



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 7, July 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 7.569

9940 572 462

6381 907 438

[ijirset@gmail.com](mailto:ijirset@gmail.com)

[www.ijirset.com](http://www.ijirset.com)



# Smart Online Attendance Management System using Face Recognition

Dhanshri Rathod<sup>1</sup>, Kunal Turankar<sup>2</sup>, Manisha Shekokar<sup>3</sup>, Rutuja Mahale<sup>4</sup>, Prof. Sumit Muddalkar<sup>5</sup>

Department of Information Technology, Shri Sant Gajanan Maharaj College of Engineering

Shegaon, Dist. Buldana, Maharashtra, India<sup>1,2,3,4</sup>

Assistant Professor, Department of Information Technology, Shri Sant Gajanan Maharaj College of Engineering

Shegaon, Dist. Buldana, Maharashtra, India<sup>5</sup>

**ABSTRACT:** During the period of pandemic education area was highly impacted and the methodology of teaching was completely changes. The result of this may occur in the future of the student. Since the teaching becomes online it is an utmost importance that each and every student should attend the online training or classes so that the loss of learning may get reduce to some extent. On the other side the attendance of student was also become a major issue. Some of the students taking an advantage of this online training since they are not physically available on screen while teaching but adding some fake images or recorded images onto the video screen while attending the class. This creates the major impact in the learning perspective and to avoid and prevent this situation we try to propose a rigid system which identify the face of the student with database available with us and authentic the presence of the student in the class and mark the attendance. Many identification problems arises if the image or face was not recognizes properly and to do the process of face recognition quite accurate, we proposed the system which enables the part of accuracy and proper authentication. The aim is to develop the automated system for detection and recognition of faces using their images from videos and recording the attendance of the students by identifying him/her from their variant facial features. This helps to maintain and handle the attendance system automatically without any human intervention. The proposed system contributes to human face detection with the help of Haar cascade algorithm and face recognition with CNN algorithm.

**KEYWORDS:** face recognition, face detection, CNN, Haar cascade

## I. INTRODUCTION

However, the types of occlusions are unpredictable in practical scenarios. The location, size and shape of occlusions are unknown, hence increasing the difficulty in segmenting the occluded region from the face images. Currently most of the occlusion detectors are trained on faces with specific types of occlusions (i.e., the training is data-dependent) and hence generalise poorly to various types of occlusions in the real world environment. Traditionally, student's attendances during lecture session are taken manually by using attendance sheet given by the faculty in class, which is a time-consuming event. Moreover, it is very difficult to verify one by one student in a large practical lab with distributed branches whether the authenticated students are actually responding or not. These attendance systems are manual. There is always a chance of forgery since these are manually so there is a great risk of error. More manpower is required. Calculations related to attendance are done manually which is prone to error. It is difficult to maintain a database or register in manual systems. The human face is a sophisticated multidimensional structure that can convey a lot of information about the individual, including expression, feeling, and facial features. Effectively and efficiently analyzing the features related to facial information is a challenging task that requires lot of time and efforts. Recently, many facial recognition-based algorithms for automatic attendance management has been proposed and also new algorithms developed or some existing algorithms improved or combined with other methods, techniques, or algorithms to build facial recognition systems or applications. Maintaining attendance is very important in all learning institutes for checking the performance of students. In most learning institutions, student attendances are manually taken by the use of attendance sheets issued by the department heads as part of regulation. The students sign in these sheets which are then filled or manually logged in to a computer for future analysis. This method is tedious, time consuming and inaccurate as some students often sign for their absent colleagues. This method also makes it difficult to track the attendance of individual students in a large classroom environment. In this project, we propose the design and use of a

face detection and recognition system to automatically detect students attending a lecture in a classroom and mark their attendance by recognizing their faces. While other biometric methods of identification (such as iris scans or fingerprints) can be more accurate, students usually have to queue for long at the time they enter the classroom. Face recognition is chosen owing to its non-intrusive nature and familiarity as people primarily recognize other people based on their facial features. This (facial) biometric system will consist of an enrolment process in which the unique features of a persons' face will be stored in a database and then the processes of identification and verification. In these, the detected face in an image (obtained from the camera) will be compared with the previously stored faces captured at the time of enrolment.[1]

## II. LITERATURE SURVEY

SN.	Author and Title	Existing System	Proposed Concepts
1.	Xingjie Wei, Chang-Tsun Li, ZhenLei, Dong Yi, and Stan Z. Li, "Dynamic Image-to-Class Warping for Occluded Face Recognition"	The existing works that simply treat occluded FR as a signal recovery problem or just employ the framework for general object classification, neglect the inherent structure of the face.	Wang proposed a Markov Random Field (MRF) based method for FR that takes the facial order, which contains the geometry information of the face, into account when recognizing partially occluded faces.
2.	Evan Shelhamer, Jonathan Long, and Trevor Darrell, "Fully Convolutional Networks for Semantic Segmentation",	Fully convolutional versions of existing networks predict dense outputs from arbitrary-sized inputs. Both learning and inference are performed whole-image-at-a-time by dense feed forward computation and back propagation. In network up sampling layers enable pixel wise prediction and learning in nets with subsampled pooling. This method is efficient, both asymptotically and absolutely, and precludes the need for the complications in other works.	A proposed is sensitive for lightening conditions and the position of the head. Finding the eigenvectors and eigenvalues are time consuming on PPC. The size and location of each face image must remain similar PCA (Eigen face) approach maps features to principle subspaces that contain most energy.
3	Shengcai Liao, Anil K. Jain, and Stan Z. Li, "Partial Face Recognition: Alignment-Free Approach",	In existing System, Face recognition (FR) is the problem of verifying or identifying a face from its image. It has received substantial attention over the last three decades due to its value both in understanding how FR process works in humans as well as in addressing many challenging real-world applications, including deduplication of identity documents.	The proposed MKD-SRC algorithm significantly improves partial face recognition performance.
4.	El Khiyari, Hachim, and Harry Wechsler, "Age Invariant Face Recognition Using Convolutional Neural Networks and Set Distances".	Existing methods for face aging can be divided into two main groups, generative and discriminative. Generative methods usually rely on statistical models to predict the appearance of faces at different target ages. On the other hand, discriminative methods avoid	The approach proposed in this paper combines aspects from both generative and discriminative methods through the medium of transfer learning. Age invariance can be implemented either at the feature extraction, training and/or recognition levels, respectively. At the feature extraction level, the goal is to derive image descriptors that are robust to intrapersonal aging variation.



		creating a model for face aging, as it would be the case with generative methods. They seek to match images directly for authentication without the intermediary step of creating synthetic faces.	
5.	Timo Ahonen, Abdenour Hadid, and Matti Pietikainen, "Face Description with Local Binary Patterns: Application to Face Recognition",	In existing paper, is based on dividing a facial image into small regions and computing a description of each region using local binary patterns.	The Proposed approach is based on dividing a facial image into small regions and computing a description of each region using local binary patterns. These descriptors are then combined into a spatially enhanced histogram or feature vector. The texture description of a single region describes the appearance of the region and the combination of all region descriptions encodes the global geometry of the face.
7.	Ding, Changxing, Chang Xu, and Dacheng Tao. "Multi-task pose-invariant face recognition".	Existing face representation methods tend to extract fixed-length features from face images, with the underlying assumption that all facial components are visible in the image. The set of patch-level DCP features following PCA processing from all unconcluded patches forms the representation of the face image. Note that this representation method is general in nature, meaning that it applies to faces with arbitrary poses. This is a valuable property, because we do not need to apply different algorithms to frontal and non-frontal faces, unlike some existing approaches.	The proposed framework first transforms the original pose-invariant face recognition problem into a partial frontal face recognition problem. A robust patch-based face representation scheme is then developed to represent the synthesized partial frontal faces.
8.	M. Savvides, R. Abiantun, J. Heo, S. Park, C. Xie and B.V.K. Vijayakumar, "Partial & Holistic Face Recognition on FRGC-II data using Support Vector Machine Kernel Correlation Feature Analysis",	In existing system, PCA methods used that reduce the dimensionality to 222 features even though it has 12,776 generic set images, (note that we make full use of all 12,776 images in this dimensionality reduction step) features with fusing partial and holistic face regions.	In the proposed CFA approach, one filter (in our case a MACE filter) is designed for each of the 222 classes in the generic training set. This filter takes input all the 12,776 generic face images in a 1-against-all configuration and is designed in closed form to produce a correlation output of 1 at the origin for the authentic class (the class it is being designed for) and a correlation output of 0 for all other images from the rest of the 221 people.
9.	L. He, H. Li, Q. Zhang, Z. Sun, and Z. He. "Multiscale representation for partial face recognition under near infrared illumination".	Partial face detection is of great importance in a partial face system. All current face detection algorithms based on deep learning have achieved	In our proposed algorithm, the inner and outer eye corners are taken as eye key-points. And we use these eye key-points to attain a partial face bounding box. Therefore, a partial face is cropped into

		excellent results, but they would fail to work if the probe image is an arbitrary face patch. Likewise, partial face alignment also plays an important role for improving identification accuracy. However, face keypoints are unavailable for aligning partial face because of incomplete face.	patches in order to attain bounding box of a partial face. The width and height of each patch are equal to the width of eyes, because the width of eye stays stable in our lifetime. Therefore, we design a rule to decide a partial face
10	S. Liao, A. K. Jain, and S. Z. Li, "Partial face recognition: Alignment-free approach"	Several existing approaches are closely related to the proposed MKD-SRC algorithm. Wright et al. introduced the well-known SRC approach for face recognition, achieving robust performance in the presence of illumination variations and occlusions. However, the SRC approach requires well aligned face images. further improved the SRC method by assuming that face registration might have errors is another approach that applies SRC in conjunction with Local Binary Pattern (LBP)	In this paper, we present a general formulation of the partial face recognition problem. We require neither face alignment nor the presence of the eyes or any other facial component in the image. Further, we do not know a priori whether the input face is holistic or partial. We provide a general matching solution to accommodate all types of partial faces listed in our approach is based on a Multi-Keypoint Descriptor (MKD) representation for both the gallery dictionary and the probe image. Multi-task sparse representation is learned for each probe face, and the Sparse Representation based Classification

### III. PROPOSED SYSTEM

The main objective is to design this system to find an appropriate way of finding the authentic student to enter into the class. In various platforms such as ZOOM, Video verification it has been observed that accuracy was a major issue also in some biometric methods of identification (such as iris scans or fingerprints) can be more accurate, students usually have to queue for long at the time they enter the classroom. Face recognition is chosen owing to its non-intrusive nature and familiarity as people primarily recognize other people based on their facial features.

This (facial) biometric system will consist of an enrollment process in which the unique features of a persons' face will be stored in a database and then the processes of identification and verification. In these, the detected face in an image (obtained from the video) will be compared with the previously stored faces captured at the time of enrollment. Block diagram of proposed system is shown in figure 1.

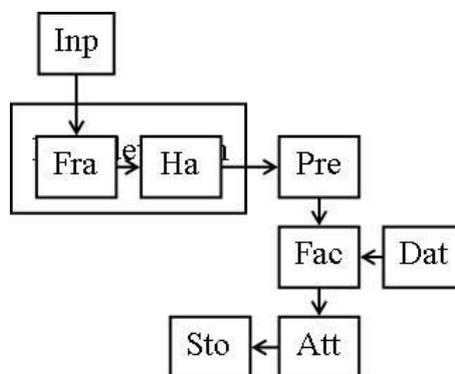


Fig 1 System Architecture



Input video is an offline video of arbitrary length from database (for training) and browsed video (testing video). Pre-processing is a common name for operations with images at the lowest level of abstraction both input and output are intensity images. The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing. At first input videos are to processed to extract frames. The frame dimensions differ, so to bring them into uniform dimensions we resize them to 324 x 240 which is the minimum size frame in the dataset. Before discussing the extraction of feature points it is necessary to have a measure to compare parts of images. To avoid redundancy we extracted key frames. Key frames are the video frames that are not too similar. The extraction and matching of features of each key frame is based on these measures. Besides the simple point feature a more advanced type of feature is also presented. Feature extraction technique is used to extract the features by keeping as much information as possible from large set of data of image. Face detection is performed using Haar cascade. When face is recognized, a tick mark is created against name of student whose face is recognized. Data is stored in excel sheet at the end of the session. Typical applications of face recognition in uncontrolled environments include recognition of individuals in video surveillance frames and images captured by handheld devices (e.g. mobile phones), where a face may be captured in arbitrary pose without user cooperation and knowledge. In such scenarios, it is quite likely that the captured image contains only a partial face.[3]

*A. CNN Algorithm*

Artificial Intelligence has been witnessing a monumental growth in bridging the gap between the capabilities of humans and machines. Researchers and enthusiasts alike, work on numerous aspects of the field to make amazing things happen. One of many such areas is the domain of Computer Vision. The agenda for this field is to enable machines to view the world as humans do, perceive it in a similar manner and even use the knowledge for a multitude of tasks such as Image & Video recognition, Image Analysis & Classification, Media Recreation, Recommendation Systems, Natural Language Processing, etc. The advancements in Computer Vision with Deep Learning have been constructed and perfected with time, primarily over one particular algorithm — a Convolutional Neural Network.

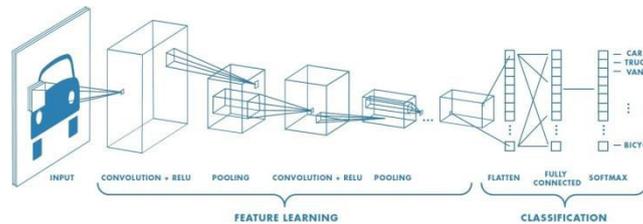


Fig 2 CNN Architecture

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics. The main intension to use the CNN architecture is to give a basic touch to visualise the face same as that of human recognizes. And the classification of CNN need more and more comparison part with an ideal image to make it sure about the authentic identity

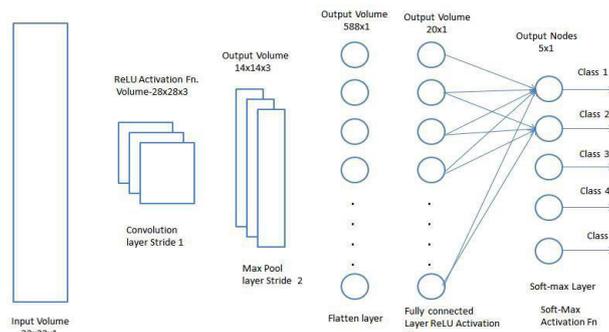


Fig 3 Classification of CNN



Adding a Fully-Connected layer is a (usually) cheap way of learning non-linear combinations of the high-level features as represented by the output of the convolutional layer. The Fully-Connected layer is learning a possibly non-linear function in that space.

### *B. Haar Cascade Algorithm*

Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images and used to detect objects in other images. The algorithm has four stages:

- Haar Feature Selection
- Creating Integral Images
- Adaboost Training
- Cascading Classifiers

**Haar Feature Selection:** A Haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums.

**Creating Integral Images:** Integral Images are used to make feature selection super fast. Among all these features we calculated, most of them are irrelevant. Therefore at this stage irrelevant images and background is deleted.

**Adaboost Training:** Selection of best feature among hundreds and thousands of features is accomplished using a concept called Adaboost which both selects the best features and trains the classifiers that use them. This algorithm constructs a "strong" classifier as a linear combination of weighted simple "weak" classifiers.

- The process is as follows.
  - a. During the detection phase, a window of the target size is moved over the input image, and for each subsection of the image and Haar features are calculated.
  - b. This difference is then compared to a learned threshold that separates non-objects from objects.
  - c. Because each Haar feature is only a "weak classifier" (its detection quality is slightly better than random guessing) a large number of Haar features are necessary to describe an object with sufficient accuracy and are therefore organized into cascade classifiers to form a strong classifier.

The cascade classifier consists of a collection of stages, where

- Each stage is an ensemble of weak learners. They are classifiers called decision stumps.
- Each stage is trained using a technique called boosting. Boosting provides the ability to train a highly accurate classifier by taking a weighted average of the decisions made by the weak learners.
- Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative.
  - a. Positive indicates that an object was found and negative indicates no objects were found.
  - a. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location.
  - b. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive.
- The stages are designed to reject negative samples as fast as possible. The assumption is that the vast majority of windows do not contain the object of interest. Conversely, true positives are rare and worth taking the time to verify.
  - a. A true positive occurs when a positive sample is correctly classified.
  - b. A false positive occurs when a negative sample is mistakenly classified as positive.
  - c. A false negative occurs when a positive sample is mistakenly classified as negative. To work well, each stage in the cascade must have a low false negative rate. If a stage incorrectly labels an object as negative, the classification stops, and you cannot correct the mistake.

## IV. CONCLUSION

In this way we designed the system which will help to design the system for proper recognition and provide the proper way of authentication. Many students who are taking undue advantage of the system can be stop and proper attendance



can be taken. It also solve many identification problems recognizes the face properly. The main aim to develop the automated system for detection and recognition of faces using their images from videos and recording the attendance of the students by identifying him/her from their variant facial features was properly executed. It will also help to maintain and handle the attendance system automatically without any human intervention. The proposed system contributes to human face detection with the help of Haar cascade algorithm and face recognition with CNN algorithm which helps to work perfectly in this regards.

#### REFERENCES

- [1] Xingjie Wei, Chang-Tsun Li, ZhenLei, Dong Yi, and Stan Z. Li, "Dynamic Image-to-Class Warping for Occluded Face Recognition", IEEE transactions on information forensics and security, Vol. 9, No. 12, December.
- [2] Evan Shelhamer, Jonathan Long, and Trevor Darrell, "Fully Convolutional Networks for Semantic Segmentation", Transactions on Pattern Analysis and Machine Intelligence, Vol 20, 2016.
- [3] Shengcai Liao, Anil K. Jain, and Stan Z. Li, "Partial Face Recognition: Alignment-Free Approach", IEEE transactions on pattern analysis and machine intelligence, Vol 35, Year: 2013.
- [4] El Khiyari, Hachim, and Harry Wechsler, "Age Invariant Face Recognition Using Convolutional Neural Networks and Set Distances", Journal of Information Security 8, no. 03 (2017).
- [5] Timo Ahonen, Abdenour Hadid, and Matti Pietikainen, "Face Description with Local Binary Patterns: Application to Face Recognition", IEEE transactions on pattern analysis and machine intelligence, vol. 28, No. 12, December 2006.
- [6] Y. Taigman, M. Yang, M. Ranzato, and L. Wolf, "Deepface: Closing the gap to human-level performance in face verification". In IEEE Conf. on CVPR, 2014.
- [7] Ding, Changxing, Chang Xu, and Dacheng Tao. "Multi-task pose-invariant face recognition", IEEE Transactions on Image Processing 24, Number 3, pp. 980-993, 2015.
- [8] M. Savvides, R. Abiantun, J. Heo, S. Park, C. Xie and B.V.K. Vijayakumar, "Partial & Holistic Face Recognition on FRGC-II data using Support Vector Machine Kernel Correlation Feature Analysis", Conference on Computer Vision and Pattern Recognition Workshop (CVPRW'06) Vol 16, 2016.
- [9] L. He, H. Li, Q. Zhang, Z. Sun, and Z. He. Multiscale representation for partial face recognition under near infrared illumination. In IEEE International Conference on Biometrics Theory, Applications and Systems (BTAS), 2016.
- [10] S. Liao, A. K. Jain, and S. Z. Li, "Partial face recognition: Alignment-free approach" IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), 35(5), 2013.



Impact Factor:  
7.569



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details