

Face Recognition System Using CNN

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Problem Statement

Problem Statement

- With the constant development of computer technology, human dependence on network technology have grown, which leads to the importance of security issues. User authentication is an important thing to avoid attacks and security vulnerabilities. There are different authentication methods such as fingerprint scanning, voice recognition, SMS one-time passcodes, and face recognition. Face recognition is one of the important applications of image processing in still images and video. Its a true challenge to build an automated system which equals human ability to recognize faces.

Introduction

Introduction

- Face Recognition is a biometric technology that identifies and verifies an individual from a digital image and video. It captures, examines, and then compares a person's facial details.
- Facial recognition has turned into a popular tool to authenticate the identity of an individual. In modern times, this technology has been used in various sectors and industries for different applications like-
 - Automobile Security
 - Access Control
 - Immigration
 - Education
 - Retail
 - Healthcare

Approaches and Limitations

Classical face recognition algorithms

1. Eigenface Algorithm

The recognition process involves projecting a new image into the "Eigenface" (A batch of face images is first converted into a set of feature vectors) subspace and determining and recognizing it by the position of its projection points in the subspace and the length of the projection lines.

Limitation:

- It fails to adequately represent faces when large variations in illumination facial expressions and other factors occur.

2. FisherFace Algorithm

The Fisherface projection approach is able to solve the illumination problem by maximizing the ratio between-class scatter to within-class scatter

Limitation

- It fails when all scatter matrices are singular.

Neural Network Approach

CNN Algorithm

Convolutional Neural Networks (CNNs) are a class of deep learning algorithms specifically designed for image processing tasks, including face recognition. The key feature of CNNs is the convolutional layer, which applies filters to input images to extract relevant features.

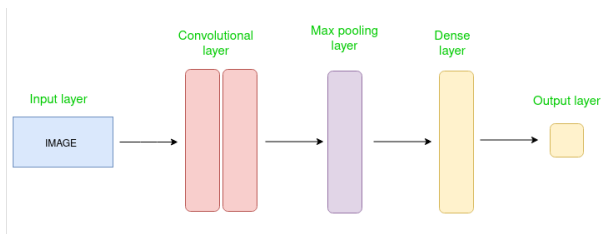


Figure: CNN architecture

CNN Concept

Input layer

This layer receives the input image, typically represented as a grid of pixel values.

Convolution layer

Convolutional layers are responsible for feature extraction from the input image. But multiple convolutional layers are typically stacked to capture increasingly complex features.

Pooling Layer

Pooling layers reduce the spatial dimensions of the feature maps, reducing the computational complexity and introducing translation invariance.

Dense layer

Fully connected layers are responsible for high-level reasoning and decision-making based on the extracted features.

Output layer

Represent different individuals or classes, with each neuron corresponding to a specific individual or class.

Supervised Learning

CNN is a supervised type of Deep learning, most preferable used in image recognition and computer vision. Supervised learning is the types of machine learning in which machines are trained using well "labelled" training data, and on basis of that data, machines predict the output. The labelled data means some input data is already tagged with the correct output.

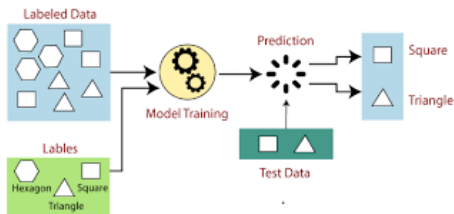


Figure: Supervised Learning

Flow chart

Flow Chart Of Face Recognition Using CNN

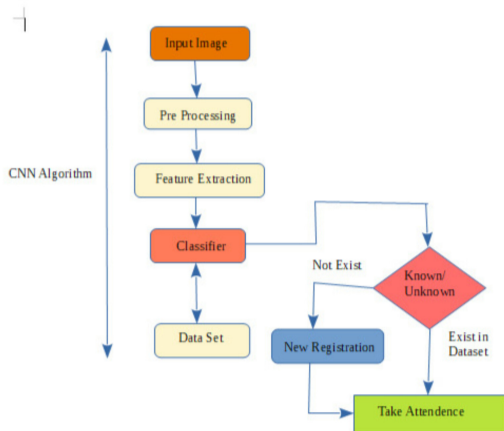


Figure: flow chart of face recognition using cnn

Implementation using Python

Used Libraries

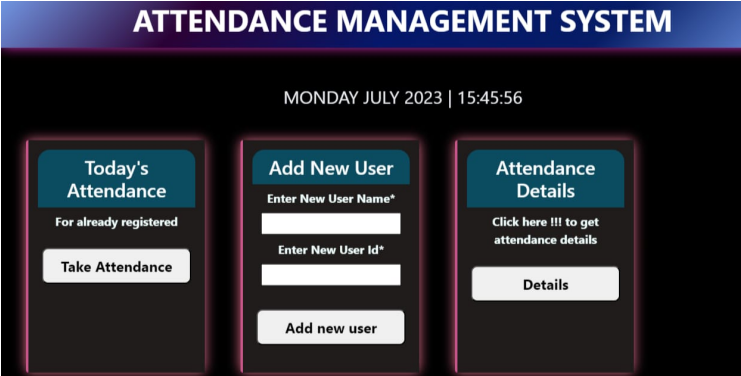
AMS.py - C:\Users\Jahnavi\FACE RECOGNITION SYSTEM\FACE RECOGNITION\FRS_using face_recognition\AMS.py (3.9.13)

File Edit Format Run Options Window Help

```
import cv2      #CV-Computer Vision (Used to process images and videos, manipulating and retrieve data from
import face_recognition  #used to detect faces and recognition
import os       #provides functions for interacting with OS for path
from flask import Flask,request,render_template      #used for web framework design
from datetime import date      #to get date
from datetime import datetime    #To get time
import numpy as np      #to work with numerical arrays
import csv      # to store data in excel sheet
import pandas as pd     #to work with data (datasets)
```

Figure: Libraries

Frame Work



The image displays a web application framework for an Attendance Management System. It features a dark blue header with the title "ATTENDANCE MANAGEMENT SYSTEM" in white. Below the header, the date and time "MONDAY JULY 2023 | 15:45:56" are shown. The main content area is divided into three vertical panels. The first panel, titled "Today's Attendance", includes the text "For already registered" and a "Take Attendance" button. The second panel, titled "Add New User", contains two input fields labeled "Enter New User Name*" and "Enter New User Id*", and an "Add new user" button. The third panel, titled "Attendance Details", includes the text "Click here !!! to get attendance details" and a "Details" button.

ATTENDANCE MANAGEMENT SYSTEM

MONDAY JULY 2023 | 15:45:56

Today's Attendance

For already registered

Take Attendance

Add New User

Enter New User Name*

Enter New User Id*

Add new user

Attendance Details

Click here !!! to get attendance details

Details

Figure: frame work

DataSet

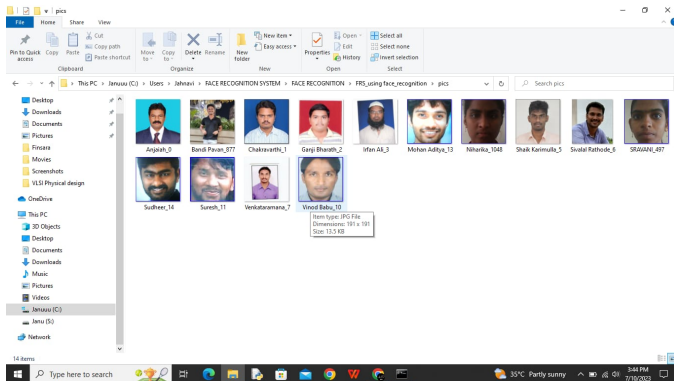
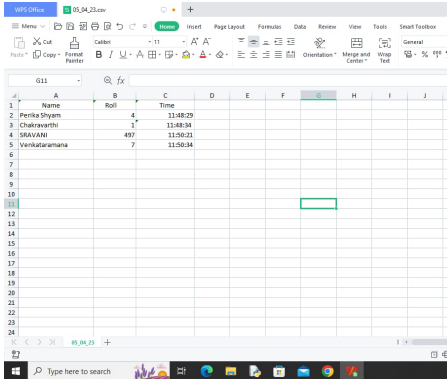


Figure: Provided Dataset

Results



WPS Office - 05_04_23.xlsx

Menu Insert Page Layout Formulas Data Review View Tools Smart Toolbox

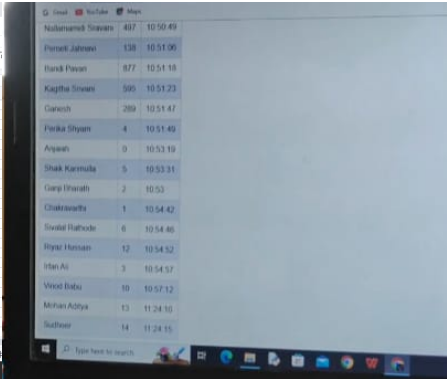
File Edit Copy Paste Font Painter Bold Italic Underline Text Color Background Color Orientation Merge and Center Wrap Text

G11 fx

	A	B	C	D	E	F	G	H	I	J
	Name	Roll	Time							
1	Perika Shyam	4	11:48:29							
2	Chakravarthi	1	11:48:34							
3	SRAVANI	497	11:50:21							
4	Venkataramana	7	11:50:34							
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05_04_23

Figure: Attendance Details



G: Invert YouTube Maps

Numbered	Snipars	487	10:50:49
Peretik Jahman	138	10:51:00	
Randi Pavan	877	10:51:18	
Kapthe Simans	595	10:51:23	
Ganesh	289	10:51:47	
Perika Shyam	4	10:51:49	
Anwar	0	10:52:19	
Shak Karanula	5	10:53:31	
Garp Dharath	2	10:53	
Chakravarthi	1	10:54:42	
Sival Rathode	6	10:54:46	
Riyaz Hassan	12	10:54:52	
Idan Ali	3	10:54:57	
Vinod Babu	10	10:57:12	
Mohan Aditya	13	11:24:10	
Sudhakar	14	11:24:15	

Type here to search

Figure: Attendance Monitoring

Conclusion

Conclusion

Face Recognition System is able to give accurate data assists managers in providing specific productivity and payroll details. Thus improves Security by preventing ID frauds and Theft in different Sectors.

Using this system, machines are able to automatically verify identity information for secure transactions, for surveillance and security tasks, and for access control to buildings etc.

Thank You!