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Geo-Enabled Doctor Attendance System for Primary Healthcare Centres

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ABSTRACT - Primary Health Centers (PHCs) serve as the backbone of healthcare delivery, particularly in rural and underserved regions. Ensuring the availability of doctors at these centers is crucial for efficient healthcare services. However, the existing attendance tracking system relies on manual registers or biometric methods, which are prone to inaccuracies, proxy attendance, and inefficiencies. To address these challenges, this project introduces a PHC Doctor Attendance System that leverages geotagged photo uploads and facial recognition using Convolutional Neural Networks (CNN) for real-time attendance monitoring. The proposed system integrates geolocation validation through geofencing and GPS coordinates, ensuring that doctors mark their attendance only from their designated PHC location. Doctors are required to upload a geotagged photo within their designated shift time, and the system verifies the location, timestamp, and identity before confirming attendance. The CNN-based face recognition module ensures that the uploaded photo belongs to the respective doctor, preventing proxy attendance.

I. INTRODUCTION

Primary healthcare is the first contact a person has with the health system when they have a health problem. Primary healthcare refers to a broad range of health services provided by medical professionals in the community. Your general practitioner (GP) is a primary healthcare provider, and so are nurses, pharmacists and allied health providers like dentists. Primary healthcare is the provision of health services, including diagnosis and treatment of a health condition, and support in managing long-term healthcare, including chronic conditions like diabetes. Primary healthcare includes seeing health professionals to help you maintain good health, with regular health checks, health advice when you have concerns, and support for ongoing care.

Primary healthcare services

Services delivered by primary healthcare providers include:

- diagnosis, treatment and care of people with health problems
- promoting good health
- preventing health problems
- Early intervention.

II. LITERATURE SURVEY

The distributed work model, which allows people to work from multiple physical places, has gained significant popularity in recent years, particularly since the outbreak of the COVID-19 epidemic. Despite the potential advantages of cost reductions associated with office space and flexible working environments, this model presents difficulties in effectively controlling and monitoring employee work activities. Applying advanced technologies in human resources can enable organizations to address these challenges effectively. However, SMEs face challenges in adopting advanced



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technologies such as AI and facial recognition due to financial constraints, lack of technical expertise, and concerns about costeffectiveness. The paper focuses on developing a low-cost attendance monitoring mobile application that utilizes real-time facial recognition and location analysis for SMEs. We try to enhance the real-time registration and identification flow with the camera of employees' mobiles by handling large data streams and integrating the system with a cloud-based solution.

Due to the global spread of the Covid-19 virus and its variants, new needs and problems have emerged during the pandemic that deeply affects our lives. Wearing masks as the most effective measure to prevent the spread and transmission of the virus has brought various security vulnerabilities. Today we are going through times when wearing a mask is part of our lives, thus, it is very important to identify individuals who violate this rule.

Besides, this pandemic makes the traditional biometric authentication systems less effective in many cases such as facial security checks, gated community access control, and facial attendance. So far, in the area of masked face recognition, a small number of contributions have been accomplished. It is definitely imperative to enhance the recognition performance of the traditional face recognition methods on masked faces. Existing masked face recognition approaches are mostly performed based on deep learning models that require plenty of samples. Nevertheless, there are not enough image datasets containing a masked face. As such, the main objective of this study is to identify individuals who do not use masks or use them incorrectly and to verify their identity by building a masked face dataset.

III. PROPOSED SYSTEM

Geotagged Photo Verification

The system integrates Convolutional Neural Network (CNN)-based facial recognition to verify the doctor's identity. The uploaded image is cross-verified with the doctor's registered facial data, eliminating the possibility of proxy attendance. This AI-driven approach ensures higher accuracy and reliability in attendance tracking.

Face Recognition Using CNN

The system integrates Convolutional Neural Network (CNN)-based facial recognition to verify the doctor's identity.

Automated Attendance Tracking

Manual attendance tracking often leads to errors and inefficiencies. The automated attendance system records the presence of doctors in real time as they check in, eliminating paperwork and minimizing human intervention.

Absenteeism Alerts and Compliance Notifications

To address absenteeism, the system automatically sends alerts and notifications via SMS, email, and in-app messages to doctors, PHC administrators, and Deputy Directors of Health Services (DDHS) in case of non-compliance.

Real-Time Monitoring Dashboard

The system provides a centralized dashboard that enables administrators and health officials to monitor doctor attendance status and trends in real time.

ADVANTAGES

- Prevents proxy marking using geotagging and face recognition.
- Tracks doctor attendance instantly.
- Notifies absenteeism and escalates repeated violations.
- Eliminates manual and biometric attendance errors.
- Ensures physical presence at PHCs.
- Logs daily patient details for better tracking.
- Generates reports for decision-making.
- Identifies trends for better planning.
- Secure authentication prevents manipulation.
- Simple and easy-to-use interface.





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IV. MODULES

PHC Doctor Attendance System Web Dashboard

The PHC Doctor Attendance System Web Dashboard is a centralized platform for tracking doctor attendance, managing patient data, and generating reports. Developed using Python, Flask, MySQL, Bootstrap, and WampServer, it ensures secure and efficient monitoring.

Stakeholder

The Stakeholder Module plays a crucial role in the PHC Doctor Attendance System, ensuring that all key users have the necessary access and functionalities to manage attendance, monitor compliance, and oversee healthcare service delivery.

GeoFence PHCs

The GeoFence Creation Module establishes a virtual boundary around each Primary Health Center (PHC) to ensure location-based attendance verification. This module uses the Polygon-Based Geofence Technique, allowing administrators to define a secure geographical zone for each PHC.

Face Enrolment

The Face Enrolment module is designed to capture, process, and recognize doctors' facial features for secure attendance tracking.

Doctor Attendance

This module ensures accurate and tamper-proof attendance logging by integrating Geo-Tagged Face Photo Upload, Geo-Location Verification, and Face Biometric Recognition.

Automated Attendance Tracking

This module automates the attendance logging process by eliminating manual errors and ensuring accuracy and efficiency. Upon successful geo-location verification and face recognition, the system automatically records the doctor's attendance, reducing the chances of manipulation or proxy marking.

Absenteeism Alerts

This module ensures real-time tracking of doctor attendance by generating alerts when a doctor fails to mark attendance within the designated timeframe.

Escalation & Compliance

This module ensures strict adherence to attendance policies by escalating repeated absenteeism cases to higher authorities.

Real-Time Monitoring Dashboard

The Real-Time Monitoring Dashboard provides administrators with a centralized interface to track doctor attendance, absenteeism alerts, and compliance trends in real-time.

Patient Management

The Patient Management Module enables doctors to systematically record and manage patient details, ensuring accurate tracking of medical history and treatments.

Attendance Reports

The Attendance Reports module automatically generates detailed reports on doctor attendance, absenteeism, and trends over specific periods.

Notification

The Notification Module ensures timely communication by sending automated alerts regarding attendance status, compliance violations, and other critical updates.





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V. EXPERIMENT AND RESULT



FIGURE 1: PHC HOME PAGE

Admin Login
admin

FIGURE 2: ADMIN LOGIN

) Dashboard				Dashboar
B Doctor				
B DDHS	Deputy Director of Health Services			
HMS	Add DDHS Details			
Logout	Name	DDHS ID: DH1		
	Mobile No.	Name Mobile No. Email	: Harish : 8895624212 : harish@gmail.com	
	Email	District	: Salem	Delete
	District			
	DH2			
	Password			
	Add			

FIGURE 3: DDHS DETAIL PAGE

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PHC Botty Attendance	HOME DOCTOR DDHS HMO PHC ADMIN
	Doctor Login
C C	

FIGURE 4: DOCTOR LOGIN

FIGURE 5: ATTENDANCE CAPTURE

PHC addenderoa	HOME DOCTOR DDHS HMO PHC ADMIN
Quality	DDHS Login
Health Environment Safety	 LOGIN

FIGURE 6: DHSS LOGIN

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FIGURE 7: ATTENDANCE REPORT PAGE

PHC Attendance	HOME DOCTOR DDHS HMO PHC ADMIN
	HMO Login
	LOGIN

FIGURE 8: HMO LOGIN

нмо	.		
O Dashboard >			
BB Monitor	Track Absente	eeism	
Logout	D1-Dr. P.R 🗸	-Month- 🗸	-Year- 🗸 Go
	Doctor ID: D1		2025-04-01- Abse
		Time	∞ 06:59:08
		GPS Location	(₭) 06:59:08, 78.696500
	Commission and Commission	Face	X Not Verified
		Time	8 08:51:54
		GPS Location	
	Constant C	Face	Verified
	Doctor ID: D1	Time	2025-04-03- Abse
		GPS Location	× 11:18:04, 78.696500
	Constant and	Face	Verified

FIGURE 9: TRACK ABSENTEEISM

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VI.CONCLUSION

In conclusion, this project successfully implements the PHC Doctor Attendance System, providing an efficient and technology-driven solution for monitoring doctor attendance at Primary Health Centers (PHCs). By integrating geotagged photo verification, face recognition using CNN, real-time attendance tracking, and automated alerts, the system ensures accuracy, transparency, and compliance with healthcare regulations.

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