Proceedings of the International Conference on Applied Artificial Intelligence and Computing (ICAAIC 2022)
IEEE Xplore Part Number: CFP22BC3-ART; ISBN: 978-1-6654-9710-7

Hybrid Student Authentication System Using RFID Reader and Face Biometrics Using Deep Learning Techniques

Mr.S.Meivel
Department of Electronics and Communication Engineering,
M.Kumarasamy College of Engineering, Karur-Tamilnadu
Email: meivels.ece@mkce.ac.in

C.Praghadeesh
Department of Electronics and Communication Engineering,
M.Kumarasamy College of Engineering, Karur-Tamilnadu
Email: praghadeeshc@gmail.com

A.Ravinder
Department of Electronics and Communication Engineering,
M.Kumarasamy College of Engineering, Karur-Tamilnadu
Email: anburavi4747@gmail.com

D.Sibisaran
Department of Electronics and Communication Engineering,
M.Kumarasamy College of Engineering, Karur-Tamilnadu
Email: sibisaran01@gmail.com

2022 International Conference on Applied Artificial Intelligence and Computing (ICAAIC) | 978-1-6654-9710-7/22/$31.00 ©2022 IEEE | DOI: 10.1109/ICAAIC53929.2022.9792810

Abstract - Every school, college, and university maintains a record of each student's attendance. Faculty are required to retain accurate and current attendance records. Because it takes a long time to organize records and determine each student's average attendance, the manual attendance record system is inefficient. As a result, a system for organizing student records and calculating average attendance is required. The proposed system should be able to save student attendance records in digital format, making attendance management easier. Even in the twenty-first century, students' attendance is recorded on attendance forms presented in the classroom by staff members, which takes time and is completely manual. Despite the fact that RFID-based and face recognition-based systems have been shown, they are implemented separately. A RFID reader is integrated with a Face recognition system in the suggested system for student attendance. RFID readers, as well as facial recognition cameras, would be placed throughout campus and in classes. When a student walks onto campus, the reader communicates their id to the server, allowing them to be easily tracked. After that, using a deep learning approach known as HAAR Cascade and Neural network algorithm, recognize the face from a real-time camera and match it to a database. This strategy ensures that the attendance records of the pupils are stored correctly and efficiently. As a result, the system will generate a list of kids who have been assigned to detention. It's a small-scale automated programme that's easy to operate, redeemable in time, and dependable.

Keywords: *Artificial intelligence, Attendance, Face detection, Features Extraction, RFID reader*

I. INTRODUCTION

The replication of human intelligence processes by computers, particularly computer systems, is known as artificial intelligence (AI) (artificial intelligence). Learning (the acquisition of knowledge and the rules for applying it), reasoning (the use of rules to reach approximate or definite conclusions), and self-correction are examples of these processes. Expert systems, speech recognition, and machine vision are examples of AI applications. Artificial intelligence is classified in a number of ways, but here are a few instances. The first classifies AI systems into two categories: weak AI and strong AI. Weak AI, often referred to as narrow AI, is artificial intelligence that has been constructed and trained to do a single task. Weak AI can be found in virtual personal assistants like

Apple's Siri.. Artificial intelligence (AI) is a term used to describe strong AI.

Face recognition is a method of identifying or authenticating a person's identity by looking at their face. Face recognition software can recognize people in photos, movies, and real-time situations. Officers may utilise mobile devices to identify people during traffic stops. Face recognition data, on the other hand, is prone to errors, which can lead to people being charged with crimes they didn't commit. Facial recognition software has a difficult time differentiating African Americans and other ethnic minorities, women, and young individuals, and frequently misidentifies or fails to detect them, causing disproportionate harm to certain groups. In a strict sense, multi-view face recognition refers to situations in which a subject (or scene) is captured by multiple cameras at the same time and an algorithm combines the images/videos. However, the phrase is commonly used to recognize faces in a variety of poses. This ambiguity has no influence on image identification; a series of pictures taken at the same time has no bearing on picture identification. Images captured with several cameras and those captured with a single camera but at various view angles are similar in terms of posture variations. However, when it comes to video data, the two options differ. While a multi-camera system ensures that multi-view data is collected at all times, the likelihood of acquiring the same data with a single camera is unknown. Non-cooperative recognition applications, such as surveillance, require such differences. The multi-view video acquired by synchronised cameras will be called a multi-view video, whereas the monocular video sequence captured when the subject changes stance will be called a single-view video. Multi-view surveillance recordings have grown in popularity as camera networks have gotten more ubiquitous. Despite this, most multi-view video face recognition algorithms still use single-view recordings. When provided a pair of face images to verify, they seek up in the collection to "align" the appearance of the facial feature in one image to the similar stance and illumination in the second image. This procedure will also necessitate estimating the positions and lighting conditions for each face photos. The holistic matching algorithm was developed using this "generic reference set" concept, in which the ranking of.

II. RELATED WORK

M. Ayazoglu, B. Li, et.al,…[1] The suggested technique is based on the fact that, under certain conditions, the 2D trajectories of the object in each of the cameras' photo planes are limited to evolve in the same subspace. This statement allows for the identification of a single (piecewise) linear version that describes all of the available 2D data at any time. This model, on the other hand, might be used in conjunction with a modified particle filter to forecast destination target locations. When a number of cameras are obstructing the target, the missing measurements may be forecast using the records that they must each reside inside the subspace spanned by prior measurements and satisfy epipolar restrictions. As a result, the suggested technique may robustly manage broad occlusion by using both dynamical and geometrical limitations, without the requirement for acting three-D reconstruction, calibrated cameras, or sensor separation constraints. Several demanding cases with goals that drastically alter look and movement styles while obscuring some of the cameras are used to demonstrate the performance of the proposed tracker.

D. Baltieri, et.al,…[2] The human body has been brought in 2D models and, more recently, non-articulated 3D models. Unlike movement capture or movement evaluation approaches, models do not need to be exceedingly precise but must be quick. Model-based localization, on the other hand, provides more coherent and expert descriptions, as well as an accurate comparison of comparable frame parts. Occlusion-related issues and segmentation errors can also be reduced. We made a breakthrough in this series of paintings by introducing a new original 3-D way of re-identification based on articulated frame styles. To map appearance descriptors to skeletal bones, a 3-D model is used. As input, the color, depth, and skeleton streams generated by the Microsoft Kinect sensor and Open Ni libraries are used. The use of a mastering strategy that allows you to produce a "bone" set is similarly cautious with the skeleton. Because the learned signature is so closely tied to the actual body structure, it also allows for a characteristic-based description, which can be beneficial in particular applications. Furthermore, a discovered metric is used, which serves as both a characteristic choice and a frame part weighting.

D. Baltieri,et.al,…[3] supplied the creation of a full system for re-identification of people

based solely on appearance descriptors being mapped to three-dimensional frame styles (known as SARC3D). The use of 3-D frame styles for re-identification is very new in compared to other computer vision applications such as motion capture and posture evaluation. At the heart of the difficult difficulties associated with 3-D models is the necessity for accurate human recognition, segmentation, and calculation of the 3-D orientation for proper model-to-picture alignment. Global functions are simple to calculate and do not necessitate any stage of alignment. They're also particularly impervious to segmentation or detection failures. The scarcity of nearby capabilities, on the other hand, leads to misleading comparisons. Part of the difficulty is mitigated by the use of 2D models, which allows for part of the problem to be solved.

I. B. Barbosa, et.al,…[4] carried out the modeling of human appearance in terms of clothing, with the obvious problem that converting garments among camera acquisitions severely impairs reputation performance. As a result, concentrating in rgb continues to be a significant undertaking. As a result, specialising in rgb remains a significant challenge. Current rgbd sensors cannot function at the same distance as normal security cameras. To solve the aforementioned challenges, we provide a re-identification technique based only on a convolutional neural network in this paper. The framework was known for a number of outstanding features. For starters, the network structure is simpler than a Siamese configuration. It is a function extractor that is based on the inception structure. Quantitative experiments validate our preferences, resulting in high ratings in reputation terms.

Bedagkar-Gala, et.al,…[5] In the context of large-scale surveillance, researchers looked at how several people re-identify across cameras and treated matching as a exclusively on the basis of a spatiotemporal appearance model. Biometrics such as face or gait can be used for matching, however due to camera resolution or body charge constraints, they are typically difficult to recover. Appearance models are often utilised for re-identification, and spatio-temporal correlations between cameras are used to reason about fake matches. Individual re-identification in the context of multiple camera monitoring is an open set matching issue in which the gallery changes over time, the probe set for each digital FOV changes dynamically, and all probes inside a hard and fast are not necessarily a subset.

III. EXISTING METHODOLOGIES

The An RFID attendance system is a computerised embedded system that keeps track of people who have registered with a company. At a reasonable cost, an RFID provides an organisation with the efficiency and convenience of RFID technology. This is a straightforward and fast procedure. When an employee enters or quits the building, he or she uses an RFID card, and the reader records the information. The RFID attendance system as a whole combines RFID tags and readers with access to a global standardised database, allowing for real-time access to the most up-to-date information on the card. RFID is a radio-frequency identification and tracking system that sends data from an electronic tag, also known as an RFID tag or label, affixed to an object to a reader. RFID technology is a mature technology that has been widely adopted as part of automation systems by a variety of organisations. This study used an RFID-based technology to create a time-attendance management system. The RFID reader makes the Hardware. An USB converter is connect with the RFID reader, which has a low-frequency reader (125 kHz). The Time-Attendance Management System oversees the whole system's functioning, including live ID tag transactions, ID registration and deletion, attendance recording, and other minor tasks. On the host system, this interface was installed.

IV. PROPOSED METHODOLOGIES

In today's world, most educational institutions are concerned with student absences. Face recognition is extremely useful in determining a person's identification. Many papers on RFID and face-based attendance systems have been proposed. Biometric-based solutions have shown to be more successful than passwords for authenticating persons. In order to determine an individual's unique identity, these strategies examine his or her behavioral and physical traits. However, passwords and PINs are difficult to remember and can be readily guessed or stolen. As a result, person identification is crucial in this situation. Face recognition is the most well-known of the person recognition methods, as it is a tool for identifying people in everyday life. Other technologies, such as

fingerprint identification, can increase performance, but due to their extended nature, they are not ideal for natural smart interactions. We're combining face recognition algorithms and offering a prototype that will not only aid with attendance tracking and recording, but will also improve security. When a student attempts to enter the campus, he is required to swipe his identification card. The live video is captured by the web camera, and the frames from the live video are analyzed first for face detection. Face detection is the initial step toward recognizing a specific employee. After the face of the employee is discovered, it is matched with the face of the concerned student face photo that is already in the database and has been tagged for the specific ID number. After a ll of the characteristics authenticated. If a match is found, the Attendance is recorded in the file along with the log in information.

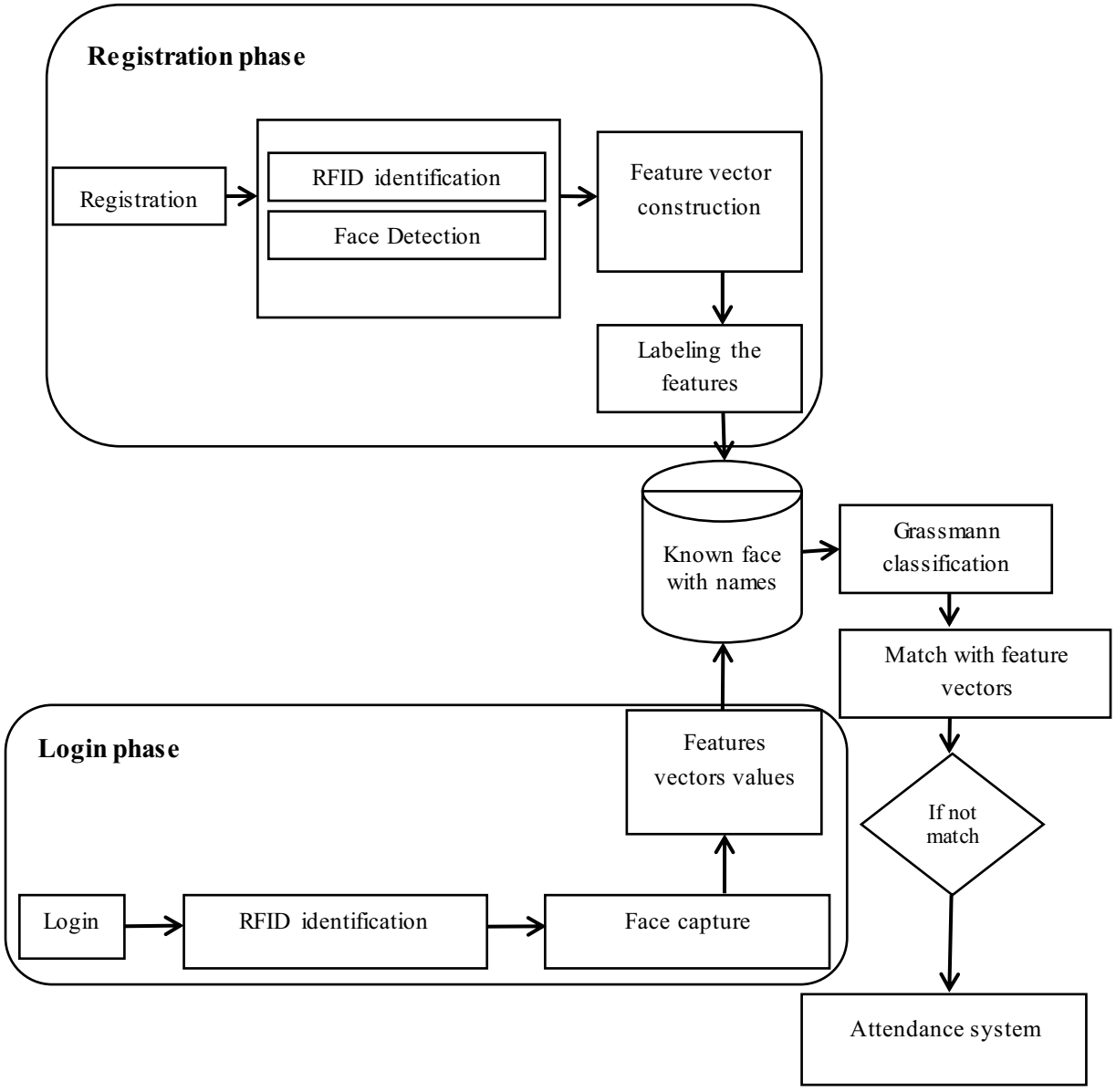

Figure 1: Proposed Architecture

In many image and video recognition applications, Grassmann manifolds are used to represent data. This paper provides a deep network architecture for deep learning on Grassmann manifolds that generalises the Euclidean network paradigm to Grassmann manifolds. We developed a deep neural network architecture for learning Grassmannian representations as a result of the extensive use of Grassmannian data. This is the goal of a novel network architecture that takes Grassmannian data as input and learns better Grassmann data to improve final visual tasks. In other words, the new network will use an end-to-end learning architecture . Many studies embed the Grassmannnian into a Euclidean space in order to do discriminating learning on Grassmann manifolds. Both tangent space approximation and embedding the underlying manifold. Because Hilbert spaces preserve Euclidean geometry, any contemporary Euclidean technique to the embedded data in each of these circumstances can be used. For example, the Grassmannian is embedded in a high-dimensional Hilbert space before being analyzed using the usual Fisher approach. Most of these methods can only use Mercer kernel-based classifiers because they are confined to Mercer kernels. Furthermore, the computational complexity of these approaches skyrockets as the number of training data grows. A particular form of Grassmann manifold is the Grassmann manifold. G collects R D's m-dimensional linear subspaces (m, D). An G detail constitute through unmarried orthogonal matrix Y and its length is D through m . The m foundation vectors of a group of R D photos, for example, can be represented through Y. Y1 and Y2 are appeared equal if and handiest if span(Y1) = span(Y2), in which span(Y) indicates the subspace protected through Y's column vectors. In different words, span(Y1) = span(Y2) if and handiest if Y1R1 = Y2R2 for all R1, R2 O. (m). The Riemannian distance among subspaces is the duration of the shortest geodesic linking places at the Grassmann manifold. Using fundamental angles to decide distances, on the opposite hand, is a extra herbal and computationally green way. Input: A set of P factors on manifold i=1P∈Gd,DOutput: Karcher meanμK1. Set an preliminary estimate of the Karcher suggest _K=X i through deciding on one factor in X i _(i=1)P at random. 2. Calculate A =1/P _(i=1), Plog K (X i) Plog K (X i) Plog K (X i) Plog K (X) 3. If A, go back to Step 4, in any other case increase to Step 4. 4. K=exp K (A), in which>zero is the step length parameter, actions K withinside the common tangent direction. Return to Step 2 till K meets all the termination requirements (most iterations or different convergence criteria). Based in this set of rules steps, facial function vectors are built and coupled with database on the time attendance making.

Table 1: Performance table

Algorithms	**FRR**
Random Forest	0.42
Adaboost Classifier	0.35
Support Vector Machine	0.28
Grassmann classifier (Proposed)	0.14

V. EXPERIMENTAL RESULTS

The cautioned gadget, which makes use of the Python Framework to offer attendance primarily based totally on RFID readers and facial features, is applied in Python. Then, the usage of real-time facial datasets calculate the correctness of the performance. A fake reject charge refers to authorized person try and get get admission to. The wide variety of efforts to identify .

- FALSE REJECT RATE = FN / (TP+FN)
- FN = Genuine Scores Exceeding Threshold
- All Genuine Scores = TP + FN

The cautioned gadget has a decrease rejection charge than present strategies like Support Vector Machines, Random Forests, Adaboost classifiers, and Convolutional Neural Networks. Table 1 summarizes the results.

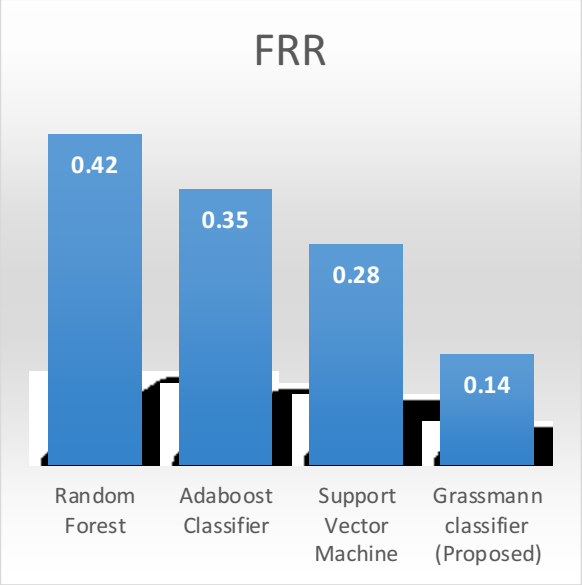

Figure 2: Performance chart

From the above figure, suggests the proposed Grassmann classifier offers the low wide variety of fake rejection charge in attendance the usage of RFID and facial features.

VI. CONCLUSION

The proposed gadget become created the usage of the multi-layer safety paradigm. We've effectively verified how RFID may be used at the side of face popularity strategies to tune attendance, and it is also a low-price option. Face popularity is a well-set up approach of recognising human beings. Radio-frequency identification (RFID) tags are utilized in get admission to manage structures with electronically saved records. These gadgets may be applied in distinctly steady and touchy places in which safety is paramount. Because the cautioned attendance gadget is primarily based totally on multilayer safety, it is able to be applied now no longer handiest for attendance however additionally for pre-safety assessments to decide whether or not the scholar is genuine. Secure organisations can enhance their inner safety the usage of the proposed approach, stopping in all likelihood intruder ingress into the campus. With the cautioned technology, safety employees can take speedy movement every time a possible incursion into campus happens. As a result, the cautioned gadget serves as each an attendance gadget and a safety device.

VII. REFERENCES

[1] M. Ayazoglu, B. Li, C. Dicle, M. Sznaier, and O. Camps. Dynamic subspace-primarily based totally coordinated multicamera tracking. In 2011 IEEE International Conference on Computer Vision(ICCV), pages 2462–2469, Nov. 2011.

[2] D. Baltieri, R. Vezzani, and R. Cucchiara. Learning articulated frame fashions for human beings re-identification. In Proceedings of the twenty first ACM International Conference on Multimedia, MM'13, pages 557–560, New York, NY, USA, 2013. ACM.

[3] D. Baltieri, R. Vezzani, and R. Cucchiara. Mapping look descriptors on 3d frame fashions for human beings reidentification. International Journal of Computer Vision, 111(3):345–364, 2015.

[4] I. B. Barbosa, M. Cristani, B. Caputo, A. Rognhaugen, and T. Theoharis. Looking past appearances: Synthetic schooling information for deep cnns in re-identification. arXiv preprintarXiv:1701.03153, 2017.

[5] A. Bedagkar-Gala and S. Shah. Multiple man or woman reidentification the usage of element primarily based totally spatio-temporal colour look model. In Computer Vision Workshops (ICCVWorkshops), 2011 IEEE International Conference on, pages 1721–1728, Nov 2011.

[6] Y. Yan, F. Nie, W. Li, C. Gao, Y. Yang, and D. Xu, "Image category through cross-media energetic studying with privileged records," IEEE Transactions on Multimedia, vol. 18, no. 12, pp. 2494–2502, 2016

[7] Y. Yang, Z. Ma, A. G. Hauptmann, and N. Sebe, "Feature choice for multimedia evaluation through sharing records amongst a couple of tasks," IEEE Transactions on Multimedia, vol. 15, no. 3, pp. 661–669, 2013.

[8] X. Chang, F. Nie, S. Wang, Y. Yang, X. Zhou, and C. Zhang, "Compound rank-okay projections for bilinear evaluation," IEEE Transactions on Neural Networks and Learning Systems, vol. 27, no. 7, pp. 1502–1513, 2016.

[9] Y. Yang, F. Nie, D. Xu, J. Luo, Y. Zhuang, and Y. Pan, "A multimedia retrieval framework primarily based totally on semi-supervised rating and relevance feedback," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 34, no. 4, pp. 723–742, 2012.

[10] W. Li, R. Zhao, T. Xiao, and X. Wang, "Deepreid: Deep clear out out pairing neural community for man or woman re-identification," in Proc. CVPR, 2014, pp. 152–159.

[11] A. A. Alamr, F. Kausar, J. Kim, and C. Seo, ''A secure ECC-based RFID mutual authentication protocol for Internet of Things,'' J. Supercomput., vol. 74, no. 9, pp. 4281–4294, Sep. 2018.

[12] Y. Chevalier and L. Vigneron, ''Automated unbounded verification of security protocols,'' in Proc. Int. Conf. Comput. Aided Verification. Berlin, Germany: Springer, 2002.

[13] D. Basin, S. Mödersheim, and L. Viganò, ‘‘OFMC: A symbolic model checker for security protocols,’’ Int. J. Inf. Secur., vol. 4, no. 3, pp. 181–208,2005.

[14] A. Armando, R. Carbone, and L. Compagna, ‘‘SATMC: A SAT-based model checker for security protocols, business processes, and security Apis,’’ Int. J. Softw. Tools Technol. Transf., vol. 18, no. 2, pp. 187–204,Apr. 2016.

[15] O. Boichut, Y. Genet, T. Glouche, and Y. Heen, ‘‘Using animation to improve formal specifications of security protocols,’’ in Proc. 2nd Conf. Secur. Netw. Archit. Inf. Syst. (SARSSI), Dec. 2007, pp. 169–182.