MINI PROJECT REPORT

Face Detection

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IN

INFORMATION TECHNOLOGY

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2023-2024

CERTIFICATE

This is to certify that the mini project report entitled

Face Detection

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INTERNAL EXAMINER

EXTERNAL EXAMINER

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To become a nationally recognized quality education center in the domain of Information Technology through teaching, training, learning, research, and consultancy.

MISSION

- The Department offers an undergraduate program in Information Technology to produce high-quality information technologists and software engineers by disseminating knowledge through a contemporary curriculum, competent faculty, and adopting effective teaching-learning methodologies.
- Igniting passion among students for research and innovation by exposing them to real-time systems and problems
- Developing technical and life skills in the diverse community of students with modern training methods to solve problems in the Software Industry.
- Inculcating values to practice engineering in adherence to code of ethics in multicultural and multi-discipline teams.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (IT) Program will be:

1. Enrolled or completed higher education in the core or allied areas of Information Technology or management.
2. Successful entrepreneurial or technical career in the core or allied areas of Information Technology.
3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of Information Technology.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (IT) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the program, the graduates of B.Tech. (IT) program will be able to:

PSO1: Design and develop database systems, apply data analytics techniques, and use advanced databases for data storage, processing and retrieval.

PSO2: Apply network security techniques and tools for the development of highly secure systems.

PSO3: Analyze, design and develop efficient algorithms and software applications to deploy in secure environment support contemporary services using programming languages, tools and technologies.

PSO4: Apply concepts of computer vision and artificial intelligent for the development of efficient intelligent systems and applications.

Institute Vision and Mission

VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

 To foster intellectual curiosity, pursuit and dissemination of knowledge.
 To explore students' potential through academic freedom and integrity.
 To promote technical mastery and nurture skilled professionals to face competition in ever increasingly complex world.

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Abstract

Attendance tracking is a fundamental aspect of managing organizations and institutions. Traditional methods involving paper registers or manual check-ins are often inefficient and prone to errors. The Face Detection System offers a modern alternative, utilizing technology to enhance accuracy and efficiency. The traditional methods of taking attendance, such as paper-based lists or manual check-ins, are prone to errors, time-consuming, and lack real-time data. To overcome these challenges, a Face Detection System based on image capture and recognition is proposed. This innovative system employs advanced image processing techniques and facial recognition technology to automate the attendance-taking process.

The Face Detection System consists of a network of cameras strategically placed in classrooms or at entry points. When students or employees enter the premises, their images are captured and processed in real time. The system uses deep learning algorithms to identify individuals and match them with the database of enrolled students or employees. This enables instantaneous and accurate attendance tracking. the Face Detection System by capturing images revolutionizes traditional attendance-taking methods by leveraging cutting-edge technology. It streamlines the process, reduces errors, and provides real-time data for efficient attendance management in educational institutions and organizations.

Keywords

Data Collection, Data Processing, face detection, Face Detection System, Real-time Data Attendance Tracking, Biometric Recognition, Image Processing,
Attendance Tracking, Efficiency, Accuracy, Biometric Recognition, FID Cards, Mobile Apps, Scalability

Introduction

In many colleges, we have an attendance system for each subject and the lack of the same leads to problems. It is difficult for students to remember the number of leaves taken for a particular subject. If every time paperwork has to be done to track the number of leaves taken by staff and check whether it is a lack of attendance or not, it involves a lot of time and is inefficient too.Face detection is a computer vision task that involves locating and identifying human faces in digital images or video streams. It is a fundamental step for many face-related applications, such as face recognition, face verification, face tracking, face filtering, and face expression analysis.
Problem Statement Attendances of every student are being maintained by every school, college and university. Empirical evidences have shown that there is a significantcorrelation between students' attendances and their academic performances. There was also a claim stated that the students who have poor attendance records will generally link to poor retention. Therefore, faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that will solve the problem of student record arrangement and student average attendance calculation. One alternative to make student attendance system automatic is provided by facial recognition.

Hence, there is a requirement of computer-based student attendance management system which will assist the faculty for maintaining attendance record automatically. In this project we have implemented the automated attendance system using PYTHON. We have projected our ideas to implement "Automated Attendance System Based on Facial Recognition", in which it imbibes large applications. The application includes face identification, which saves time and eliminates chances of proxy attendance because of the face authorization.

The face space is created by eigenface methods which are eigenvectors of the set of faces, which may not link to general facial features such as eyes, nose, and lips. The eigenface method uses the PCA for recognition of the images. The system performs by facing pre- extracted face image onto a set of face space that shows significant difference among known face images. Face will be categorized as known or unknown face after imitating it with the present database. From the obtained results, it was concluded that, for recognition, it is sufficient to take about 10% eigenfaces with the highest igenvalues. It is also clear thatthe recognition rate increases with the number of training images.

Face recognition can be applied for a widevariety of problems like image and film processing, human-computer interaction, criminal identification etc. This has motivated researchers to develop computational models to identify the faces, which are relatively simple and easy to implement. The existing system represents some face space with higher dimensionality and it is not effective too.

Problem Statement Attendances of every student are being maintained by every school, college, and university. Empirical evidence has shown that there is a significant correlation between students' attendance and their academic performances. There was also a claim stating that students who have poor attendance records will generally link to poor retention. Therefore, faculty has to maintain a proper record of attendance.

Methodology

In this project, We will use OpenCV, a popular open-source library for computer vision, to perform face detection on still and real-time images. OpenCV provides various pre-trained models and algorithms for face detection, such as Haar Cascade, Histogram of Oriented Gradients (HOG), and Single Shot Detector (SSD).We will use the Haar Cascade model, which is based on the Viola-Jones algorithm, to detect faces in grayscale images. The model uses a cascade of simple features, such as edges and corners, to classify regions of interest as faces or non-faces. The model is fast and accurate, but it may not work well on faces with different orientations, poses, or expressions. We will also use the OpenCV library to perform some basic image processing tasks, such as converting the images to grayscale, drawing rectangles around the detected faces, and displaying the number of faces found.

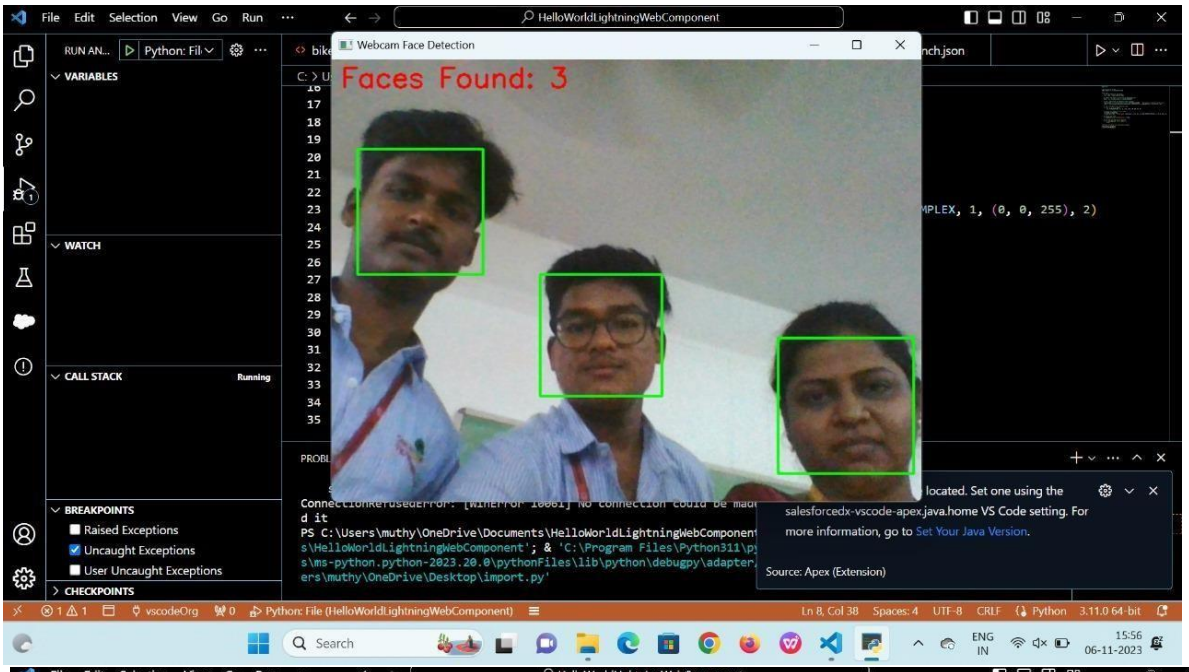
Implementation

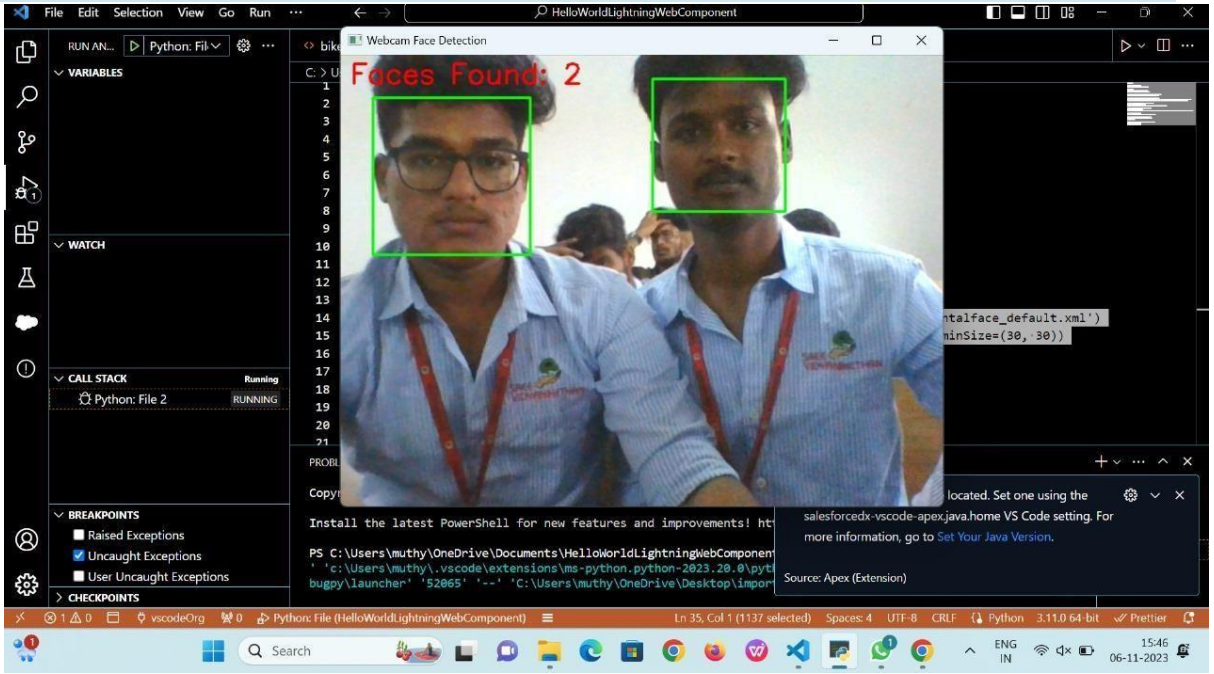
Cammera.py:

```
import cv2

# Initialize the webcam video_capture
= cv2.VideoCapture(0)

while True:
    # Read a frame from the webcam ret,
    frame = video_capture.read()

    # Convert the frame to grayscale for face detection gray
    = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)

    # Use a pre-trained face detector (Haar Cascade)
    face_cascade = cv2.CascadeClassifier(cv2.data.haar cascades +
'haarcascade_frontalface_default.xml') faces =
face_cascade.detectMultiScale(gray, scaleFactor=1.1, minNeighbors=5,
minSize=(30, 30))
    # Draw rectangles around detected faces for (x, y, w, h)
    in faces: cv2.rectangle(frame, (x, y), (x+w, y+h), (0, 255,
    0), 2)

    # Display the number of faces found num_faces
    = len(faces)
    cv2.putText(frame, f"Faces Found: {num_faces}", (10, 30),
cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 255), 2)

    # Display the frame
    cv2.imshow('Webcam Face Detection', frame)
```

```
    # Exit the loop when 'q' is pressed if
    cv2.waitKey(1) & 0xFF == ord('q'):
        break

# Release the webcam and close OpenCV windows
video_capture.release()
cv2.destroyAllWindows()
```

Output


Webcam Face Detection
Faces Found: 3
HelloWorldLightningWebComponent
VARIABLES
WATCH
CALL STACK
Running
BREAKPOINTS
Raised Exceptions
Uncaught Exceptions
User Uncaught Exceptions
CHECKPOINTS
salesforcedx-vscode-apex.java.home VS Code setting. For more information, go to Set Your Java Version.
Source: Apex (Extension)


Webcam Face Detection
Faces Found: 2
HelloWorldLightningWebComponent
VARIABLES
WATCH
CALL STACK
Running
Python: File 2
RUNNING
BREAKPOINTS
Raised Exceptions
Uncaught Exceptions
User Uncaught Exceptions
CHECKPOINTS
salesforcedx-vscode-apex.java.home VS Code setting. For more information, go to Set Your Java Version.
Source: Apex (Extension)

Conclusion

The concept of Face Detection has revolutionized the way attendance tracking is approached in various sectors, from education to corporate environments and beyond. This report has explored the core components, methodologies, benefits, challenges, and considerations associated with Face Detection Systems.

The adoption of technology in attendance management, including data collection, processing, and storage, has paved the way for more accurate, efficient, and real-time attendance tracking. By replacing manual processes with automated systems, organizations and institutions have been able to reduce administrative workloads and minimize errors, while simultaneously enhancing data security.

Despite the many advantages of Face Detection Systems, it is important to acknowledge the challenges that may arise during implementation, such as privacy concerns, technical issues, and the need for reliable network connectivity. However, these challenges can be mitigated with careful planning and the adoption of robust security measures.

As technology continues to advance, and as organizations seek more efficient and data-driven solutions, the Face Detection concept is likely to gain further prominence. The recommendations provided in this report highlight opportunities for further improvements and expansions, including scalability and potential integrations with other systems.

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