AUTOMATED ATTENDANCE SYSTEM USING FACIAL RECOGNITON

A PROJECT REPORT

for

BIOMETRIC SYSTEMS (SWE1015)

in

M.Tech (Software Engineering)

by

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Fall Semester,2020-2021

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NOV, 2020

<u>DECLARATION BY THE CANDIDATE</u>

We here by declare that the project report entitled **"AUTOMATED ATTENDANCE SYSTEM USING FACIAL RECOGNITON"** submitted by us to Vellore Institute of Technology University, Vellore in partial fulfillment of the requirement for the award of the course **Biometric Systems (SWE1015)** is a record of bonafide project work carried out by us under the guidance of **Prof. Agilandeeswari L.** We further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other course.

Place : Vellore   Signature

Date :

School of Information Technology & Engineering [SITE]

CERTIFICATE

This is to certify that the project report entitled **"AUTOMATED ATTENDANCE SYSTEM USING FACIAL RECOGNITON"** submitted by **Harish D (18MIS0163), Naveenkumar J (18MIS03595), Siva surya C(18MIS0410) r**to Vellore Institute of Technology University, Vellore in partial fulfillment of the requirement for the award of the course **Biometric Systems (SWE1015)** is a record of bonafide work carried out by them under my guidance.

Prof. Agilandeeswari L

GUIDE

Asso. Professor, SITE

AUTOMATED ATTENDANCE SYSTEM USING FACIAL RECOGNITON

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Abstract

The administration of the attendance can be a splendid burden on the instructors if it is achieved by means of hand. To unravel this problem, smart and auto attendance administration device is being utilized. But authentication is an essential difficulty in this system. The clever attendance system is typically completed with the assist of biometrics. Face recognition is one of the biometric methods to improve this system. Being a prime characteristic of biometric verification, facial attention is being used exceptionally in various such applications, like video monitoring and CCTV photos system, an interaction between laptop & people and access structures current indoors and network security. By using this framework, the trouble of proxies and college students being marked existing even although they are now not bodily present can without problems be solved. The primary implementation steps used in this type of gadget are face detection and recognizing the detected face. This paper proposes a model for enforcing an automated attendance management gadget for students of a type via making use of face awareness technique, by way of using LBPH(Local Binary pattern Histogram) along with Haar cascade. After these, the connection of diagnosed faces ought to be plausible by using comparing with the database containing student's faces. This model will be a successful method to manipulate the attendance and records of students.

Keywords – Face Recognition, LBPH, Authentication, SAMS(Smart Attendance Management System) ,Face Quality Assessment.

I.   INTRODUCTION

In a classroom, taking attendance is one of the anxious and time-consuming things to do for a lecturer, particularly in a study room of 70-80 + students. All these handwritten records of attendance in the shape of statistical facts is tough to compute and analyze manually. And these methods are greater inclined to false attendance or proxy. As a solution to this many people got here up with a number of other techniques to discover an individual. A few of the exceptional options had been scanning ID cards, using fingerprint sensors, and face attention systems. Each of these has obtained its personal professionals and cons.

Even though the fingerprint technique is viewed the fine biometric system for the identification of an individual, it is instead more time-consuming than the manual method. Hence face attention system is considered the fantastic feasible solution.

By the use of this face attention device we can devise a dynamic system. This machine will mark attendance for students current in the classification automatically with the aid of recognizing their faces. The Senor is break up into a couple of steps, but face detection and face recognition are the most important steps. Firstly, we need to database each student's face in order to mark their attendance. Then a digital camera sensor is used to take photos of the school room in such a way that all the faces are captured. This photograph serves as a sensor input. For the excellent face recognition, the picture needs to enhance by using ability of a few Image Enhancement techniques like conversion of an image to grayscale and to operate histogram equalization. For the last row college students who face are no longer without a doubt visible, a approach referred to as histogram equalization is carried out to decorate the image.

Most of these frameworks, however, have corresponding portability, usability, validity or cost limits. So the enhancement of a Smart Attendance Management System (SAMS) based entirely on face recognition leads to a pastime to solve the vulnerabilities of the respective systems. Knowledge of technical know-how stands high with its specific benefits, unlike other biometric and non-biometric attendance device capabilities.
Every student has a separate facial identity and by using mere proxies, it can now not be
faked. In addition, the category instructors feel more familiar with the pupil
through their countenance than the number of the title or roll.

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II.   BACKGROUND

This paper uses the tool named Vscode for the implementation purposes and the general technique carried out is using the Local Binary Patterns with Histogram(LBPH) also this technique includes various packages such as Numpy, Pandas, opencv-contrib-python, OpenCV2 , Pillow, python-csv, yagmail , pytest-shutil,and for the proposed system implementation. Also, the implementation language used here is Python.

III.   Literature Survey

Authors &Year	Methodology or Techniques used	Advantages	Issues	Metrics used
Automatic student Attendance system using Face Recognition Authors: Partha Chackraborth,Mahmuda Khatun, Fahmida Islam,Chowdhury Shahriar Muzammel Year:Feb2020	Principle Face Recognition(PCA) Algorithm	Simple,reliable ,cost-effective,time-saving	Simple,reliable ,cost-effective,time-saving	FAR and FRR are threshold dependent. Overall Recognition accuracy is above 85%
Automatic Attendance System using Face Recognition Technique Authors:Mayur Surve,Priya Joshi,Sujata Jamadar,Minakshi Vharkate Year:2020	Histogram of oriented gradient features(HOG) Haar Cascade features.	High Accuray compare to other algorithms. No network connectivity needed. System is simple to operate. It is able to capture images from 60-80cm distance very accurately.	More time required to extract feature from the object(Face)	FRR is 3.35%
Face Recognition based Attendance	Dlib's Face Recognition	Higher accuracy in	Does not work for side face.	Low Threshold=More

System Authors:Dhanush Gowda H.L, K.Vishal,Keertiraj B.R, Neha Kumari Dubey, Pooja M.R Year:2020	Model Deep Metric Learning	recognition of multiple faces from a single frame with lower response time.		results.
Convolutional Neural Network Authors: Nusrat Mubin Neural Network Apporach for Vision based student Recognition system Year:2017	Alex NET CNNs and RFID Technology	Uses the camera system to Monitor the scene information	Alex NET method hard to apply to high resolution images.	CNN that use Rectified Linear Units(ReLU) to achieve 25% error rate.
NFC Based Mobile Attendance System with Facial Authorization on Raspberry PI and Cloud Server. Authors:Siti Ummi Masruroh ,Andrew Fiade Imelda, Ristanti Julia Year:2018	Iris Recognition	Real time face detection and efficient	Iris condition needs to improve in different light conditions.	FRR and FAR depends on the sensor.
Face Recognition-based Attendance System using Machine Learning and Algorithms. Author:Radhika C,Damale Year :2018	Local Binary patterns,LDA based OpenCV and FLTK	Continuous and automatic attendance system.	System has issues with system performance and accuracy.	FAR is above 60%.
Prototype model	ADA Boost	By using this	Works only for	FRR is High

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for an Intelligent Attendance System based on facial Identification. Authors:Raj Malik,Praveen kumar,Amit Verma,Seema Rawat Year:2016	algorithm with techniques PCA and LDA Hybrid algorithm.	system chances of fake attendance and proxy can be reduced. Efficient methodology.	single image of a system.	with 90% and FAR is less than 20%.
Automated Attendance System Using Face Recognition. Authors:Akshay Jadhav,Akshara Jadhav,Tushar Ladhe,Krishna Yeolekar Year:2017	Discrete Wavelet Transform (DWT) algorithm and PCA	Does not divide image into blocks,but analyse the whole image.	Computational complexity and time. Efficiency depends on no.of decomposition levels.	FAR and FAR is equal.
Face Recognition:A Literature Review Authors:Nawaf Hazim Barnouti,Baghdad Year:2016	Appearnce-Based(Holistic)Methods.PCA	PCA reduces dimensionality of data,while keeping as much as variation as possible.	PCA will not give you sensible results.	Checkbycheck distance is maximum value distance.
Deep FaceRecognition Authors: Omkar M. Parkhi, Andrea Vedaldi, Andrew Zisserman. Year:2015	Fisher Vector Faces,Deep Face,Fusion, FaceNet	Duplicate Removal, Manual filtering.	Disadvantage in Fisher Vector Faces is relative large size of these vectors. In Deep Face method they need for very large,labelled training datasets as collecting and labelling them	Highest accuracy rate among these is Face Net is 99.95%. EER –Highest accuracy in EER which found in Deep face method with 91.4%

			can be time consuming and prone to error.	
Face Recognition/Detection by Probabilistic Decision-Based Neural Network Shang-Hung Lin, Sun-Yuan Kung, Fellow, IEEE, and Long-Ji Lin. Year:1997	Probabilistic Decision-Based Neural Network.	PDBNN are much faster than Multiplayer perceptron networks. PDBNN networks generate accurated predicted target probability scores.	PDBNN are slower than multiplayer perceptron networks at classifying new cases.PNN require more memory space to store the model.	Recognition: Trained by original set accuracy is 84.64%, and Trained by Valid set 98.34%.
Face Description with Local Binary Patterns: Application to Face Recognition Timo Ahonen, Student Member, IEEE,Abdenour Hadid, and Matti Pietikainen, Senior Member, IEEE. Year:2006	Principal Component Analysis(PCA),Local binary patterns.	It reduces significantly the histograms dimensionality by comparing pairs of neighbors in the operator. It considers the center pixel points effect and gives it the largest weight,thus imporving discrimination.	They produce rather long histograms,which slow down recognition speed especially on large-scale face database.Under some certain circumstance,they miss the local structure as they don't consider the effect of the center pixel.	LBP,weighted mean is 0.81 and failure to capture is 0.79%.
Single Sample Face Recognition via Learning Deep Supervised Auto-Encoders Authors:Shenghua Gao, Yuting Zhang, Kui Jia, JiwenLu, Yingying Zhang. Year:2018	Supervised Auto-Encoders using Eigen faces and Fisher faces.	Reduction of high-dimensional datasets to low-dimensional datasets is effective.	Its not efficient. Struggle to keep up and images start to get blurry.	SSAE AR Dataset is 85.21%.

Face Recognition-based Lecture Attendance System Authors: Yohei KAWAGUCHI Tetsuo SHOJI Weijane LIN Koh KAKUSHO Michihiko MINOH. Year:2011	Active Student Detecting method	In the background substraction method,noise factors like bags and coats of the students are also detected,and the students are not detected if the color of clothes of them are similar the seats.	This method is expensive to implement.	Face detection rate accracy is 80.0%
Face Recognition-Based Mobile Automatic Classroom Attendance Management System. Authors:Refik Samet,Muhamme d Tanriveri Year:2017	LBP and Eigen Faces	Robustness, computational simplicity	Slow process on large-scale face database.	FAR,FRR and accuracy is 84.86%
Attendance System Based on Face Recognition System using CNN-PCA Method and Real-time Camera Authors:Edy Winarno,Prajanto Wahyu Adi,Imam Husni Al Amin,Wiwien Hadikurniawati,H erny Februariyanti,Mu	PCA and CNN	PCA is used to reduce dimensional of face image resoution. Component analysis is used to convert a large variable data into a form of representation of other smaller	CNN do not encode the position and orientation of object. Lack of ability to be spatially invariant to the input data.	Accuracy is 98%.

chmaad Taufiq Anwar. Year:2019		variables.		
Vision-Face Recognition Attendance Monitoring System for Surveillance using Deep Learning Technology and Computer Vision. Authors:Harikrishnan J,Arya Sudarsan,Remya Ajai,Aravind Sadashiv. Year:2019	Deep Learning,Local Binary Patterns.	This function gives produces a real time monitor which can be used for surveillance in lab facilities and classrooms for real-time surveillance.	This methods depends on lighting conditions and we need extra sensor(raspberry pi).	Accuracy is 75% and above.
An image Acquisition Method for Face Recognition and Implementation of an Automatic Attendance System for Events. Authors: Luis Fung-Lung,Mikael Nycander-Barua,Pedro Shiguihara-Juarez. Year:2019	Haar Cascade,KNN,Bayes,RF,MLP,DT,AB and SVM.	The results using ResNet 34 had good accuracy using KNN,Rf,and SVM. In more detail,KNN,RF,and SVM had an accuracy of more than 90% when using between 5 and 50 images.	Not suitable to current Environment.	Error rate-3.6% Accuracy - 94.73%
Automation of Attendance System Using Facial	Viola jones algorithm,Deep Neural networks,LD	Reliable and Effective.	Images and video take up a lot of space compared to typical fingerprint	False Match Rate(FMR) and False Non-Match

Recognition. Authors:SatyaSathvik Kadambari,Gauraang Prabhu,Deep Mistry,Monica Khanore. Year:2020	R		records.	Rate(FNMR).
Face Recognition based Attendance system using Haar Cascade and Local Binary Pattern Histogram Algorithm. Authors: Bharath Tej Chinimilli , Anjali T. Akhil Kotturi , Vihas Reddy Kaipu , Jathin Varma Mandapati Year:2020	Haar Cascade and LBP and Histogram.	LBP operation creates an image which highlights the characteristics of a image in a better way.	The problem is the data set is small.	False positive rate is 14% and 30% with and without applying threshold respectively.

IV.   PROPOSED ALGORITHM

It can represent local features in the images.
It is possible to get **great** results (mainly in a controlled environment).
It is robust against monotonic gray scale transformations.
Simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a **binary** number.
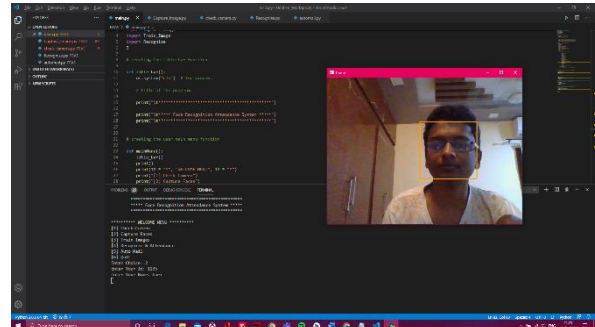
MODULE:
❑ Image Acquisition
❑ Preprocessing
❑ Feature Extraction
❑ Feature Matching
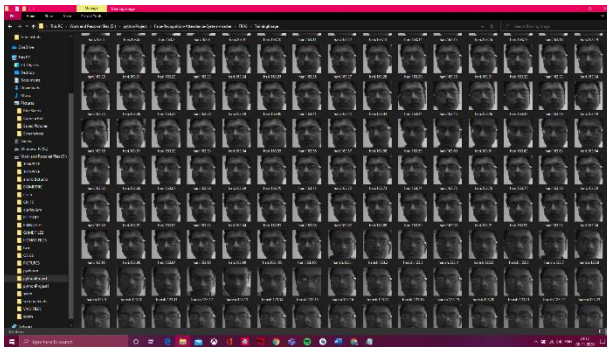❑ Attendance Marking using Automail
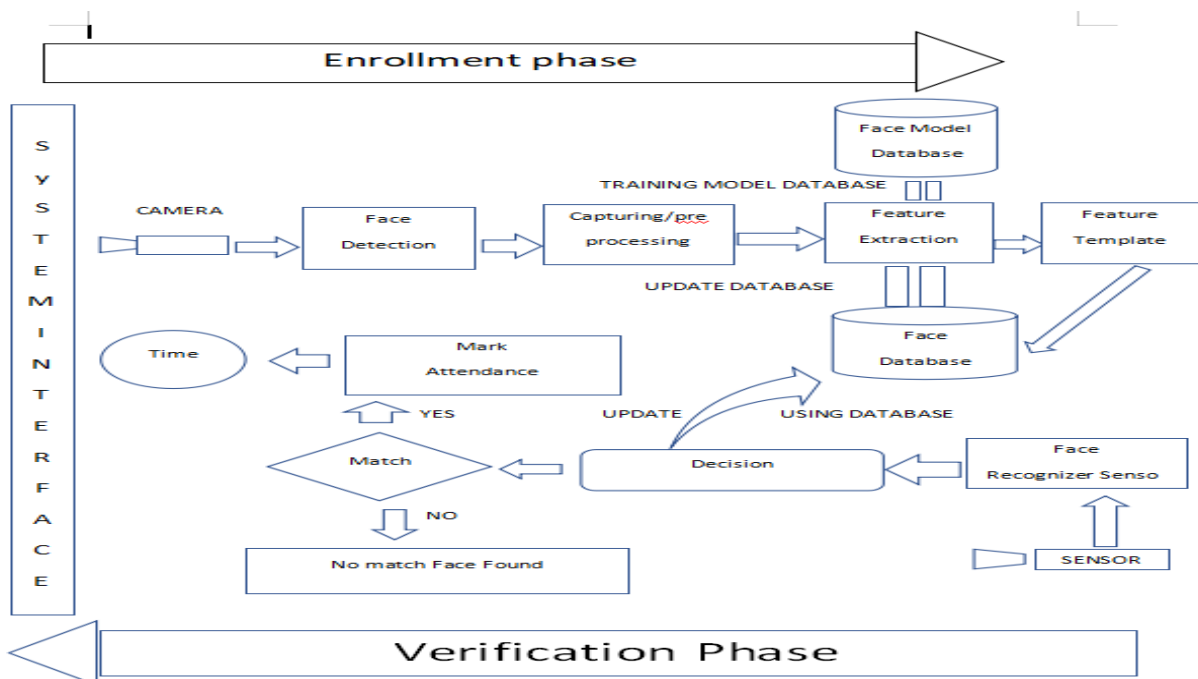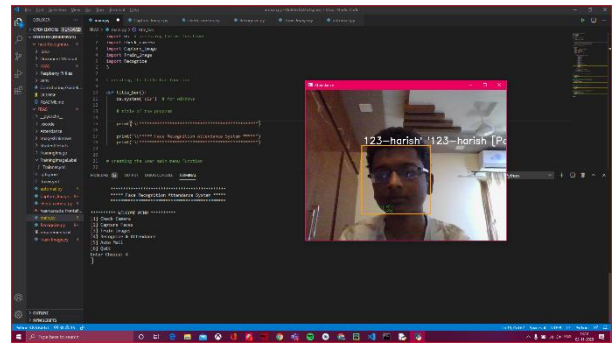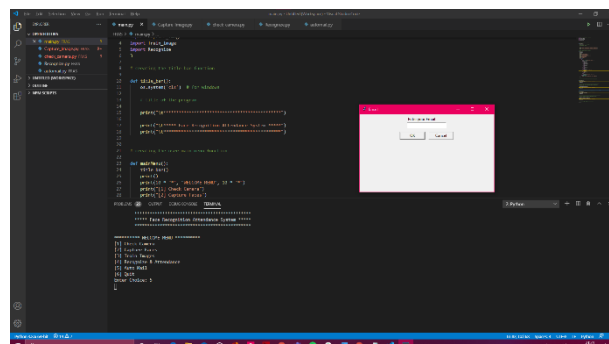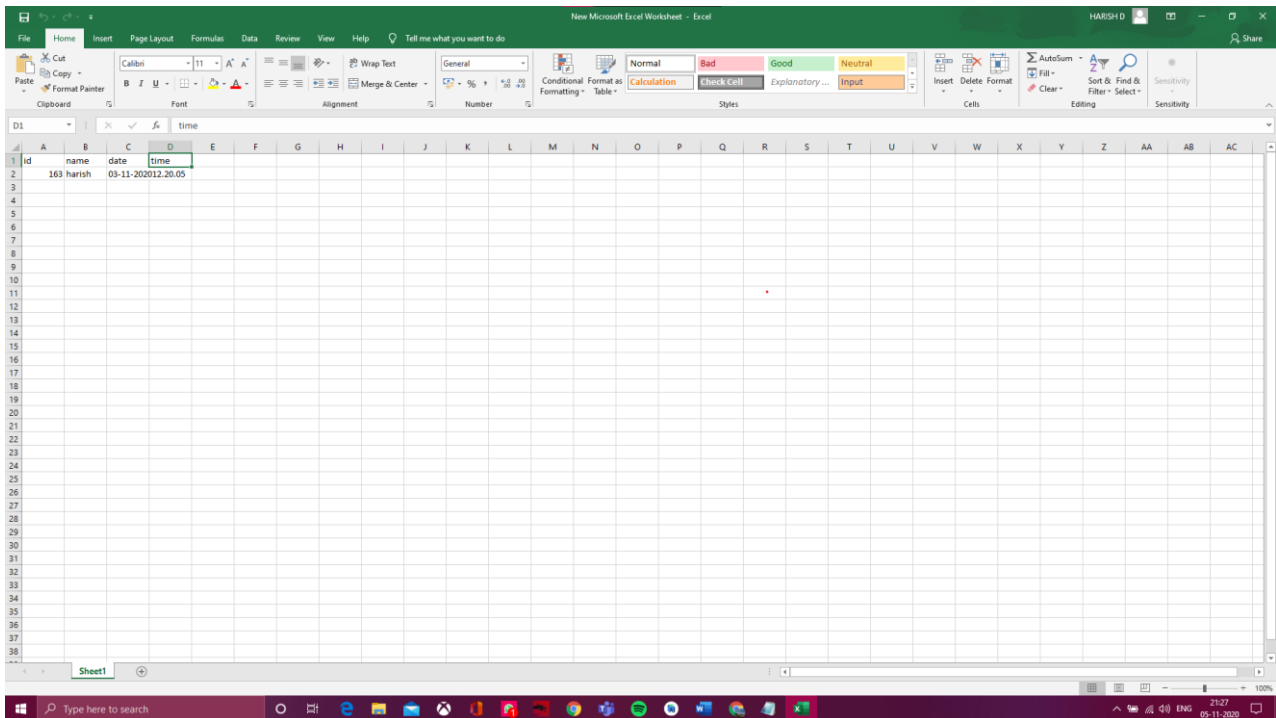
V. EXPERIMENTS RESULTS
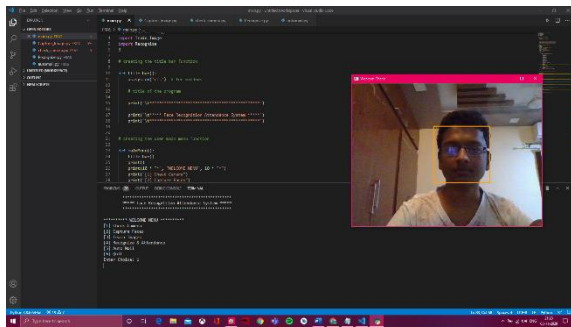
1.CHECK CAMERA

2.CAPTURE CAMERA

3.TRAINING IMAGE

4.RECOGNIZE IMAGE

5.EMAIL SYSTEM

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VI. COMPARATIVE STUDY

Exposure	Light exposure levels				
	-70	*-50*	*-20*	*-10*	*0*
Eigenfaces	6.65	7.95	11.74	12.08	11.31
Fisherfaces	22.16	24.63	30.14	29.15	30.01
LBPH	25.08	35.28	53.62	52.42	57.36

LIGHT EXPOSURE

Algorithms	Noise values				
	0	*20*	*25*	*30*	*50*
Eigenface	11.31	10.02	10.87	12.18	13.38
Fisherfaces	30.01	26.25	28.09	29.07	26.76
LBPH	57.36	58.02	51.99	44.15	6.81

NOISE LEVELS

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Algorithms	Video resolution		
	720p	*480p*	*360p*
Eigenfaces	11.31	12.33	12.54
Fisherfaces	30.01	26.85	31.10
LBPH	57.36	50.53	50.42

VIDEO RESOLUTION

VII.CONCLUSION AND FUTURE WORK

In future,we are able to detect students expression using Emotion Detection — Classifying the emotion on the face as happy, angry, sad, neutral, surprise, disgust or fear and suggest a feedback of the class to the respective faculty.With this method,we can also include face mask detection in the future,So that the face recognition method becomes more successful during global pandemic.

To detect real time human face are used and a simple fast LBPH has used to recognize the faces detected with a high accuracy rate. The matched face is used to mark attendance of the students via faculty through email.Our system maintains the attendance records of students automatically.

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