

INVESTIGATING SMART PRESENCE SYSTEMS WITH MACHINE LEARNING METHODS

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ABSTRACT: Verifying that all employees have fulfilled their attendance targets may be a laborious and time-consuming process in large companies. To solve this problem, developers are creating an automated method that is both simple and effective in indicating presence. But evidence is required for this approach. Authentication and face recognition in real-time are the backbone of the Smart Presence System's many features. In this investigation, two distinct algorithms are utilized. A few examples of this approach include the Haar Cascade Classifier and the Convolutional Neural Network (CNN). A Haar Cascade Classifier was used to make this happen. A convolutional neural network (CNN) was invoked for this investigation. The process of recognizing a user's face all week long results in a new paper being generated every week. Authorized users are the only ones who can access this facial recognition and identification system. Individuals who have not yet registered can have their identities confirmed via a QR code identification method. There are several potential applications for user data that this technology could address. Within the confines of this system, users with and without accounts can live in harmony. Success rates of 99.99% were made possible with the use of the Haar Cascade Classifier.

Keywords: *Haar Cascade Classifier, Convolutional Neural Network, Attendance System, Face Recognition, Machine Learning.*

1. INTRODUCTION

A company's capacity to grow is directly correlated to the caliber of its employees' labor. This can only be achieved with a presence-based approach. Right now, you can choose one of two approaches. Methods that are driven by humans and those that are automated are both in use. It is now not possible to use Manual Presence. Conversely, managers can be alerted when an employee shows up at the workplace via a customizable presence device. With the aid of face tracking and recognition technology, they were able to check in with ease and speed. Keeping one's cool becomes easier as a result. Now that clients can check an employee's

whereabouts online, there is a greater incentive for them to be punctual. A lot of people are interested in facial recognition because it is a fairly reliable way to identify oneself. In the absence of facial recognition technology, biometrics would serve no useful purpose. Among these, face identification using image analysis stands out as very useful. Biometric verification methods, such as fingerprinting and retinal scanning, may only be used in person. Nevertheless, methods that rely on facial features to identify images are unnecessary. Face recognition is better than other methods of person identification because it doesn't require human intervention to work. As a result, individuals need to prove who they are. Individuals can overcome operational limits and

improve precision by using larger datasets and novel methodologies. The end goal is to find human characteristics in picture databases. Methods for quickly and accurately identifying individuals from big groups using only their facial traits have been developed by researchers in the field of biometric face recognition.

2. RELATED WORK

In order to keep track of when workers were there, a system was created that is comparable to Smart Attendance. Interviews, the narrative method, and a literature review are utilized in the employee attendance research to ascertain the optimal approach to keeping accurate and efficient financial records. Only employees were able to receive assistance. Those who sought our wares via QR codes were, nonetheless, assisted. Surveillance systems might record every student that walks through the school's doors. It was hinted that finding the people would necessitate more work and time. Nonetheless, our strategy was the best. You can make an Excel file using our program. Scientific advancements in facial recognition have opened the door to potential integration with time and attendance tracking systems. Radial Basis Function (RBF) was used to classify the features of each student's face into multiple categories. Using this method resulted in an 82% improvement in accuracy. Using this method, we were able to build upon our earlier findings. Beyond just accomplishing those goals, the project aims to create a system that can accurately, quickly, and in real time identify faces of one or more people. Extra and harder hours were expected of those who did not have legal employment. It is more convenient to use a single QR code rather than several. The evolution of facial recognition and RFID-based technologies has also enhanced older methods of recording attendance. The price is exorbitant. To accomplish this, we used facial recognition technology and

real-time monitoring. Staff and visitors who haven't signed up can be located with the help of QR codes.

3.METHODOLOGY

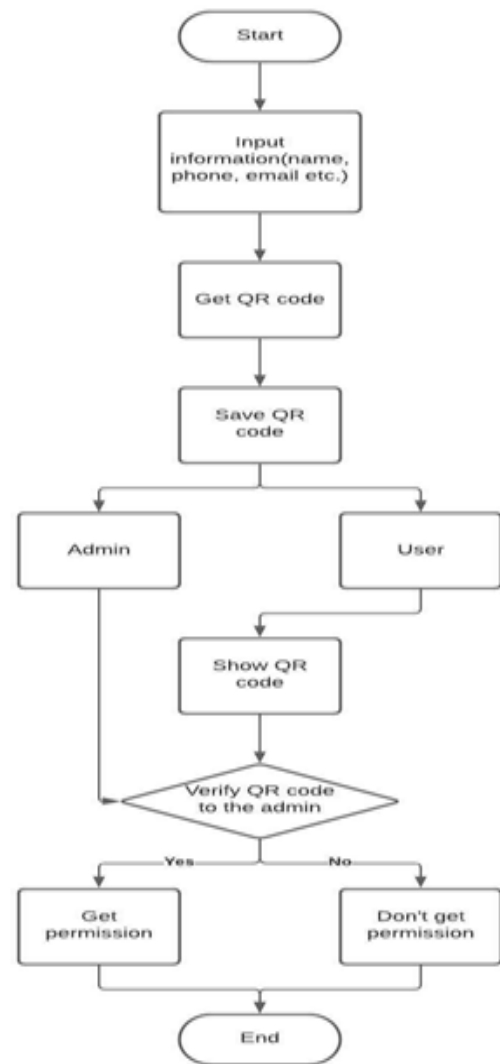


Fig. 1. The intelligent presence system cannot distinguish between a human and a robot..

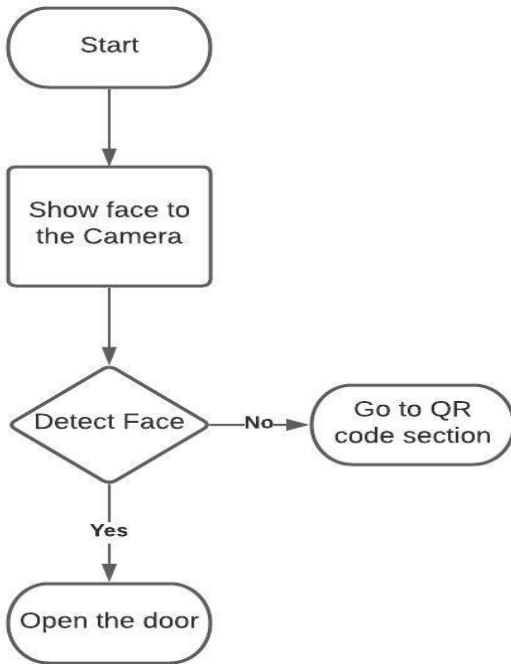


Fig. 2. The person who registered fulfills the profile of a Smart Presence System employee. You can still acquire QR codes by giving some basic personal information even if you don't want to create an account. Here, we'll be employing a certain review method.

The evolution of a contract through time is seen in Figure 2. When entering the building, employees are required to face the camera directly for identification purposes. Upon detecting face recognition, the door is instantly opened. Those who haven't signed up yet can do it by scanning a QR code.

Haar Cascade Classifier

One computer vision approach for feature detection is the Haar Cascade Classifier. It was Michael Jones and Paul Viola that came up with the idea. As seen in Figure 3, it is composed of four main elements. Use of the Adaboost method, the cascade method, Haar features analysis, or integral picture production can be difficult in some environments.

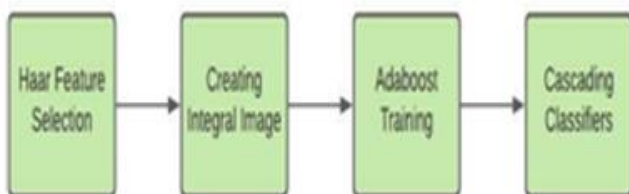


Fig. 3. The Haar Cascade Classifier's steps are

listed below.

A detection window looks for nearby rectangles that might have the Haar feature and flags them as such. In this process, we add up all the pixel values from all the places and then subtract them. You can find these Haar traits in integrated photos with little further work. Only the most important parts are chosen and built by Adaboost. The process takes many weak classifiers and combines them to form a "strong classifier" that can correctly identify the item. Consistently good results in the cascade predictor are hard to come by.

Convolutional Neural Network Algorithm:

An example of a deep learning neural network is a convolutional neural network, which is used to evaluate the quality of structured data collections like imagery libraries. When it comes to identifying numerous visual design elements, including gradients, lines, circles, irises, and more, CNN excels. For this reason, computer vision is an area where convolutional neural networks shine. There's no need to plan ahead while using CNN; it can be applied instantly in case of an under- or overexposed photo. In order to build a convolutional neural network, a fixed number of hidden layers are added in a specific sequence. It is a feed-forward neural network with many layers. CNN's linear motion allows it to potentially detect level-related attributes.

A number of individuals are responsible for different parts of the research. Some form of relationship exists between them. In this approach, no stages are skipped. Figure 4 shows the process in action, while Figure 1 shows the process schematic.

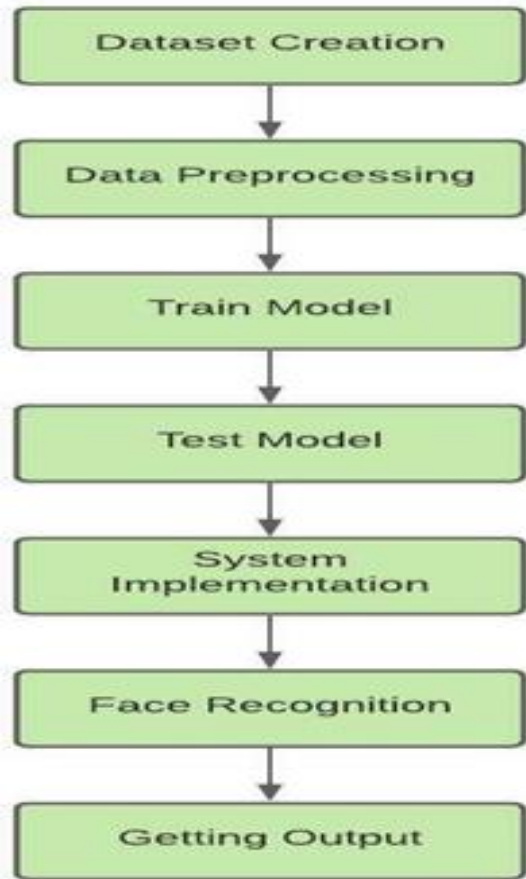


Fig. 4. Diagram of the Smart Presence System's Process Flow

As with any study, the first step is to gather pertinent data. Gathering and analyzing data is an essential part of any "innovative research" project. The Intelligent Presence System relies significantly on libraries and AI techniques to carry out its functions. At the present time, it is a state-of-the-art computer vision tool. This method uses the Haar Cascade Classifier to quickly locate faces. This software uses machine learning to examine both static and dynamic photos. Most of these files were gathered using the Python Imaging Library (PIL). Once finished, using Python to work with photographs will be a breeze. It is recommended to import the sample images and then transform them to grayscale. The remaining NumPy collection is neat and tidy when the picture IDs are eliminated. We add the face to the ID database once we retrieve it from a training image. With each iteration, the facial recognition algorithm will be fed new training data. New

stories are published daily.

Link our team to the wider world through the use of QR codes. Collaborating across global areas is essential for implementing this plan. Quick response codes can be grouped into two types. While the second is more suited to C-suite executives, the first is good reading for everyone. The adoption of a single password type (OTP) ensured that each password was unique.

4. RESULT AND DISCUSSION

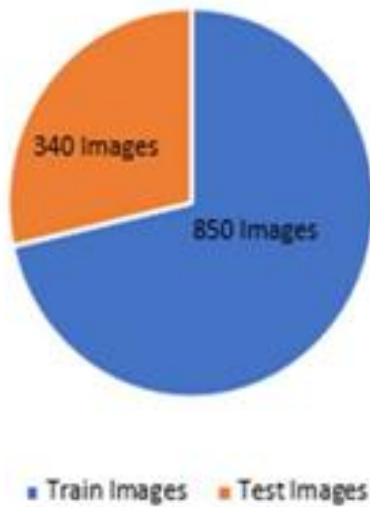
Before you can finish the study project, you need to finish these assignments. During system development, finding the optimal solution is of the utmost importance. This was accomplished using two separate types. With a 98% success rate, the Haar cascade prediction approach is the most secure solution in this case. The precision of each method is shown in Table I.

TABLE I. ARE THE DIFFERENT COMPUTER-BASED METHODS OF EVALUATING PERFORMANCE RELIABLE?

Algorithms	Results
Haar Cascade Classifier Algorithm	99 %
Convolutional Neural Network Algorithm	97%

850: 850 pictures are currently saved in RAM. There were 850 images and 340 training occurrences in the dataset.

Dataset Splitting



Your segmentation approach needs to be planned, as shown in Figure 5.

Figure 5 shows the differences between the test and training images. For tagging purposes, only 340 photos will be used. Next, 850 of these will find their way into schools.

		Actual Values	
		Positive (1)	Negative (0)
Predictive Values	Positive (1)	TP	FP
	Negative (0)	FN	TN

Fig.6. The Problem-Solving Matrix

On order to have a better grasp of any given topic, you should educate yourself on statistics. It employs two separate approaches. The Haar Cascade Classifier and convolutional neural networks (CNNs) are two well-known machine learning techniques. The time and effort required to complete the calculation are the two most

important considerations. The Haar Cascade Classifier method is significantly faster than the CNN methodology. Convolutional neural networks (CNNs) use significantly more resources than Haar Cascade Classifiers.

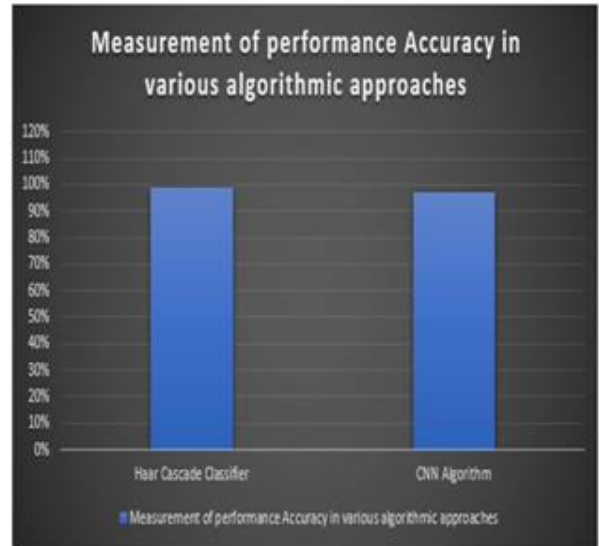


Fig.7. Data visualizations illustrating the outcomes

Documenting and analyzing human behavior is the main goal of the research. Simply placing yourself in front of the projector will capture a photograph. The repair will be handled automatically by the system. Once the data has been obtained, it will be utilized. We have finished collecting, instructing, and analyzing data. Make sure that the necessary data training is finished. The show was subsequently shown to the audience. In order to find out how similar the current data and results are to those of the past, machine learning is used right from the start. Here, a hybrid strategy is being employed. Alternatively, you can use the Haar Cascade.

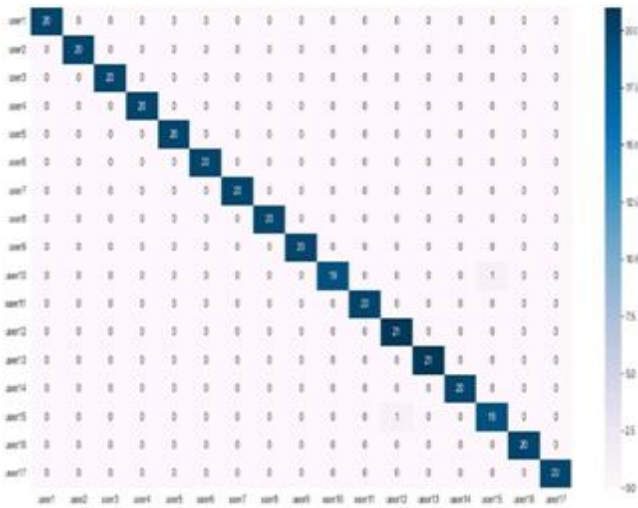


Fig. 8. Temperature Dependability Map

Figures 7 and 8 show that the Convolutional Neural Network Algorithm only works 97% of the time, whereas the Classifier Algorithm has a performance rate of 99%. A confusion matrix is shown in Figure 6, and a link heatmap is shown in Figure 8. A diverse range of business types may benefit from this effort. A lot of companies still use paper forms to keep tabs on who's at the office. The use of all available modern technology, however, is of the utmost importance. The linked systems improved their performance after these steps.

5.CONCLUSION

Applying machine learning techniques to an intelligent presence system can boost its efficiency and functionality. Machine learning systems can quickly and effectively identify people in any given scenario because they can learn and adapt to new patterns and behaviors. Research into machine learning-based facial recognition and labeling has the potential to yield many practical applications. Our long-term objective is to establish a new benchmark that will improve the safety of everyday business processes while also making it easier to comply with new rules. Improving system performance and production was the goal. This study, however, has

a number of major flaws. Human annotation is necessary due to the complexity of face recognition. Even if our system works as expected, it can still require significant improvements. Keep in mind the importance of upholding basic moral standards while you study. Our findings might have far-reaching consequences for how this problem is tackled in the future. Typically, you can use it to make sure everything is safe enough. The company stands to gain from this since it has the ability to eliminate numerous security concerns. The required research will take too much time for me to complete at this time. Gradual improvements are best for the future. According to the results of the study, it could be really useful. Newer models are more cost-effective, safer, and more efficient.

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