AUTOMATED ATTENDANCE SYSTEM

A PROJECT REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE AWARD OF THE DEGREE OF

BACHELOR OF TECHNOLOGY IN

[INFORMATION TECHNOLOGY]

Submitted by:

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CONTENTS

1.Candidates Declaration

I, Utsav Singh (2K20/IT/156), student of B. Tech. (INFORMATION TECHNOLOGY), hereby declare that the project Dissertation titled “Automated Attendance System” which is submitted by me to the Department of INFORMATION TECHNOLOGY,Delhi Technological University, Delhi in partial fulfillment of the requirement for the award
of the CGPA of 4th Semester for the degree of Bachelor of Technology, is a python based program which is used to automate the process of attendance by using modules such as opencv and pytesseract and the code is original and not copied from any source and the documentations of the modules have been mentioned in this report.

Place: Delhi
Date: 17th April, 2022

Signed by:

Utsav Singh
2K20/IT/156

2.Abstract

In our daily lives we can see some form of an attendance system in any school , college or workplace .In most workplaces the salary of employees is affected by the number of working days and students from school and colleges have to get a certain minimum required percentage of attendance to pass. The traditional way of taking the ascendance i.e. by roll call is tedious and time taking if there are a large number of students ,it is also inefficient and commonly noted down in registers/notebook which have to be entered into the database by the teachers later which is very inconvenient.Therefore, as we are moving into the modern era of digitization we need something that is efficient, fast , affordable ,reliable and can be used automate the whole process of attendance for the convenience of both teachers and the student , employees and the employees.

The goal of this project is to create a automated attendance system.

3.Acknowledgement

In performing our major project, I had to take the help and guideline of some respected persons, who deserve my greatest gratitude. The completion of this assignment gives me much pleasure. I would like to show my gratitude to Asst. Prof. Anurag Chauhan , Mentor for a major project. Giving me a good guideline for my report throughout numerous consultations. I would also like to extend my deepest gratitude to all those who have directly and indirectly guided me in writing this assignment.

Many people, especially my classmates , have made valuable comment suggestions on this proposal which inspired us to improve my assignment. I thank all the people for their help directly and indirectly to complete my assignment. Also, I would like to thank, Department of Information Technology, Delhi Technological University for allowing me to work on this topic.

4.Introduction

The goal of this project is to create an automated attendance system which can be used to automatically mark and store the attendance of DTU students in the form of excel sheets which can be easily accessed and modified.

The plan is to create a robust system where only DTU students of a specific batch attending a specific class can mark their attendance and there will be no way to cheat the system and get free attendance .

Once the program is started , the user (most likely the Professor or the CR) will be asked to select the batch and the course whose attendance is to be taken based on that information the program will first access the specific excel sheet of that batch and then allow students to mark their attendance.

The students will be able to mark their attendance by showing their valid ID cards to the camera(webcam of the computer the program is run) then the program will extract the student roll number from their ID card and mark the their attendance in the excel sheet ,once this process is completed a confirmation message will be displayed to the student.

5.Approach

First we will need a way to access the camera (webcam) of the computer and then use it to take pictures of the ID card when it is showed to the camera by the student.

This will be done by the **OpenCV** module in python that has functions to access camera and perform various operations.

But before extracting the roll from the ID we need to first perform some operation on the image to remove useless information and make the process of extraction faster.

First we will crop to ID card photo to the part which only contains the Roll number then we will convert the image to greyscale and sharpen the image to improve the predictions.

Now that we have decreased the size of our data we will need a way to actually read the characters from the image are return us a string . This will be done by the **pytesseract** module which will provide an ocr model that is light weight and fast and meets our requirements.

Once we get the contents of the ID card in string format we will search for the DTU Roll number .Once the roll is acquired we can mark the attendance in the excel sheet.

To work with the excel sheets **openpyxl** module is used which has various functions to work with excel sheets.

6.Explanation of Code

```
#MENU
option = -1

while option!=0:

    print('\n\t\tMAIN MENU')
    print('\n1.Mark Attendance')
    print('2.View Attendance')
    print('3.Close')
```

When the program is started the user is greeted with a menu , here user can decide to mark attendance or view the attendance of a batch or close the program . Based on the user decision sub menus are opened.

```
if option ==1:
    os.system('cls')
    print('\n\tMark Attendance')
    print('\nSelect Batch :-',end='')

    selectedBatchWB , selectedBatchName = displayBatches_and_returnSelected()

    selectedSubject_WS , selectedCourseName = displaySubjects_and_returnSelected
    (selectedBatchWB)

    selectedDate = dateSelect_and_returnSelected()

    os.system('cls')
    print(f"Marking Attendance of {selectedBatchName} for course : {selectedCourseName}
    ")
    markAttendance(selectedDate,selectedBatchName,selectedSubject_WS,selectedBatchWB)
    #calling the mark attendance function
```

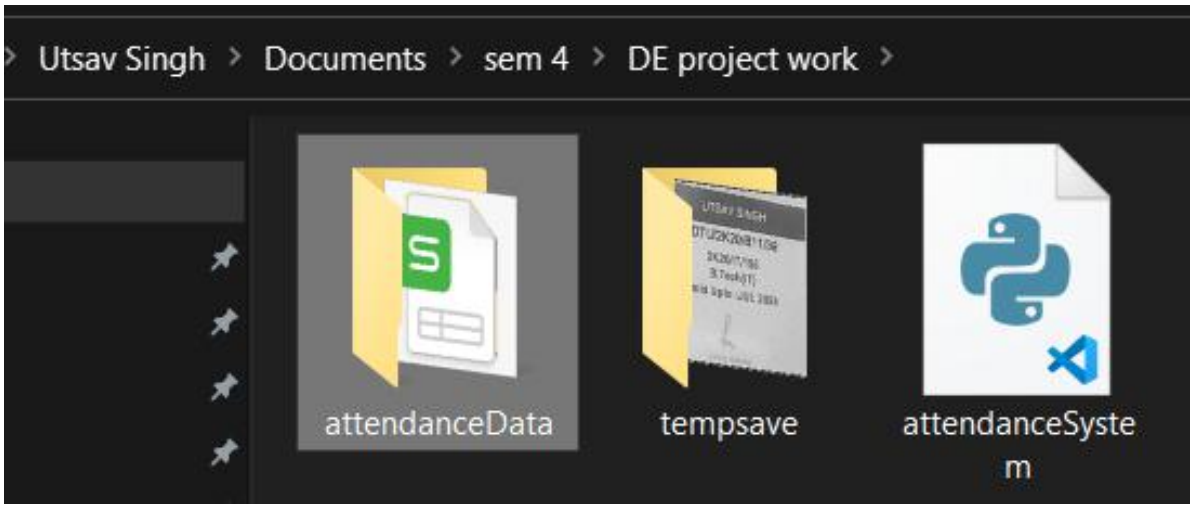
```
    if option == 2:
        os.system('cls')
        print('\n\tVIEW ATTENDANCE')

        #First we make the user select a batch
        selectedBatchWB , selectedBatchName = displayBatches_and_returnSelected()

        #Then we make the user select the course/subject
        selectedSubject_WS , selectedCourseName = displaySubjects_and_returnSelected
        (selectedBatchWB)
        showAttendance(selectedSubject_WS,selectedBatchName,selectedCourseName)

    if option == 3:
        break

print('Closing the Attendance System ....')
time.sleep(1.5)
os.system('cls')
```

User is asked to select the batch and course whose attendance is to be viewed or marked and based on that info a specific workbook is loaded.Each workbook belongs to a batch and the worksheets inside are of the different courses of that batch.

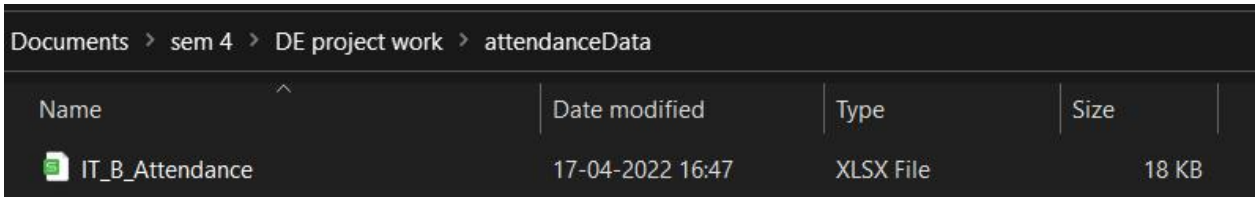
```
#Displays the existing batches and returns the workbook and the batch name according to the user's choice
def displayBatches_and_returnSelected():

    workbook_names = []
    batch_names = []

    i=1
    print('\nThe list of batches are :-')
    for filename in os.listdir('attendanceData'):
        workbook_names.append(filename)
        filename = filename.split('_')
        branch = filename[0]
        batch = branch + " " + filename[1]
        batch_names.append(batch)
        print(f"{i}.{batch}")
        i= i+1


    batchNumber = input('\nPlease Enter the number of the batch you want to select :')
    batchNumber = int(batchNumber)
    batchNumber = batchNumber-1


    selectedBatchName = batch_names[batchNumber]
    selectedWB = load_workbook('attendanceData/'+workbook_names[batchNumber])


    return selectedWB,selectedBatchName
```

```python
#This function displays all the sheets(subjects) in the selected workbook and then returns the selected worksheet
def displaySubjects_and_returnSelected(selectedWB):
    print('\nThe courses of this batch are :-')
    i=1
    for ws in selectedWB.sheetnames:
        print(f"{i}.{ws}")
        i+=1

    selectedSubjectNumber = int(input("Please Enter the number of the subject you want to select :"))
    selectedSubjectNumber -=1
    selectedSubjectName = selectedWB.sheetnames[selectedSubjectNumber]
    selected_WS = selectedWB[selectedSubjectName]

    return selected_WS , selectedSubjectName
```

Above two functions load the specific workbook which is selected based on the batch. The workbooks are presaved into a directory with specific names for easy identification.



This is the directory structure all the batch specific excel sheets are saved in ‘attendanceData’ folder



Excel sheet name format : Branch_Section_Attendance

```python
#Makes the user select a date and returns the date
def dateSelect_and_returnSelected():
    print('\nPlease select the method to input the date from the following options :-\n')
    print('\n1.Enter Date Manually')
    print("2.Automatically Select Today's Date\n")

    opt = int(input("Please enter the number of the date input method :"))

    if opt == 1:
        date = input('Enter the date in which you want to mark attendance (Format : dd/mm/yyyy) : ')
        return date

    if opt == 2:
        date = datetime.today()
        date = date.strftime("%d/%m/%Y")
        return str(date)
```

When attendance is being marked the the user is asked to chose a method to input the date , user can chose to automatically input system date or manually enter a date.

After date , batch , subject is chosen the function that collects images ,performs operations on the images and extracts the roll form the id is called.

```python
#Opencv code that read the roll from the ID and calls the function to mark the attendance in excel for that roll
def markAttendance(attendance_date,batch,attendance_ws,selected_wb):

    branch = batch.split(' ')[0]

    # Using the webcam
    idCapture = cv.VideoCapture(0,cv.CAP_DSHOW)

    while(True):
        # Getting the frames from cam one by one
        ret,frame = idCapture.read()
        if ret:
            # Putting Text
            idText ='Show ID'
            dataText = 'Keep Roll in this box'
            markText = 'Press M : To mark Attendance'
            endText = 'Press Esc : To save and close'
            cv.putText(frame,idText,(250,80),cv.FONT_HERSHEY_COMPLEX,1,(255,0,0),2)
            cv.putText(frame,dataText,(150,140),cv.FONT_HERSHEY_SIMPLEX,1,(0,0,255),2)
            cv.putText(frame,markText,(10,400),cv.FONT_HERSHEY_SIMPLEX,1,(0,255,255),2)
            cv.putText(frame,endText,(10,450),cv.FONT_HERSHEY_SIMPLEX,1,(0,255,255),2)
            # Putting the roll drectangle
            cv.rectangle(frame,(200,160),(450,360),color=(0,0,255),thickness=2)
            cv.imshow('cam',frame)

            key = cv.waitKey(1)
            # When Esc is pressed
            if  key == 27:
                print('Closing Attendance System')
                break
```

The above code is mainly the UI that is displayed.

Below code collects the image and extracts the roll from it when the keyboard key ‘M’ is pressed.

```
# When M is pressed
if key==ord('m'):
    # Getting the Required part from the image (Croping)
    required_part = frame[160:360,200:450]
    savedName = 'tempsave/req_part.jpg'
    # Converting Image to grayscale
    required_part = cv.cvtColor(required_part,cv.COLOR_BGR2GRAY)

    # Sharpning the image
    kernel = np.array([[0, -1,  0],[-1,  5, -1],[0, -1,  0]])
    required_part = cv.filter2D(src=required_part, ddepth=-1, kernel=kernel)

    cv.imwrite(savedName,required_part)

    #OCR section
    text = pytesseract.image_to_string(Image.open(savedName))
    # splitting the text into different lines
    lines = text.split('\n')
    # Finding line that contains the roll
    found = False
    roll = ''
    for line in lines:
        if(line[:4]=='2K20' or line[:2]=='2K' or line[2:4]=='20'):
            roll = line[-3:]
            found = True
            #Checking if the roll string is numeric
            if(roll.isnumeric()):
                roll = '2K20/'+branch+'/'+roll
                print("Marking the attendance of Roll :",roll)

            else:
                found = False
```

If the roll is successfully extracted this function will call another function to mark the attendance in excel , if roll is not extracted it allows student to try again.

```
            if (found == True):
                markingAttendanceInExcel(roll,attendance_ws,attendance_date,selected_wb,batch)

            elif(found == False):
                print("Couldn't Read Roll Please Try Again!")
```

```python
#Function that marking the attendance in the excel sheet
def markingAttendanceInExcel(roll,attendance_ws,attendance_date,selected_wb,batch):
    #First we have to find / append the date column
    dateColumnNo = -1
    dateFound = False

    #Searching For the date column
    for cell in attendance_ws[1]:
        if cell.value == date:
            dateColumnNo = cell.column
            dateFound = True
            break

    #Appending the date column if date not found
    if dateFound == False:
        #First we find the length of the dates row
        dateColumnNo = len(attendance_ws[1])+1

        #Then we add new date at the end of the row
        attendance_ws.cell(row = 1,column = dateColumnNo).value=attendance_date


    #Now we have to search for the row of the student according to the roll to mark present
    studentRowNo = -1
    studentFound = False

    for cell in attendance_ws['B']:
        if cell.value == roll:
            studentRowNo = cell.row
            studentFound = True
            break

    if studentFound == False:
        print(f'Student with roll : {roll} is not a part of this batch.')
        return

    #First we mark the attendance in sheet by writing 'P' in the specific cell
    #print(studentRowNo,dateColumnNo)
    attendance_ws.cell(row = studentRowNo,column = dateColumnNo).value = 'P'
    print(f'Attendance of roll : {roll} is succesfull marked')

    #Now we increase the total attendance of that student by 1
    attendance_ws.cell(row = studentRowNo,column = 1).value +=1

    saveFileName = f"attendanceData/{batch.split(' ')[0]}_{batch.split(' ')[1]}_Attendance.xlsx"
    selected_wb.save(saveFileName)
```

This function marks the marks the attendance in excel and saves it.

```python
#Fucntion that shows the attendance of all the students of a specific batch
def showAttendance(selected_WS,batch,course):
    os.system('cls')
    print('\nATTENDANCE RECORD OF',batch)
    print('\nCourse :',course,'\n\n')

    gap = ' '*3
    heading = f"{'Roll No.':13s}{gap}{'Student Name':20s}{gap}{'Total Present':13s}{gap}{'Total Absent':12s}"
    print('='*(13+20+13+12+10))
    print(heading)
    print('='*(13+20+13+12+10))
    rowNumber = 1
    totalDates = 0
    for row in selected_WS.iter_rows():
        if(rowNumber==1):
            for cell in row:
                if cell.column>3:
                    if cell.value!= None:
                        totalDates +=1
                        #print(cell.value)


        if(rowNumber>3):
            studentNameBreak = row[2].value.split(' ')
            if(len(studentNameBreak)>1):
                studentName = studentNameBreak[0] +' '+ studentNameBreak[1]
            else:
                studentName = studentNameBreak[0]

            totalAbsent = totalDates-int(row[0].value)
            rowPrint = f"{row[1].value}{gap}{studentName:20s}{gap}{row[0].value:13d}{gap}{totalAbsent:12d}"
            print(rowPrint)

        rowNumber = rowNumber + 1

    input("\nPress Enter to go back to Main Menu")
    os.system('cls')
```

Above function displays the attendance of all students of a specific batch and of a specific course.

7.Screenshots of working Program

Main Menu

```
(de_proj) C:\Users\utsav\Documents\sem 4\DE project work>python attendanceSystem.py

               MAIN MENU

1.Mark Attendance
2.View Attendance
3.Close

Enter your option number :
```

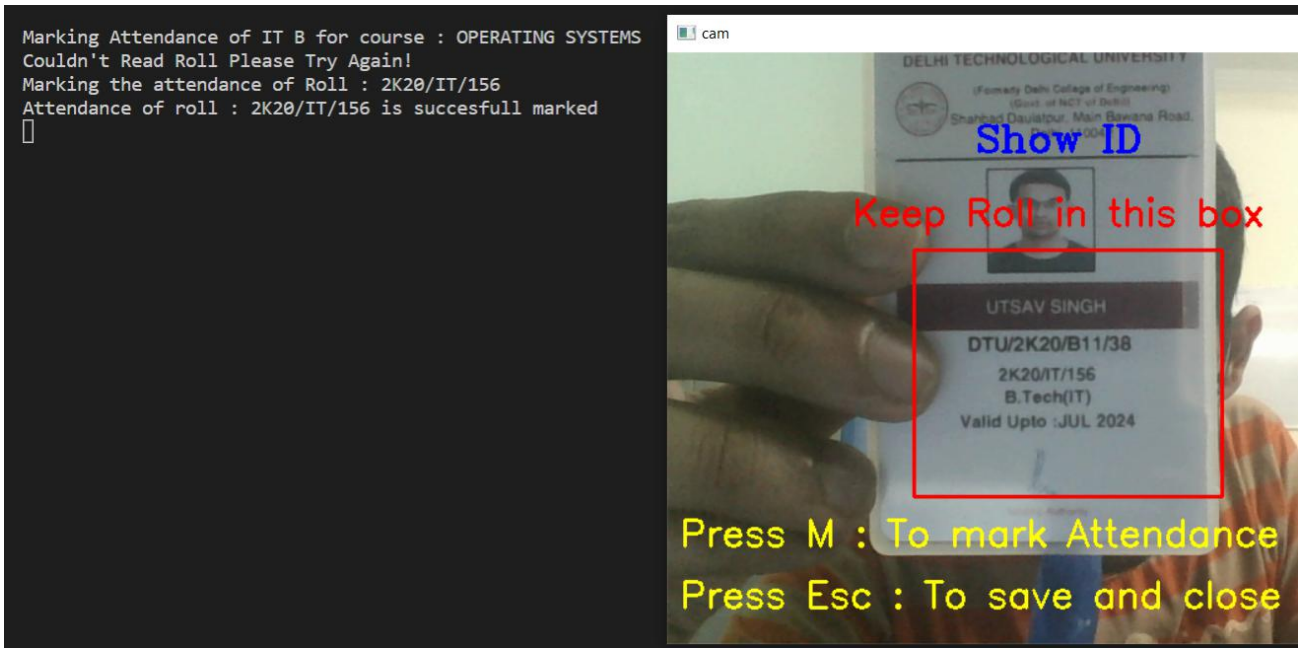
Sub Menus

```
        Mark Attendance

Select Batch :-
The list of batches are :-
1.IT B

Please Enter the number of the batch you want to select :1

The courses of this batch are :-
1.DIGITAL ELECTRONICS
2.OPERATING SYSTEMS
3.ADA
4.COA
5.DBMS
Please Enter the number of the subject you want to select :2
```

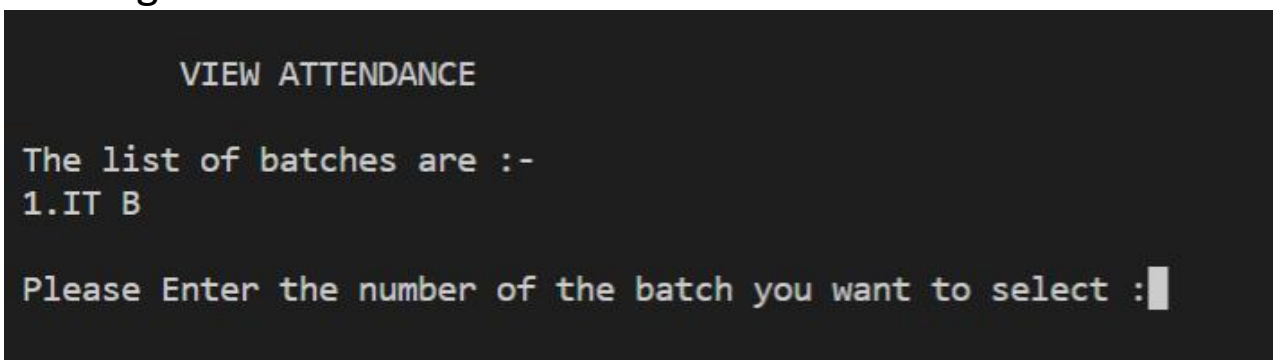
Date input

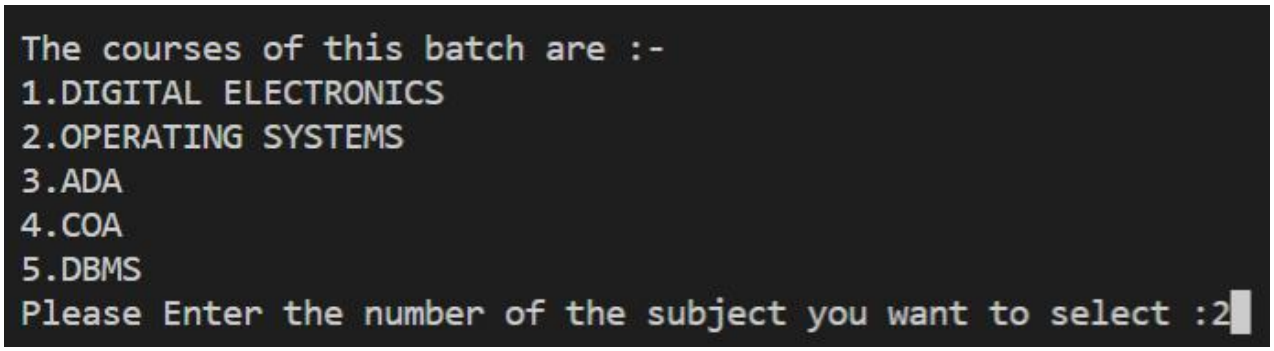
```
Please select the method to input the date from the following options :-


1.Enter Date Manually
2.Automatically Select Today's Date

Please enter the number of the date input method :
```

Main UI



Viewing the marked attendance





ATTENDANCE RECORD OF IT B

Course : OPERATING SYSTEMS

Roll No.	Student Name	Total Present	Total Absent
2K20/IT/086	MAYANK KUMAR	0	1
2K20/IT/087	MEHAK GARG	0	1
2K20/IT/088	NALIN DEWAN	0	1
2K20/IT/089	NALIN YADAV	0	1
2K20/IT/090	NIMISH ADVANI	0	1
2K20/IT/091	NIRANJAN KUMAR	0	1
2K20/IT/092	NISHANT KUMAR	0	1
2K20/IT/093	NITESH KUMAR	0	1
2K20/IT/094	NITIN KUMAR	0	1
2K20/IT/095	NOMAN KHAN	0	1
2K20/IT/096	PARTH GUPTA	0	1
2K20/IT/097	PARUL GOEL	0	1
2K20/IT/098	PAWAN KUMAR	0	1
2K20/IT/099	PIYUSH CHAUHAN	0	1
2K20/IT/100	PIYUSH KUMAR	0	1
2K20/IT/101	PRANJAL MEENA	0	1
2K20/IT/102	PRANJAL SINGLA	0	1
2K20/IT/103	PRASHANT TIWARI	0	1
2K20/IT/104	PRASHANT VASHISHT	0	1
2K20/IT/149	SURENDRA KUMAR	0	1
2K20/IT/150	SWAPNIL YADAV	0	1
2K20/IT/151	TARUN SHARMA	0	1
2K20/IT/152	TUSHAR	0	1
2K20/IT/153	TUSHAR GIRI	0	1
2K20/IT/154	UNMIK GYAWALI	0	1
2K20/IT/155	UTKARSH PANDEY	0	1
2K20/IT/156	UTSAV SINGH	1	0
2K20/IT/157	VAIBHAV	0	1
2K20/IT/158	VAIBHAV AJAYY	0	1
2K20/IT/159	VAISHNAVI	0	1
2K20/IT/160	VARNIT RASTOGI	0	1
2K20/IT/161	VED PRAKASH	0	1

8.Conclusion

In conclusion I was able to successfully create an automated attendance system that can be used by DTU to mark the attendance of students without the use of any expensive hardware such are fingerprint or retina scanners.

The required to use this program are :-
1. Laptop or computer with webcam
2. Student with their ID cards.

9.Future Scope

There are still some ways that the students can cheat the system which are not accounted for in this program , for example if you have your friends ID card your can mark their attendance , this can be prevented by teacher supervision but goes against the purpose of making the process automated .A possible solution is to match the photo on the ID card with the person that is showing the ID card to the camera by using face detection models , this may solve the issue but will definitely make the code slower due to excessive image processing.
To improve this program in the future will will definitely need to work on this issue to come up with some solution or make some other compromise that still lets us meet our goal of creating a fast ,robust and fully automated attendance system .
Another thing I would like to work on is the UI and create a better looking program.

10.Documentations of Modules Used

OPENCV - https://docs.opencv.org/4.x/

PYTESSERACT - https://pypi.org/project/pytesseract/

OPENPYXL - https://openpyxl.readthedocs.io/