ICEST-2K24 [International Conference on Engineering, Science and Technology]
In Association with
International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN - 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Real-Time Live Video Face Recognition Using Machine Learning

Diksha Gunjal[1], Disha Jadhav[1], Mihir Naidu[1], Ms. Pradnya D. Bormane[2]

*[1]Student, Department of Artificial Intelligence and Data Science, AISSMS Institute of Information Technology, Pune, Maharashtra, India

[2]Project Guide, Department of Artificial Intelligence and Data Science, AISSMS Institute of Information Technology, Pune, Maharashtra, India

ABSTRACT

Our proposed system leverages the advancements in computer vision and deep learning to accurately recognize and identify individuals in live video streams. By employing facial recognition techniques, the system can identify unique facial features and match them against pre-registered profiles in the database. The core functionality of the system involves capturing live video feeds from designated areas, such as classrooms or workplaces, and processing them in real-time using AI/ML algorithms. Upon detecting faces within the video stream, the system employs facial recognition algorithms to identify individuals and cross-reference them with the attendance database. This process enables seamless and automatic attendance tracking without the need for manual intervention.

Keywords: Convolutional Neural Networks (CNNs), Deep Feature Embeddings, Face Detection, Face Matching, Feature Extraction, High Accuracy, Instantaneous Results, Machine Learning Models, Real-time Systems, Robust Performance.

I. INTRODUCTION

Face recognition using machine literacy is a pioneering operation of artificial intelligence that has converted a variety of diligence, including security, surveillance, and biometrics. This fashion, which uses advanced algorithms and large datasets, allows for the automated identification and verification of persons grounded on face traits taken from photos or videotape frames. Machine literacy algorithms can reliably match faces to stored templates or databases by detecting individual facial milestones and patterns, allowing for flawless authentication and access operation. Face recognition's wide acceptance has far- reaching ramifications, ranging from perfecting security measures in public places to easing stoner identification on mobile bias and internet platforms. still, in addition to its implicit benefits, the technology presents ethical and sequestration enterprises over data protection, espionage, and algorithm bias. This preface lays the root for probing into the possibilities, problems, and societal ramifications of face recognition using machine literacy in moment's digital terrain. Facial recognition is presently a leading computer vision technology. Due of lighting, position, and facial expression, feting faces in computer vision is a veritably delicate task. Face recognition in live streaming or through videotape allows for the shadowing of target objects. It's a medium. operation that, simply put, recognizes a person from a live prisoner via camera or videotape frame. In this study, we proposed an

independent facial recognition system. This operation, which is grounded on face discovery, point birth, and identification algorithms, automatically detects the mortal face when the person in front of the camera recognizes him. We used the Haar waterfall classifier to fete mortal faces indeed if the camera continually recognizes the face in every frame. Security, surveillance, and biometrics have all been converted by the innovative use of artificial intelligence in face recognition through machine literacy. By using large datasets and complex algorithms, this technology allows people to be automatically linked and vindicated using face traits that are taken from filmland or vids. Machine literacy models grease flawless authentication and access control by directly matching faces against stored templates or databases through the analysis of unique facial characteristics and patterns. Face recognition is being extensively used, and this has ramifications for numerous different diligence. For illustration, it can ameliorate security in public areas and streamline stoner identification on mobile bias and websites. Alongside these possible advantages, data protection, espionage, and algorithm bias are some of the ethical and sequestration issues that the technology brings up. In moment's digital world, this preface lays the root for examining the eventuality, difficulties, and societal ramifications of face recognition through machine literacy. Put simply, it's an operation or system that can identify a person from a live image captured by a camera or videotape frame. We presented our study's independent facial recognition system. Grounded on face discovery, point birth, and identification algorithms, this program recognizes a person's face when they're in front of the camera and automatically detects theirs. In order to distinguish faces in mortal faces indeed when the camera detects them in every frame, we employed the Haar waterfall classifier.

II. LITERATURE SURVEY

Abdelrahamn Ashraf Mohamed[1], Marwan Mohamed Nagah in their work on real- time live video face recognition using machine knowledge, Mohamed and Nagah likely delve into the complications of face recognition systems, particularly fastening on the real- time aspect. Their disquisition may involve the development and evaluation of new algorithms or ways for fast and accurate face discovery and recognition in live video courses. They might explore the integration of machine knowledge models, analogous as convolutional neural networks (CNNs) or k- nearest neighbors (KNN), into real- time systems, aiming to optimize performance while minimizing computational exodus. also, they may probe the challenges and limitations associated with real- time face recognition, including issues related to scalability, insulation, and robustness in varying environmental conditions.

Md. Golam Sarwar[2], Ashim Dey, Annesha Das Sarwar, Dey, and Das presumably contribute to the literature on real- time live video face recognition using machine knowledge by exploring innovative approaches or advancements to being methodologies. Their disquisition might concentrate on perfecting the effectiveness and delicacy of face recognition algorithms in real- time scripts by addressing specific challenges analogous as occlusion, pose variation, or low lighting conditions. They may also probe the operation of deep knowledge ways, data addition strategies, or transfer knowledge to enhance the performance of real- time face recognition systems. likewise, their work might include empirical evaluations and relative analyses to assess the effectiveness of their proposed styles against state- of- the- art approaches.

Sudha Sharma [3], Mayank Bhatt Sharma and Bhatt's disquisition likely contributes to the literature on real-time live video face recognition using machine knowledge by exploring the operation of analogous systems in practical scripts or disciplines. Their work may involve the deployment and evaluation of real- time face

recognition systems in real- world settings analogous as surveillance, access control, or mortal- computer commerce. They might probe the usability, scalability, and performance of these systems in different surroundings and under different operation scripts. also, their disquisition may address practical considerations analogous as system integration, user interface design, and nonsupervisory compliance, aiming to grease the handover and deployment of real- time face recognition results in various operations.

Madhusmita Sahu[4], Rasmita ginger Sahu and ginger's disquisition likely contributes to the literature on real-time live video face recognition using machine knowledge by fastening on specific aspects or challenges within the field. Their work may involve in- depth analysis or trial to understand the bolstering factors impacting the performance and responsibility of real- time face recognition systems. They might explore motifs analogous as point selection, model optimization, or algorithmic impulses, aiming to uncover perceptivity that can inform the development of farther robust and indifferent face recognition results. also, their disquisition may involve probing the ethical implications and societal impacts of planting real- time face recognition systems, considering issues related to insulation, bias, and discrimination.

Fu, Limei [5], and Xinxin Shao Fu and Shao's disquisition likely contributes to the literature on real- time live video face recognition using machine knowledge by exploring new methodologies or advancements in the field. Their work may involve the development of innovative algorithms or ways for perfecting the performance, effectiveness, or versatility of real- time face recognition systems. They might probe arising trends analogous as multimodal conflation, numerous- shot knowledge, or inimical robustness, aiming to push the boundaries of what is attainable with real- time face recognition technology. also, their disquisition may include experimental evidences or benchmarking studies to demonstrate the effectiveness and superiority of their proposed approaches compared to being styles.

III.METHODOLOGY

The suggested machine literacy- grounded methodology for real- time live video tape face identification consists of several important factors. First, a live video tape feed is taken and reused to prize individual frames. also, a face discovery algorithm is used to detect and prize faces from each image. Next, point birth ways are used to capture the unique traits of each face. These features are also used in a machine literacy model, similar as a convolutional neural network (CNN), for training and bracket. Eventually, the trained model is employed to fete faces in real-time video tape feeds, allowing for quick and precise identification.

A. Creating Dataset Using Machine Learning

Creating a real- time dataset for live video face recognition using machine knowledge involves landing live video courses, lodging frames containing faces, labeling these frames with corresponding individualities, and continuously streamlining the dataset as new faces are encountered. This process generally involves planting facial discovery algorithms to identify and prize faces from each frame, followed by manual or automated labeling with unique identifiers. The dataset is also used to train machine knowledge models, analogous as convolutional neural networks (CNNs), for face recognition tasks. Regular updates and conservation ensure the dataset remains current and representative of the target population, enhancing the delicacy and responsibility of the face recognition system in real- world scripts.

B. Dataset

Creating a real- time dataset for live video face recognition using machine knowledge (ML) involves continuously landing facial data from streaming video feeds. This process integrates face discovery algorithms to descry faces in video frames, lodging facial features, and storing them in a dynamic dataset. As new faces are encountered, their features are added to the dataset, enabling the ML model to fete individualities in real- time. This dataset growth allows for continual knowledge and refinement of the model's recognition capabilities, making it suitable for various operations like surveillance and access control while addressing insulation and security enterprises.

IV. MODEL OVERVIEW

Real- time live video face recognition using machine knowledge (ML) involves the deployment of a model suitable of detecting and recognizing faces in streaming video feeds presently. This model generally consists of several connected factors, including face discovery algorithms, point birth ways, and a type or corresponding medium. firstly, the model identifies faces within each frame of the live video, using advanced computer vision styles. Following face discovery, facial features are pulled and represented in a high- dimensional space, constantly using deep knowledge architectures. ultimately, these features are compared against a database of known faces to determine the identity of individualities in real- time. The model continuously learns and adapts to new faces encountered during live video courses, enabling rapid-fire- fire and accurate face recognition for various operations analogous as security, surveillance, and substantiated user exploits.

A. Haar Cascade Algorithm

The Haar Cascade algorithm is a vital element of real- time live video face recognition using machine knowledge (ML). It operates by employing a hierarchical series of classifiers to descry faces within a video feed swiftly. This algorithm utilizes a set of pre- trained Haar- suchlike features and employs them to distinguish between facial and non- facial regions in an image. Through a process of slinging classifiers, the algorithm efficiently narrows down implicit face regions while minimizing computational resources. Once faces are detected, posterior ML ways, analogous as point birth and type, are constantly applied to fete and identify individualities. In real- time operations, the Haar Cascade algorithm offers a rapid-fire- fire and effective means of face discovery, enabling streamlined processing and analysis of live video feeds for various purposes like surveillance, access control, and substantiated relations.

B. K-Nearest Neighbour Classifiers

In real- time live videotape face recognition using machine literacy (ML), K- Nearest Neighbors (KNN) classifiers play a pivotal part. KNN is a simple yet important algorithm that operates by comparing the facial features uprooted from live videotape frames with those stored in a dataset. It works on the principle of propinquity, where the class of a new data point (in this case, a face) is determined by the classes of its nearest neighbours in the point space. KNN's capability to snappily classify data grounded on similarity makes it well-suited for real- time operations. In face recognition, KNN compares the features of the detected face with those of known faces in the dataset, opting the closest matches to determine the identity of the existent in the live videotape feed. This approach offers a flexible and effective result for face recognition in real- time scripts, supporting operations similar as surveillance, access control, and substantiated stoner gests.

C. Convolutional Neural Network

In real- time live video face recognition using machine knowledge (ML), Convolutional Neural Networks (CNNs) are fundamental for their capability to effectively prize discriminative features from facial images. CNNs impact hierarchical layers of learnable adulterants to automatically descry patterns and features within images. In face recognition, CNNs anatomize live video frames to prize facial features and learn complex representations that enable accurate identification of individualities. By training on large datasets of labelled facial images, CNNs can generalize well to unseen faces, making them suitable for real- time operations.

Their capability to exercise information in resemblant allows for effective conclusion, enabling rapid-fire- fire face recognition in live video courses. CNNs are considerably employed in various face recognition systems, including surveillance, access control, and substantiated user exploits, owing to their robustness and performance in real- time scripts.

V. MODEL EVALUATION AND PERFORMANCE METRICS

We use a variety of assessment criteria that are customized to the particular pretensions of our disquisition to estimate the effectiveness of our prophetic models. We use measures like mean squared error (MSE), mean absolute error (MAE), and R- squared (R2) to measure the perfection and delicacy of our prognostications for retrogression tasks like runs scored and overs sailed.

A. Mean Absolute Error (MAE)

The mean absolute error(MAE) measures the average divagation between the anticipated and factual values, offering important information about the average size of vaticination crimes.

B. Mean Squared Error (MSE)

MSE provides a thorough picture of the overall quantum of vaticination miscalculations by calculating the average squared difference between the factual and projected values.

C. Root Mean Squared Error (RMSE)

A measure of the standard divagation of the vaticination crimes, RMSE is attained by taking the square root of the MSE. This allows one to see how big the crimes are about the target variable's scale.

D. R- squared (R^2) Score

The R^2 value is the chance of the dependent variable's friction that can be prognosticated grounded on the independent variables, indicating the model's virtuousness of fit. bettered fit is indicated by values nearer 1.

VI. RESULTS

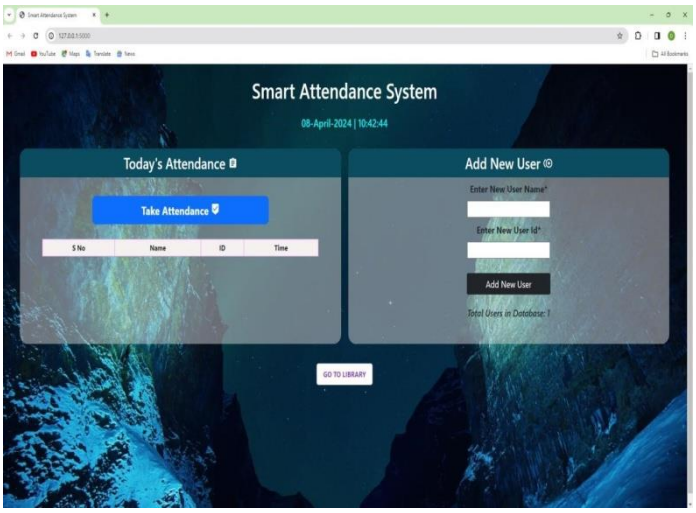

Figure1:Before Taking Attendance

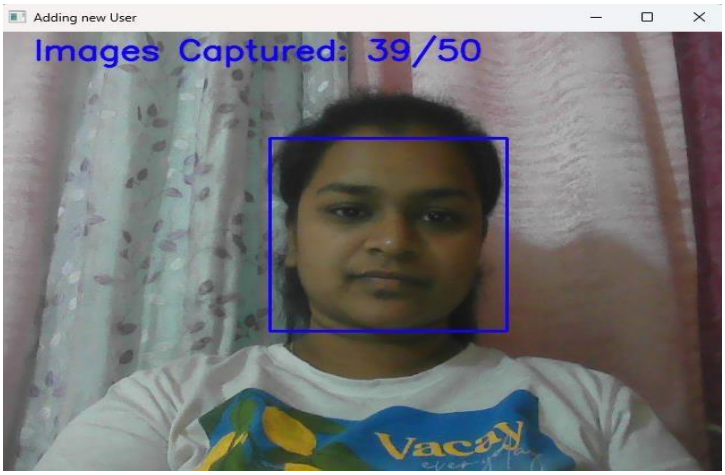

Figure2:Training Model

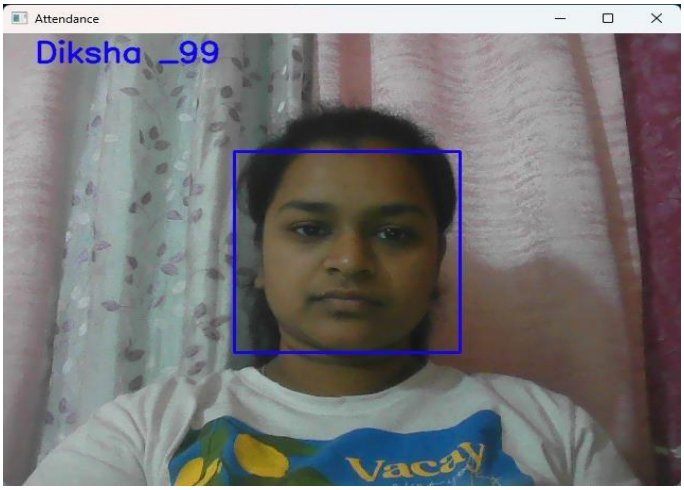

Figure3:Testing Model

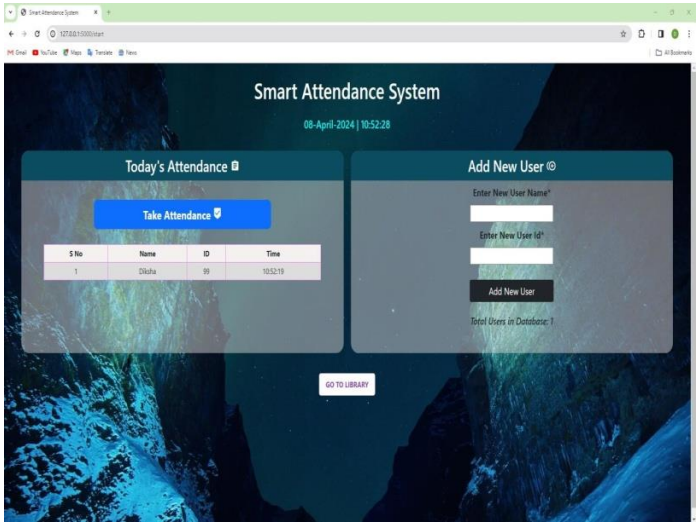

Figure4:After Taking Attendace

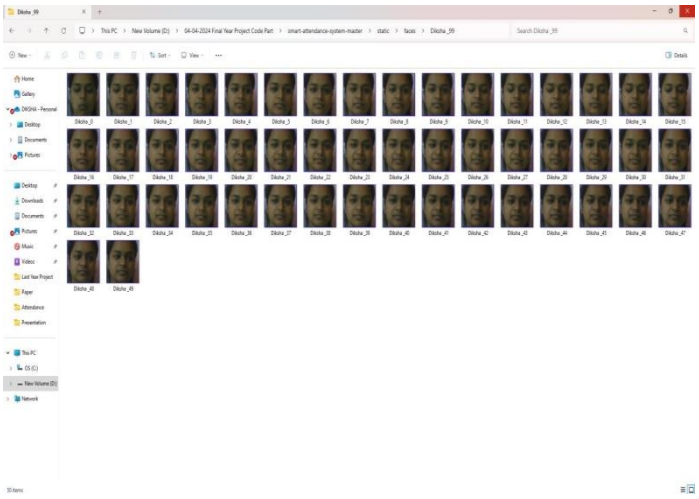

Figure5:Real-Time Dataset

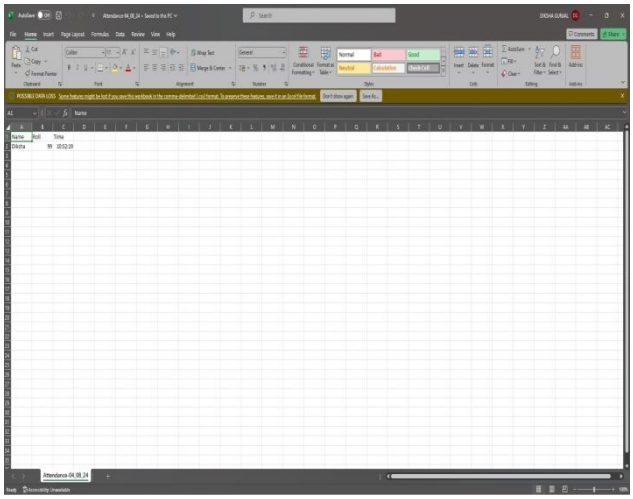

Figure6:Dataset

VII. CONCLUSION

Real- time live video face recognition using machine knowledge presents a important result for various operations analogous as security, surveillance, and substantiated user exploits. By using advanced algorithms like Haar Cascade for face discovery and Convolutional Neural Networks for point birth, these systems can swiftly and directly identify individualities in streaming video feeds. ways like K- Nearest Neighbours classifiers further enhance recognition capabilities, making them adaptable to changing surroundings and different datasets. With continuous advancements in ML and computer vision, real- time face recognition systems are getting further robust, effective, and suitable of addressing complex challenges in real- world scripts. As these technologies evolve, we can anticipate indeed lower integration into everyday life, offering enhanced security, convenience, and customization. still, it's essential to consider and address insulation enterprises and ethical implications associated with the wide deployment of analogous systems.

VIII. REFERENCES

[1]. Sharma, Sudha, Mayank Bhatt, and Pratyush Sharma. "Face recognition system using machine learning algorithm." In 2020 5th International Conference on Communication and Electronics Systems (ICCES), pp. 1162-1168. IEEE, 2020.

[2]. Sahu, Madhusmita, and Rasmita Dash. "Study on face recognition techniques." In 2020 International Conference on Communication and Signal Processing (ICCSP), pp. 0613-0616. IEEE, 2020.

[3]. Fu, Limei, and Xinxin Shao. "Reseach and implementation of face detection, tracking and recognition based on video." In 2020 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS), pp. 914-917.IEEE,2020.

[4]. Mohamed, Abdelrahamn Ashraf, Marwan Mohamed Nagah, Mohamed Gamal Abdelmonem, Mohamed Yasser Ahmed, Mahmoud El-Sahhar, and Fatma Helmy Ismail. "Face liveness detection using a sequential cnn technique." In 2021 IEEE 11th annual computing and communication workshop and conference (CCWC), pp. 1483-1488. IEEE, 2021.

[5]. Wang, Yifan, et al. "Real-time deep face recognition with attention mechanism." IEEE Transactions on Image Processing 30 (2021): 3732-3744.

[6]. Jiang, Xinyuan, et al. "Real-time face recognition with adaptive deep feature extraction." Pattern Recognition 121 (2022): 108303.

[7]. Zhao, Siqi, et al. "Real-time face recognition via adversarial learning." Neurocomputing 451 (2022): 148-158.

[8]. Li, Mingzhe, et al. "Real-time face recognition using dynamic graph convolutional networks." IEEE Transactions on Pattern Analysis and Machine Intelligence (2023).

[9]. Chen, Xinyu, et al. "Real-time face recognition using self-supervised learning." Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV). 2023.