorithm, so we have expected a face recognition system that has at least 95% accuracy as shown in Table 5.1. According to the accuracy graph, this neural network approach has greater than 95% accuracy. Although all testing images are taken at the same time when training images are taken.

SVM	KNN	CNN
0.75	1.5	2.6
0.8	1.3	2.1
0.85	1.4	2.3
0.69	0.9	2.2
0.71	0.9	1.9
0.72	0.9	1.9
0.72	0.9	1.9
0.72	0.9	1.9
0.72	0.9	1.9
0.72	0.9	1.9

Table 1: Accuracy Comparision

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Special Issue: 1 Volume No.7 April – 2023
DOI:10.46647/ijetms.2023.v07si01.078 ISSN: 2581-4621

The proposed System CNN algorithm will produce better results while compared to SVM and KNN. In fig 5.2 the accuracy for face recognition algorithms where compared and in fig 5.3 the overall accuracy of the system with CNN were compared with the SVM and KNN algorithms.

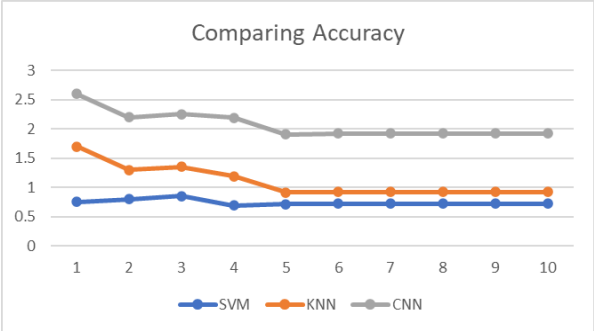

Fig 1: Overall Accuracy Comparison

5. Conclusion:

The primary objective of our research is to achieve individual human recognition through visual recognition. The first step towards this goal involves recognizing human facial images through external training data. In the data collection section, we have discussed the data we collected and used to train and test our system. Using a deep learning-based machine learning algorithm, specifically a convolutional neural network, we have demonstrated the accuracy of our system in recognizing students individually. Although there were some false predictions, this issue can be minimized by increasing the number of training images.

In this paper, we present a comparative study on live video face recognition. Face liveness detection is becoming increasingly important in digital forensic environments, where the reliability of face-based access systems is crucial. With the development of deep learning tools, more real-world applications are being proposed. In our work, we developed a deeplearning-based face spoof detection system using popular deep learning methods. We utilized three widely used face liveness recognition databases for this research. The results show that the CNN method produced more accurate results for both databases. Additionally, the SVM and KNN methods had a shorter training time than the CNN model. In future work, we plan to enhance the performance of the CNN method by using different deep models and incorporating various sizes of face images to improve the quality of the model.

6. References:

1. Md Abu Talha Reyaz, K Sunil Kumar, Arun Kumar, Aathimuthu , Z.Qulitha Begum “Facial Recognition Attendance System Using Deep Learning” published in International Journal of Advanced Research in Computer Engineering & Technology(IJARCET)
2. Radhika C.Damale, Prof.Bageshree. V.Pathak. “Face Recognition Based Attendance System Using Machine
Learning Algorithms. " Proceedings of the
Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018). IEEE 2018 .
3. Adrian Rhesa Septian Siswanto, Anto Satriyo Nugroho, Maulahikmah Galinium. “Implementation of Face Recognition Algorithm for Biometrics Based Time Attendance System" Center for Information Communication Technology Agency for the Assessment Application of Technology (PTIK-BPPT) Teknologi 3 BId., 3F, PUSPIPTEK Serpong, Tangerang, INDONESIA, 15314. 5 ITM Web of Conferences 32, 02001 (2020)

DOI:10.46647/ijetms.2023.v07si01.078 ISSN: 2581-4621

4. Nusrat Mubin Ara, Nishikanto Sarkar Simul, Md. Saiful Islam.“ "Convolutional Neural Network(CNN) Approach for Vision Based Student Recognition System." 2017 20th International Conference of Computer and Information Technology (ICCIT), 22-24 December, 2017.
5. Mathew, Vimala, et al. "Person reidentification through face detection from videos using Deep Learning." 2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS). IEEE, 2019.
6. Akbulut, Yaman, et al. "Deep learning based face liveness detection in videos." 2017 international artificial intelligence and data processing symposium (IDAP). IEEE, 2017.
7. Sujata G. Bhele and V. H. Mankar “A Review Paper on Face Recognition Techniques” published in International Journal of Advanced Research in Computer Engineering & Technology (IJARCET).
8. Xiaoguang Lu ” Image Analysis for Face Recognition” published by Dept. of Computer Science & Engineering
Michigan State University.