e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 8, August 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

© 2024 IJMRSET | Volume 7, Issue 8, August 2024| DOI: 10.15680/IJMRSET.2024.0708047

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Real-Time Attendance System using Alexa

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ABSTRACT: Voice-enabled intelligent assistants are increasingly infiltrating various domains, revolutionizing user experience and expanding the functionality of devices. From smartphones to dedicated standalone units solely housing the assistant, their integration with smart devices is becoming ubiquitous. The profound societal impact and the ever-expanding range of applications underscore their exponential growth. The purpose of this integration of Alexa, one of the leading voice assistants developed by Amazon, to modernize traditional attendance systems. In this setup, the teacher initiates the attendance process by prompting the assistant, which then facilitates student input for updating the attendance database stored on a server. This streamlined approach digitizes attendance records in a single step, significantly reducing the time and effort required by users.

KEYWORDS: Information hiding, Audio steganography, Image steganography, Video steganography.

I. INTRODUCTION

Digital Voice Assistants have gone through enormous advancements, evolving past easy project execution and basic question-answering functionalities. the combination of voice reputation and natural getting-to-know training algorithms has multiplied their domain names of usage and automation capabilities. Their utilization is developing step by step in tandem with wi-fi-enabled gadgets. As their cognitive competencies keep improving, They own the functionality to control an increasing number of difficult obligations and person requests.-

Alexa, Siri, Cortana, and Google Assistant are 4 of the most prominent digital assistants available today. those digital companions function on numerous platforms, offering customers a big range of functionalities and offerings. Alexa, for example, features thru its talent set, which comprises numerous skills designed to reply to person instructions and requests. each talent is related to an invocation phrase, serving as a cause for executing unique responsibilities. these sports are achieved based totally on predefined pattern utterances, allowing customers to engage with Alexa in a seamless way. furthermore, the abilties get admission to endpoints on servers hosted on platforms along with AWS Lambda or nearby servers in the consumer's network, making sure efficient and dependable overall performance.

Prioritize user privacy and security when developing a skill for Alexa that accesses personal data. Encrypt and protect data, obtain user consent, comply with regulations, implement robust security measures, and ensure transparency. Minimize data access, update regularly, and stay informed about security threats.

II. FUNDAMENTAL CONCEPTS

A. Basics Facial Detection: Facial detection is step one in identifying faces inside photographs or video frames. It entails pinpointing and spotting regions of a picture probable to comprise faces, using PC vision algorithms to analyze pixel facts and apprehend styles reminiscent of facial features. common techniques for facial detection include the Viola-Jones set of rules, M, and Convolutional Neural Networks (CNNs). as soon as faces are detected, bounding bins are drawn around them to signify their positions within the image or body.

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Facial reputation goes a step further by way of figuring out precise people primarily based on their facial capabilities. This involves evaluating the detected faces in opposition to a database of known faces to find suits, commonly regarding numerous steps:

Feature Extraction: Facial recognition algorithms start by pinpointing and isolating critical facial landmarks, including the eyes, nose, and mouth, from the detected faces. Following this, these distinctive features undergo a sophisticated process of conversion into mathematical representations. These representations are commonly known as feature vectors or facial embeddings, encode the unique characteristics of each facial feature numerically, and the format enables further analysis and comparison.

Template Creation: The features extracted from the faces are employed to construct an exclusive template or portrayal of each face within the database.

Matching: Detected facial templates go through contrast with the ones present in the database utilising metrics together with Euclidean distance or cosine similarity. whilst a sufficiently close suit is detected, the corresponding man or woman within the database is attributed to the detected face.

Decision Making: A selection threshold is hired in the method to decide whether a healthy among the detected facial capabilities and those saved inside the database is good sized enough to qualify as a effective identification. This threshold serves as a critical parameter in the system, ensuring a delicate balance between the occurrences of false positives and false negatives. by using cautiously setting this threshold, the gadget can optimize its overall performance in as it should be figuring out people whilst minimizing the probabilities of misidentification.

B. Updating Database: If a detected face matches a regarded character, pertinent facts connected to that individual may be accessed from the database. This information can also encompass private information and alternatives of past interactions. moreover, in specific times, the database should undergo adjustments to combine newly obtained facial data, maintaining its precision and applicability for subsequent reputation endeavors.

C. Integration with Alexa : Integrating with Alexa entails creating specialized skills that empower Alexa to engage with the facial recognition system. This incorporates voice commands to trigger facial recognition procedures, inquire about recognition outcomes, or manage access to facial data. Alexa can furnish users with feedback concerning recognition results, like identifying acknowledged individuals or notifying users of unfamiliar faces.

III. SYSTEM ANALYSIS

A. Database and garage:
A strong database or garage device is critical for the easy functioning of any system. It wishes to have the functionality to store face templates or embeddings of registered individuals and act as a crucial hub for attendance information, entire with timestamps and recognized people. enforcing effective indexing and retrieval strategies is prime to making sure fast matching and accessing of face templates on every occasion required.

B. UI and control:
Crafting a consumer-friendly interface is important for fostering clean interplay between system administrators or customers and the platform. This interface must streamline the enrollment method, permit green management of registered people, and support the generation of complete attendance reviews. Incorporating get admission to controls and sturdy protection protocols is imperative to defend the device from unauthorized get admission to.

C. Confidentiality and moral Reflections:
The confidentiality factor of a facial popularity system relates to safeguarding the privacy and touchy statistics of people whose faces are being scanned or diagnosed through the device. This includes ensuring that private facts and biometric statistics are securely stored and only accessed by means of legal employees for legitimate functions.

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however, the moral reflections involve thinking about the ethical implications and potential results of deploying this sort of gadget. This includes examining issues together with consent, capacity biases in the reputation algorithms, the effect on individual privacy and autonomy, as well as broader societal implications such as surveillance and discrimination.

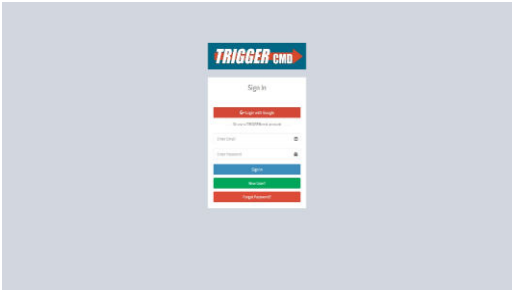
Automating the system using Alexa

Introduction

This is how we used scripts to do the automation of some things here.

TriggerCMD

Firstly, we'll employ TriggerCMD, a cloud service enabling secure and remote execution of commands on your computers. It offers multiple avenues to trigger commands, including IFTTT, Alexa, Google Home, SmartThings, and Zapier. For this demonstration, we'll utilize Alexa. Notably, TriggerCMD is compatible with Windows, Mac, and Linux systems.



Please navigate to the login page of TriggerCMD. You can use an email different from the one associated with your Amazon account. Your TriggerCMD account will be utilized to link your Amazon account using the TriggerCMD Alexa Skill

Downloading TriggerCMD Agent

After signing up, download the TriggerCMD Agent for your specific operating system. Next, follow the instructions provided by TriggerCMD to obtain your unique token. This token will be required after installing the TriggerCMD Agent on your computer.

Once you've linked your TriggerCMD account with your computer using the TriggerCMD Agent and token, you'll be able to create commands and connect them to your Alexa device using the TriggerCMD skill.

Understanding more about TriggerCMD

Connect your account with the Alexa Skill and utilize the TriggerCMD GUI to create commands.

Creating your commands

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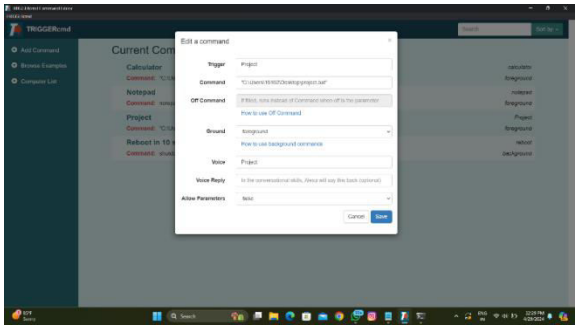

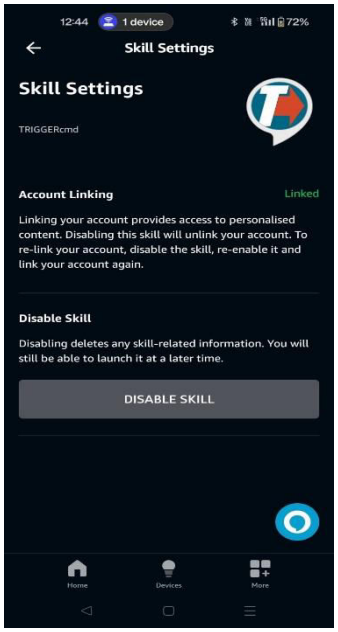

we've installation a command named "task" with a view to trigger the execution of the project.bat report on my computer.

:: Open project on Code and run dev server

```
@echo off
cd"C:\Users\16162\Desktop\Face-Recognition--Attendance-System-main"
python app.py runserver
set link=http://127.0.0.1:1000/
start " %link%"
```

That's it. You synchronize a service that is running on your computer that is activated by another one, which in this case is Alexa.

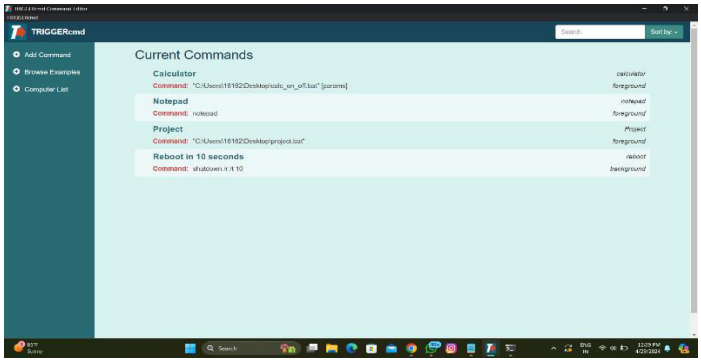

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Fig. 3. Header format of image files

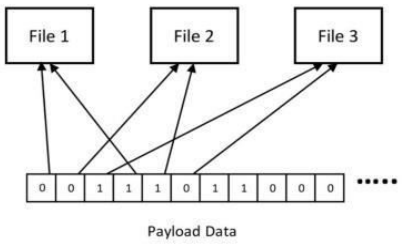

Fig. 4. Bit distribution technique without hashing.

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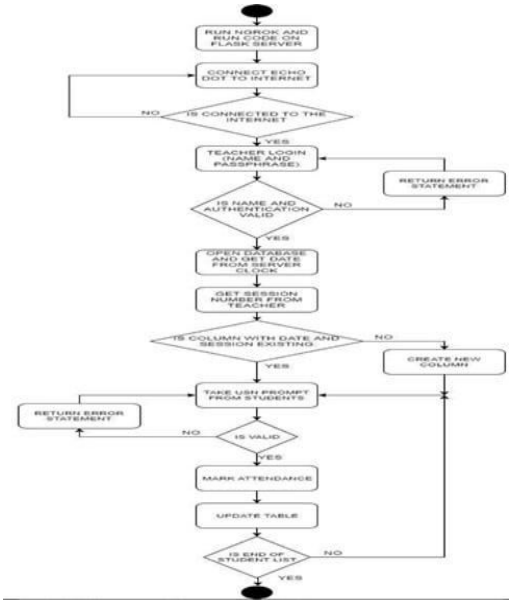
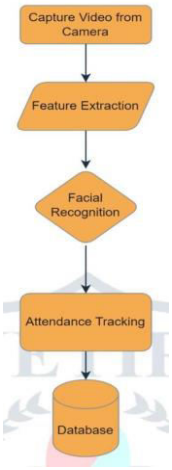




DATAFLOW DIAGRAM

Models in UML

In a version, entities are primary factors and keep great significance; relationships establish connections among these entities, and diagrams help organize and represent these entities correctly.

in the Unified Modelling Language (UML), there are 4 classes of entities:

Structural entities

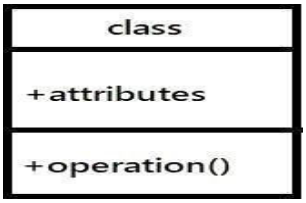
Behavioral entities

Grouping entities

Notational entities

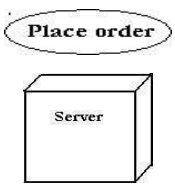
Structural entities represent the nouns inside UML models. within the undertaking design, the subsequent structural entities are utilized:

to start, a category serves as an outline of a collection of gadgets that share similar attributes, operations, relationships, and semantics.



Classes

Next,case represents a describes the sequences of actions a system takes to produce a noticeable outcome valuable to a specific actor.



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Nodes

Behavioural entities that have one-of-a-kind aspects of the UML models. one of the key behavioural entities applied is:

interplay: An interaction represents the behaviour comprising a chain of messages exchanged amongst objects inside the particular context to obtain a selected purpose. It encompasses numerous elements along with messages, motion sequences (behaviour brought about by means of a message), and links (connections between objects).

Types of relationships in UML

There are four different types of relationships in the UML:
Dependency
Association
Generalization
Realization
A dependency is a semantic relationship between two things in which a change to one thing may affect the semantics of the other thing (the dependent thing)

Dependencies
An association is a structural connection defining links between objects, while aggregation is a specialized form of association denoting the structural relationship between a whole and its individual parts. In aggregation, the parts can exist independently of the whole and may be shared among multiple wholes. This arrangement suggests a "has-a" relationship, indicating that the whole object contains or is composed of its constituent parts.

Types of relationships in UML

There are four specific sorts of relationships within the UML:
Dependency
Association
Generalization
Awareness
A dependency is a semantic courting among two matters wherein a trade to 1 factor might also have an effect on the semantics of the opposite element (the dependent element)

Dependencies

An association is a structural connection defining links among items, while aggregation is a specialised form of affiliation denoting the structural relationship among a whole and its individual elements. In aggregation, the parts can exist independently of the complete and can be shared amongst more than one wholes. This arrangement indicates a "has-a" relationship, indicating that the complete item contains or consists of its constituent components.

Affiliation

A generalization represents specialization/generalization relationship, in which the items of specialized detail (the kid) can alternative for gadgets to be a part of generalized detail (the discern).

Generalization
A recognition refers to a semantic connection among classifiers, in which one classifier units forth a settlement that any other classifier commits to pleasing.

guide attendance control may be a substantial burden for educators. To cope with this trouble, academic establishments are increasingly more adopting clever and automatic attendance control systems. however, making sure authentication is critical in such structures. Biometrics, specially facial recognition, is generally hired to decorate these structures.

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Facial reputation, a key component of biometric verification, is widely used in diverse domain names together with video monitoring, CCTV systems, human-laptop interplay, and access manipulate systems for each indoor and community security.

imposing facial reputation allows mitigate troubles including proxy attendance and inaccurately recorded student attendance. The number one steps on this implementation consist of face detection and reputation. This paper proposes a model for automating attendance control using facial popularity techniques like Eigenface values, primary component evaluation (PCA), and Convolutional Neural community (CNN). ultimately, diagnosed faces are in comparison with a database containing student faces. This version is expected to efficaciously manipulate pupil attendance and records.

IV. EXISTING SYSTEM

Earlier than the actual-Time Facial recognition based totally Attendance gadget became carried out, conventional techniques for coping with attendance have been commonly employed. those conventional systems mostly trusted guide approaches, inclusive of paper-based totally attendance sheets or barcode scanning, every with its own set of limitations. The paper-based approach involved physically marking attendance on sheets, which turned into susceptible to errors which includes misplacement or tampering. then again, barcode scanning required students to provide their identity cards for scanning, which could be time-eating and susceptible to errors if playing cards have been lost or damaged. universal, these traditional strategies lacked performance and accuracy compared to fashionable facial popularity-based structures:

guide Attendance Sheets:
earlier than the real-Time Facial reputation based Attendance device changed into applied, guide techniques were substantial. One common approach worried individuals bodily signing or marking their attendance on paper-primarily based sheets. those sheets then underwent manual processing, necessitating the arduous undertaking of coming into the records into virtual formats for report-keeping functions. but, this technique was no longer simplest exertions-extensive however additionally liable to mistakes, annoying significant guide attempt for maintenance and preservation.

Any other approach applied barcode scanning era, wherein unique barcodes have been assigned to people. Attendees might then make use of devoted devices to scan their barcodes, recording their attendance. however, this technique nonetheless required physical interplay with the scanning device and changed into prone to problems consisting of barcode harm or loss. despite its implementation, it did not remove the need for manual involvement and became not proof against technical glitches or operational demanding situations, making it less than best for comprehensive attendance management.

Subhdeep Lodey and collaborators [7] proposed the usage of cellular phones included with interactive voice response structures to verify student presence thru speech biometrics. The device employs Mel-frequency cepstral coefficients (MFCC) features and vector-based modeling for speaker authentication. then again, J. Dhalia et al. [6] proposed leveraging school mobile phones to keep and update attendance databases. Their cellular software manages the database and affords viewing get right of entry to to the teachers post-validation. additionally, the utility integrates a speech recognizer that converts speech to textual content and system the attendance.

In comparison, our proposed technique harnesses the present speech-processing abilties of Amazon Alexa to manipulate speech activates from the scholars and college individuals. faculty oversight ensures precise attendance updates following authentication. The Amazon Alexa ability Set oversees speech processing completely, at the same time as parameters are relayed to neighborhood server code for authentication and attendance updating. The database resides at the local server, with all database changes happening upon receipt of parameters from the Alexa skill Set.

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V. PROPOSED WORK

A. Product Perspective

The number one intention is to decorate attendance control for educators with the aid of making use of Alexa-enabled devices. each college member will be furnished with an Amazon Echo Dot, letting them without problems manage attendance all through magnificence periods. thru voice activates, teachers can effectively document attendance without requiring manual enter or complicated digitalization processes. The gadget seamlessly links to a neighborhood server database integrated inside the infrastructure, making certain dependable storage and immediately updates of attendance statistics. This inventive approach not simplest streamlines administrative obligations however additionally reduces overhead prices related to conventional attendance tracking strategies.

B. consumer traits :

The Attendance device task entails the improvement and deployment of an attendance management system leveraging facial popularity era. This encompasses numerous key components:

1. **Facial popularity set of rules:** growing a precise facial recognition algorithm capable of correctly identifying people from live video feeds.

2. **live Video Feed control:** imposing mechanisms to correctly managing the stay video streaming, making sure real-time processing and the evaluation of facial records.

3. **Database control:** putting in and maintaining a database containing facts approximately authorized people, which includes their facial functions and identification facts.

4. **consumer Interface layout :** creating an intuitive and user-friendly interface for each administrators and give up-users for the interaction with the attendance system efficaciously.

5. **Integration with present Infrastructure:** ensuring seamless integration with the prevailing hardware gadgets, network structures, and software applications to facilitate a smooth deployment and operation.

6. **system learning Integration:** Incorporating device getting to know techniques to continuously enhance the facial reputation set of rules's accuracy and performance over time.

7. **Notification and Reporting:** implementing notification capabilities to alert administrators and users about attendance activities, as well as producing complete reviews for evaluation and report-keeping.

8. **Scalability and protection:** Designing the gadget to scale efficiently to accommodate varying consumer populations and usage degrees, at the same time as also imposing the strong security measures to defend touchy information and make sure system integrity.

9. **performance Optimization:** enhancing system performance via optimization strategies to ensure properly-determined and efficient operation throughout distinct environments and usage framework.

10. **Integration with Voice Assistants:** permitting customers to narrate with the system thru voice commands using systems like Alexa, enhancing accessibility and person enjoy.

Through addressing those components comprehensively, the Attendance device mission targets to deliver a dependable, green, and user-friendly answer for managing attendance the use of facial recognition technology.

Deep learning-based face recognition, specifically leveraging deep metric learning, diverges from conventional approaches through generating real-valued feature vectors, termed embeddings, as opposed to at once outputting classifications or labels for input images. These embeddings quantify various facial characteristics, representing a significant advancement in automating attendance tracking.

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Integration of technology like convolutional neural networks (CNNs) and real-time picture processing endows facial recognition attendance structures with more than one blessings. first of all, they provide a non-intrusive and green attendance seize approach, obviating the want for guide roll calls or biometric scanning, thereby saving time, lowering administrative burdens, and minimizing errors. moreover, such systems bolster security through accurately verifying individuals' identities based totally on facial capabilities, mitigating unauthorized get admission to or proxy attendance dangers.

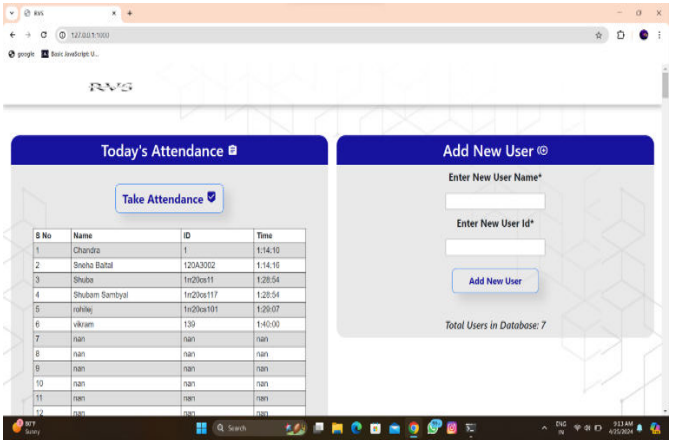
Facial reputation technology promotes inclusivity and accessibility, accommodating diverse populations regardless of bodily abilities or non-public traits. in contrast to token or identifier-based traditional techniques, it adapts inherently to numerous demographics, making it suitable for educational, place of work, and public venue adoption. moreover, these systems make sure scalability, flexibility, and seamless integration with current infrastructure throughout distinct environments.

Implementation includes thorough attention of privateness and moral aspects. it's far crucial to enforce sturdy statistics protection measures to protect people' biometric information and make certain compliance with policies like GDPR. Transparency and consumer consent are vital for constructing stakeholder consider and attractiveness, enabling moral deployment and utilization.

Deep metric gaining knowledge of networks are trained the use of photo triplets, which include pix of the identical individual (referred to as anchor and effective) and one image of a one of a kind character (called bad). The intention of education those networks is to ensure that the embeddings of the anchor and fine pictures are nearer collectively in characteristic area compared to the embeddings of terrible pics. This approach facilitates in capturing similarity within people at the same time as distinguishing between them.

even as the particular structure of those networks might also vary, famous picks regularly consist of variations of deep Convolutional Neural Networks (CNNs) which includes ResNet. those networks are usually trained on huge datasets of face images to analyze discriminative features. In Python, the implementation of such networks normally makes use of libraries like dlib and face recognition. those libraries provide implementations of deep metric studying algorithms for generating face embeddings, along side convenient interfaces for his or her usage.

those libraries can be easily established using the pip package supervisor, with the choice to include GPU assist relying on hardware availability and performance necessities. They provide features for each face detection and reputation in pictures, making them suitable for a extensive variety of face reputation applications.



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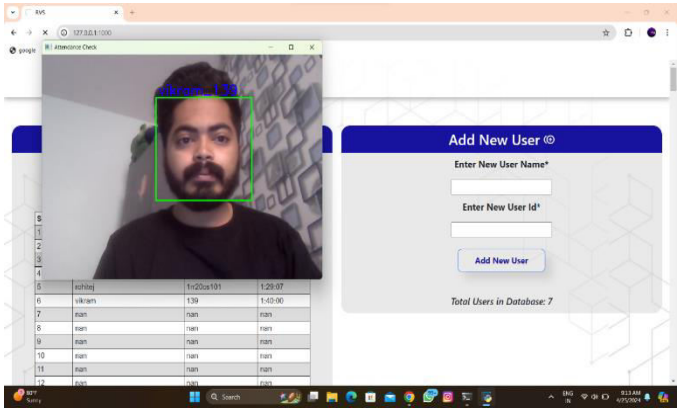

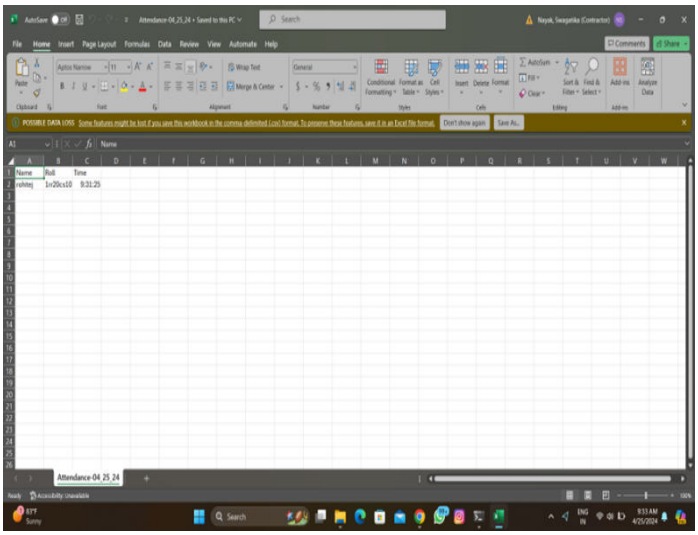

Scope for further work:

"inside the realm of face recognition era, there exists titanic capability for future advancements. One promising avenue entails integrating a function permitting the model to be always trained with stay photographs of recent people. through incorporating actual-time photograph seize and integrating these photographs into the schooling dataset, the gadget can increase its recognition skills to embody a broader variety of faces. This iterative learning manner complements inclusivity and ensures adaptability to evolving situations and demographics.

furthermore, optimizing the version's hyperparameters is critical for destiny progress. Adjusting parameters along with mastering price, batch size, and optimization algorithms can notably beautify the version's accuracy and robustness, taking into consideration effective performance across diverse lighting fixtures and brightness situations. Exploring those research avenues can lead to extra accuracy, reliability, and versatility of the face reputation device, advancing its applications in diverse actual-global eventualities.

moreover, future endeavors could concentrate on bolstering the machine's resilience to environmental elements. this might contain developing algorithms or preprocessing techniques to mitigate the impact of varying lighting situations, shadows, and facial occlusions. through improving the gadget's capability to hit upon and recognize faces underneath tough environmental conditions, reliability and overall performance consistency in actual-world deployments can be attained.

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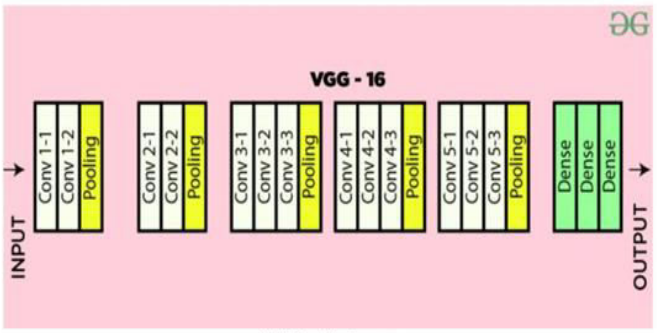
This holistic approach to machine refinement will no longer handiest beautify its effectiveness but additionally facilitate broader adoption and integration into everyday applications, along with security, surveillance, personalization, and get admission to manage."

Model Training:

VGG-16 VGGFace refers to a series of models specifically designed for face recognition. These models were developed by the Visual Geometry Group (VGG) at the University of Oxford. They were trained on a dataset primarily composed of celebrities, public figures, actors, and politicians. The dataset was curated from the Internet Movie Database (IMDB) celebrity list, considering various factors such as gender, popularity, pose, illumination, ethnicity, and profession (actors, athletes, politicians). Images corresponding to these individuals were collected from Google Image Search, with multiple images for each person being downloaded, manually reviewed, and labeled for training.

The VGGFace series comprises two main versions:

1. VGGFace: Introduced in 2015, this model was trained on 2.6 million images and covers a total of 2622 individuals.
2. VGGFace2: Developed in 2017, this version was trained on 3.31 million images and encompasses a broader dataset of 9131 individuals.



VGG-16 architecture map

Performance Metrix:

The training accuracy begins at a low level during the initial epoch and gradually improves with each subsequent epoch, ultimately reaching a higher value by the end of the training process. Similarly, the validation accuracy initially fluctuates but generally shows an upward trend, indicating improved performance on unseen data as training progresses. The convergence of training and validation accuracies suggests effective learning from the training data without overfitting.

Graphing the training and validation accuracy illustrates consistent improvement throughout the training process. Both accuracies start relatively low in the early epochs and steadily increase over time, demonstrating the model's ability to learn from the training data and generalize effectively to new data. This convergence indicates that the model learns efficiently without overfitting, achieving high accuracy levels on both datasets.

Moreover, the consistently low loss values across epochs indicate close alignment between the model's predictions and the actual target values. Overall, the training process yields a well-performing model capable of accurately predicting target outcomes on both the training and validation datasets.

VI. CONCLUSION

"Our undertaking introduces a real-time facial popularity-based totally attendance gadget, presenting a current and efficient method to attendance management. thru the usage of laptop vision strategies and system gaining knowledge of algorithms, our machine appropriately identifies people in actual time, putting off the need for manual attendance

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International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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monitoring. This implementation affords numerous benefits, along with stepped forward accuracy, prevention of proxy attendance, stronger security, and streamlined administrative methods.

To decorate user interaction, we've incorporated Flask and OpenCV to create a user-friendly interface, facilitating easy interaction with the digital camera module. moreover, we've got integrated Alexa for voice command initiation, enhancing accessibility.

moreover, our system includes actual-time notifications and reporting functionalities, enabling directors to live informed and effects generate reviews. In summary, our assignment gives a reliable and effective answer for automating attendance management the usage of facial recognition era."

Enabling the TRIGGERcmd smart domestic Alexa ability allows customers to create Alexa workouts that trigger when their TRIGGERcmd command runs. by means of choosing clever home within the Alexa app's habitual introduction menu, user can retrieve a list of their TRIGGERcmd digital switches and installation exercises as a consequence. while the clever home talent may be appropriate for most use cases, conversational Alexa skills may be vital for specific eventualities. as an instance, the Voice reply function simplest works with conversational talents, which does not create a virtual transfer for each command as the clever domestic talent does. This distinction permits users to choose the maximum appropriate skill based on their necessities and choices.

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ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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