

Transient Faces
a new economical security alternative using OpenCV

Submitted in partial fulfillment of the requirements
for the award of
Bachelor of Engineering degree in Computer Science and Engineering

by

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade “A” by NAAC

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **SNEHANSHU SEN** (37110724) who carried out the project entitled "**Transient Faces a new economical security alternative using OpenCV**" under my supervision from November 2020 to April 2021.

Internal Guide

Dr. B. ANKAYARKANNI M.E., Ph.D.

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

I **Snehanshu sen** hereby declare that the Project Report entitled “**Transient Faces a new economical security alternative using OpenCV**” done by me under the guidance of **Dr. B. Ankayarkanni M.E., Ph.D.** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in 2017-2021.

DATE:

PLACE:

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E.,Ph.D., Dean**, School of Computing **Dr.S.Vigneshwari M.E., Ph.D.** and **Dr.L.Lakshmanan M.E., Ph.D.** , Heads of the Department of Computer Science and Engineering for providing us necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and a deep sense of gratitude to my Project Guide **Dr. B. Ankayarkanni M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Computer Science and Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

Nowadays people are more dependent on others. And more numbers people visit others houses for various reasons. For tracking of people who have visited is a major concern for so many people as a topic is included which is security. This data helps to manage and make a record of people who visit the home and may be useful for any kind of thing. This will help the owner of the house to take a record of people and they can characterize the people according to their priority and they can contact them easily. No doubt CCTV is playing a very good role to manage this kind of work, but it takes so much time to manage CCTV data and very hard to go through the whole clip. The proposed system is used to take a record of people who visit our home on a particular day along with time. As now a days the number of crimes is increasing rapidly, this security system can help to manage people and help police while investing a case if anything happened. This system cannot replace CCTV security but this system is really a simple and efficient way for personal houses and flats.

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CHAPTER 1

INTRODUCTION

OVERVIEW

Machine learning is a very common term used by almost everyone nowadays. This topic can be defined as a scientific procedure of an advanced computing system designed for specific work. The human face is more complex than other objects as the human faces are dynamic objects which consist of many colors and forms. Facial detection is commonly used in various places for various operations. However, the detection of faces is required a high-level algorithm to detect faces efficiently.

OPENCV

OpenCV is an Open-source software library for computer vision and machine learning. Various infrastructures were built in OpenCV to provide powerful tools for computer vision applications and to increase the use of computer vision and machine learning commercially. As OpenCV is open-source, the developers can easily modify the codes according to their requirements. For face detection, OpenCV plays a great role as it already has built-in libraries which can be used almost in all programming languages. The built-in libraries help users to work efficiently with computer vision.

HAAR CASCADES

The core basic idea behind Haar classifier object detection is that the Haar-like options. These features are used for changes in distinction values between adjacent rectangular groups of pixels. The contrast variance between the pixel groups is used to determine relative dark and light areas. Haar features can easily be managed by increasing or decreasing the size of the group of pixels being examined. By using these features detection of objects of various sizes can be done.

OUTLINE OF THE PROJECT

From the name itself we can guess how we works. Transient Faces are those images who are temporary. It means this system made a record of the people who are visiting our houses in day-to-day life. As the maximum number of people who visits our house is temporary, so we come to this name. Our project is basically a security related application. In day-to-day life a lot of people visits our houses, apartments, flats etc. People may visit the house when nobody is there, as we can't predict that. This security system will help us to manage and track down who are the people who have visited our house when nobody was there or may be somebody as there. These people can be temporary people, relatives, co-workers, society people or may be some people who can be harmful. This system will take the image of the people who have visited our house along with the time and date. It will help the owner of the house to identify and take necessary step. If any person who is important to the owner for example co-workers, delivery boy, relatives etc. Or if anything happened in the society or near the house then this system can help police while investigation.

OBJECTIVES

- Capture the image who have visited the house.
- Create a doc file to capture time.
- Create a doc file to capture date.

CHAPTER 2

LITERATURE SURVEY

From many years only, computer vision and machine learning become a very common term as many people are coming up with different kinds of ideas about facial detection and computer vision. Nowadays Facial detection is used in almost every small big companies. The author of the paper illustrates that how face detection can be used for tracking faces and used for further operation. As the computer vision technology is not a new name. So many people have implemented various great ideas in terms of making something efficient and useful. As the field is so large, A lot of things can be achieved by using various tools and infrastructures of OpenCV in projects. Nowadays facial detection is commonly used by the high-tech companies like Microsoft, Amazon, Google, Intel etc. All these companies use facial detection for various purpose but the basic idea for all the operation is same. As the technology is increasing the crimes are also giving its full effort. So, technologies are using to stop the crime along with efficiency.

CHAPTER 3

Aim and Scope of the present investigation

AIM: To create a program for tracking who ever visited home with visitor's picture, date and time.

SCOPE:

- Create folder for separate user
- Capture the visitor's picture
- Create a document about time and date

SYSTEM REQUIREMENTS

HARDWARE CONFIGURATION:

Processor: i3 processor
RAM: 2 GB
Hard Disk: 1 TB
Monitor: 15" Color monitor
Key Board: 122 Keys

SOFTWARE CONFIGURATION:

Operating System: Windows NT,
Windows 98,
Window 2000,
Window 2010,
Windows XP.
Language: python

TOOL REQUIRED:

This program can be used in windows 98, Windows2000, Windows 2007, windows 2010, Windows XP and Windows NT, supported for another platform such as Applet, Macintosh and UNIX.

The system must be running Windows operating system and must meet the following hardware requirements.

- For Windows 95 based computers, a 486 / 66 MHz or higher processor with 8MB
- For Windows 98 based computers, a 500/88MHz or higher processor with 32Mb of RAM

- For Windows NT based computers, a 488 / 66 MHz or higher processor with 16 MB of RAM
- For Windows 200 based computers, a 700/850 MHz or higher processor with 512 MB of Ram

ROLE OF PYTHON:

Python is a popular and general-purpose programming language with an emphasis on being easily readable and helping programmers to use fewer lines of code to accomplish tasks compared to older languages. Libraries such as NumPy, Matplotlib make this language more useful for scientific computing. Python is an excellent tool for anything for four reasons:

- Open source
- Speed
- Support
- Scope

OPEN SOURCE:

Python is free of cost, open source, and is developed using a community-based model. It runs on Windows, IOS and Linux environments and can easily be ported to multiple platforms.

SPEED

Python is a high-level language, which means it has more number of benefits that accelerate code development. The high-level character of Python makes prototyping ideas and code fast. This transparency eases both maintenance of the code (rewriting, finding bugs, etc.) and the process of adding to the code base in a multi-user development environment.

SUPPORT

Python is widely used for scientific computing almost in every field including academia and industry. As a consequence, a huge number of useful analytics libraries are available which is totally tested, including packages for numerical computing, data analysis, statistical analysis, visualization and machine learning.

SCOPE

Python supports object-oriented programming and advanced data structures such as lists, tuples, sets, dictionaries and so on. Also, advance mathematical operations can be done using NumPy libraries including matrix operations and the package pandas supports data frames. Having these abilities within Python scope helps simplify and speed up data operation.

CHAPTER 4

MATERIALS AND METHODS USED

CAPTURING PHOTO

For our project the main part is capturing the image of the person who visits our house. For capturing the images, we are using OpenCV as it supports so many languages, it has along of powerful functions and easy to use. Using OpenCV we will take the frame from the cam after 5 sec and later process with other functions. As the camera will take each frame after 5 secs but not all the picture will be stored. The frame will be taken from the cam and check whether any person's face is there or not. If any person's face is there in the frame, then it will store the image to a folder and check for another face. If the frame doesn't have any image, then it will discard the frame and take the next frame and continue its process.

cap=cv2.VideoCapture(0)

VideoCapture() function is used here for capturing the frame and for the later process.

FACE DETECTION USING HAAR CASCADES

Haar cascades are predefined XML files which includes the shape and value for a face. These shapes values are used for detecting faces. Various kind of face values are predefined in these cascades and very efficiently it works to identify faces. Haar cascades are the collections of various identifiers such as profile image, frontal face, full body etc. We are using frontal face as moto of the project is to store the face image.

face_cascade=cv2.CascadeClassifier('cascade/data/haarcascade_frontalface_default.xml')

here **CascadeClassifier()** function will read the xml files from the given location.

STORING PHOTO OF THE USER INTO FOLDER

For storing the image, we need to follow various steps. First the image will be taken by the cam. As we are using OpenCV the image is in BGR. But while using the cascades the image should be in gray color. Haar cascades only works in grey color image. So, we need to change the image from BGR to grey using a function called

cv2.cvtColor(frame,cv2.COLOR_BGR2GRAY). Later the image will be processed by the haar cascades whether there is any human face present or not. If the any face found, the image will be saved in a predefined folder.

For saving the image, we need to use `cv2.imwrite()` function in the specific folder.

STORING TIME AND DATE:

Storing time and date is an easy job. For taking the time and date we need to import OS module in python first. After that we can take the time and date easily from the system.

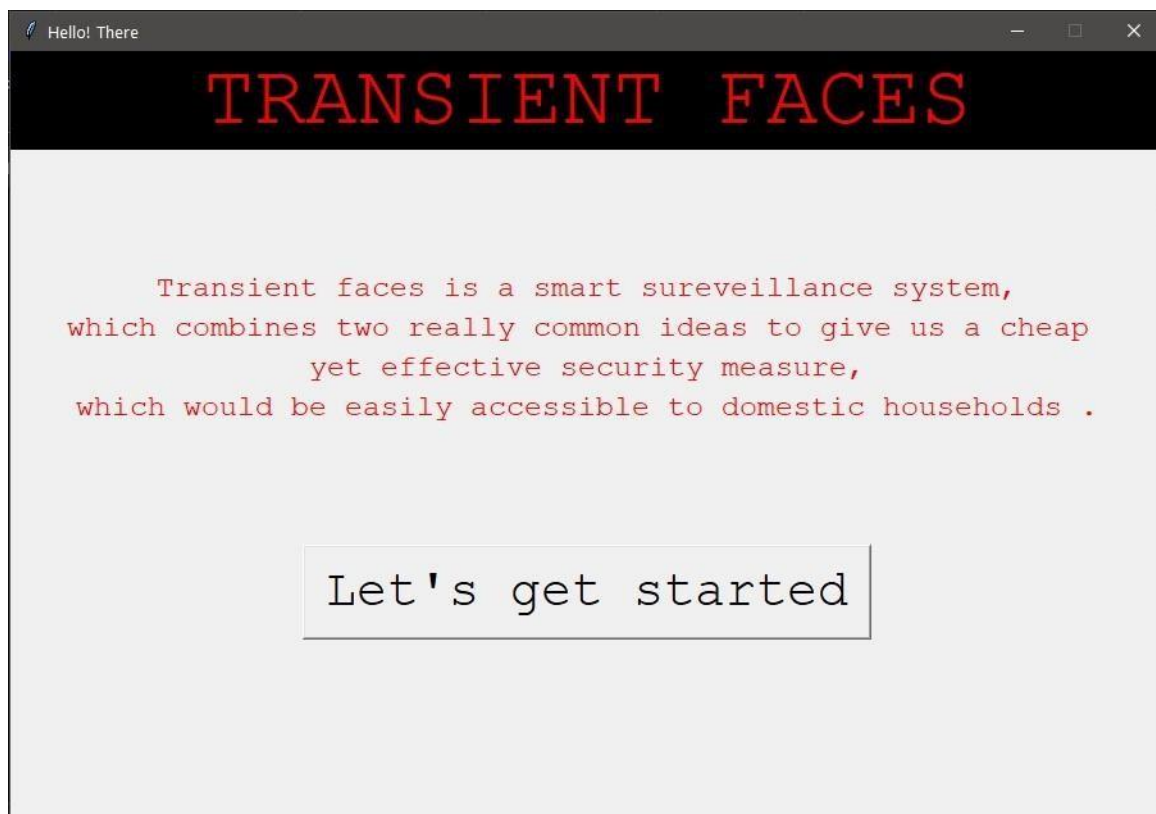
`datetime.now()`

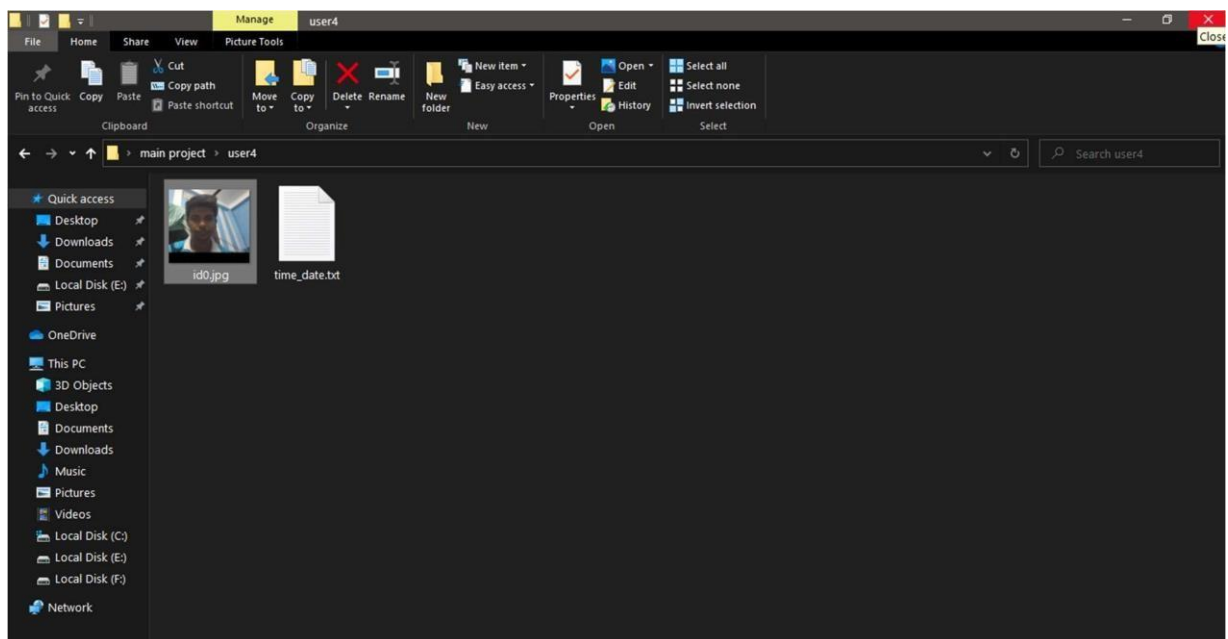
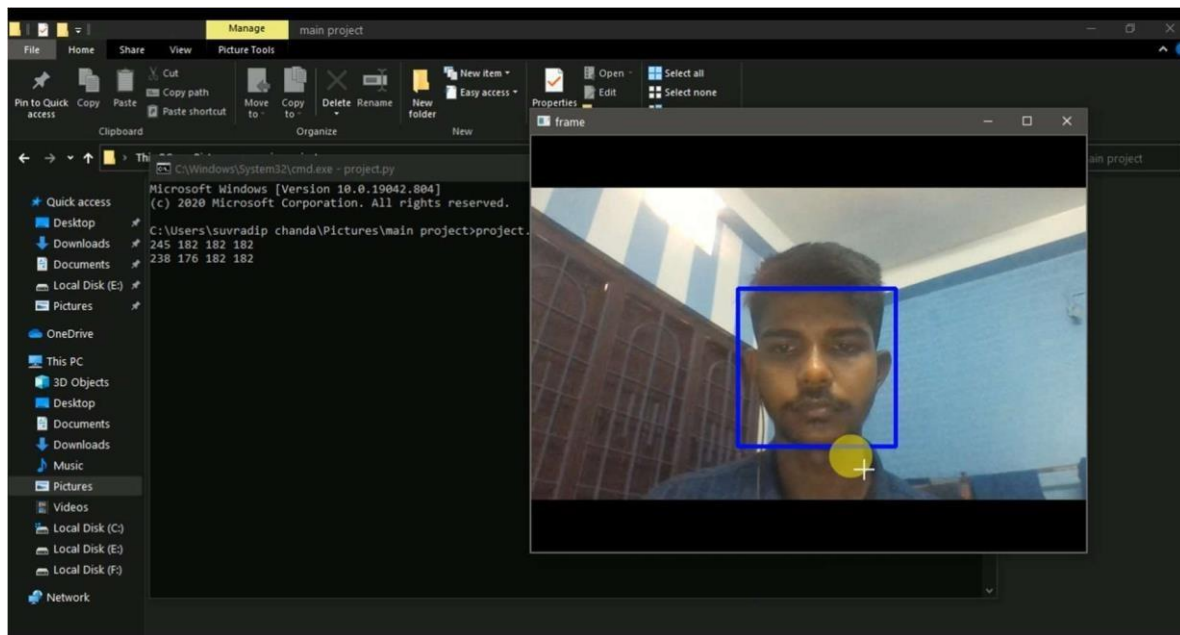
This function is used to get time and date from the system. After that we need to store the value in a variable and later using `imwrite()` function we can easily create a doc file and store the time and date on it.

5.

Results and Discussion

After using the program which is made for creating user data who have visited the house and store the image as well, is working totally fine. Using the program, we can easily track and manage who have visited at what time and date in our house. As the security is becoming very essential part of our life the project will help us to be updated, manage our surroundings and our house.





Chapter 6

Conclusion and future work

Conclusion:

The intension of the project is to manage and create a record of people who visit the house or flat along with time and date, which will help to manage the people according to their priority easily. It is very efficient way to manage as CCTV is not very efficient in terms of memory and time. This security system easily identifies peoples and make a record of the people by taking the person's photo along with his/her visiting time and date. As this system only store the people of who have visited the house, so it is very eco-friendly security system.

Future Work:

In the future projects we will try to improve this security system by adding facial recognition process so that it will work more efficiently and will try to find out whether this person have visited ever before and when. By adding other features this security system can work more efficiently and can help to manage and strengthen our security system as crimes are increasing day by day.

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APPENDIX

Source Code:

Project.py

```
import cv2
```

```
import numpy as np
```

```
import os
```

```
import face_recognition
```

```
from datetime import datetime
```

```
j=0
```

```
i=0
```

```
m=0
```

```
face_cascade=cv2.CascadeClassifier('cascade/data/haarcascade_frontalface_default.xml')
```

```
cap=cv2.VideoCapture(0)
```

```
while(True):
```

```
    ret,frame=cap.read()
```

```

gray=cv2.cvtColor(frame,cv2.COLOR_BGR2GRAY)

faces=face_cascade.detectMultiScale(gray,scaleFactor=1.5, minNeighbors=5)

for(x,y,w,h)in faces:

    print(x,y,w,h)

    roi_gray=gray[y:y+h,x:x+w]

    roi_color=frame[y-100:y+h+200,x-100:x+w+200]


parent='C:/Users/suvradip chanda/Desktop/main project'

dire="user%s" %j

path=os.path.join(parent,dire)

mode=0o666

os.mkdir(path,mode)

cv2.imwrite('C:/Users/suvradip chanda/Desktop/main project/All
pictures/user'+str(m)+'.jpg',roi_color)

m=m+1

while(i<1):

    cv2.imwrite('C:/Users/suvradip
chanda/Desktop/main project/user'+str(j)+'/'id'+str(i)+'.jpg',roi_color)

    f=open('C:/Users/suvradip
chanda/Desktop/main project/user'+str(j)+'/'time_date.txt',"w+")

    k=datetime.now()

```

```

f.write(str(k))

f.close()

i+=1

i=0

j+=1

color=(250,0,0)

stroke=3

cord_x=x+w

cord_y=y+h

cv2.rectangle(frame,(x,y),(cord_x,cord_y),color,stroke)

cv2.waitKey(2000)


cv2.imshow('frame',frame)

if cv2.waitKey(20) & 0xFF== ord('q'):

    break

cap.release()

cv2.destroyAllWindows()

```

User-Interface:

Run.py

```
import tkinter
```

```
from tkinter import Text, Tk
```

```
from tkinter import messagebox
```

```
import os
```

```
root = tkinter.Tk()
```

```
def helloCallBack():
```

```
    os.system('project.py')
```

```
root.title("Hello! There")
```

```
root.resizable(width="false", height="false")
```

```
root.minsize(width=900, height=600)
```

```
root.maxsize(width=900, height=600)
```

```
topic_label1 = tkinter.Label(root, text="TRANSIENT  
FACES",foreground="red",background="black")
```

```
label1=tkinter.Label(root,text="")
```

```
label2=tkinter.Label(root,text="")
```

```
label3=tkinter.Label(root,text="")
```

```
label4=tkinter.Label(root,text="")
```

```
content_label1=tkinter.Label(root,text=" Transient faces is a smart sureveillance system,  
",fg="red")
```

```
content_label2=tkinter.Label(root,text="which combines two really common ideas to give  
us a cheap",fg="red")
```

```
content_label3=tkinter.Label(root,text="yet effective security measure,",fg="red")
```

```
content_label4=tkinter.Label(root,text="which would be easily accessible to domestic  
households .",fg="red")
```

```
label5=tkinter.Label(root,text="")
```

```
label6=tkinter.Label(root,text="")
```

```
label7=tkinter.Label(root,text="")
```

```
label8=tkinter.Label(root,text="")
```

```
go_button = tkinter.Button(root, text="Let's get  
started",fg="black",command=helloCallBack)
```

```
topic_label1.config(font=("Courier", 50))
```

```
content_label1.config(font=("Courier", 17))
```

```
content_label2.config(font=("Courier", 17))
```

```
content_label3.config(font=("Courier", 17))
```

```
content_label4.config(font=("Courier", 17))
```

```
go_button.config(font=("Courier", 30))
```

```
topic_label1.pack(fill="x")
```

```
label1.pack()
```

```
label2.pack()
```

```
label3.pack()
```

```
label4.pack()
```

```
content_label1.pack(fill="x")
```

```
content_label2.pack(fill="x")
```

```
content_label3.pack(fill="x")
```

```
content_label4.pack(fill="x")
```

```
label5.pack()
```

```
label6.pack()
```

```
label7.pack()
```

```
label8.pack()
```

```
go_button.pack()
```

```
root.mainloop()
```

Screenshots:

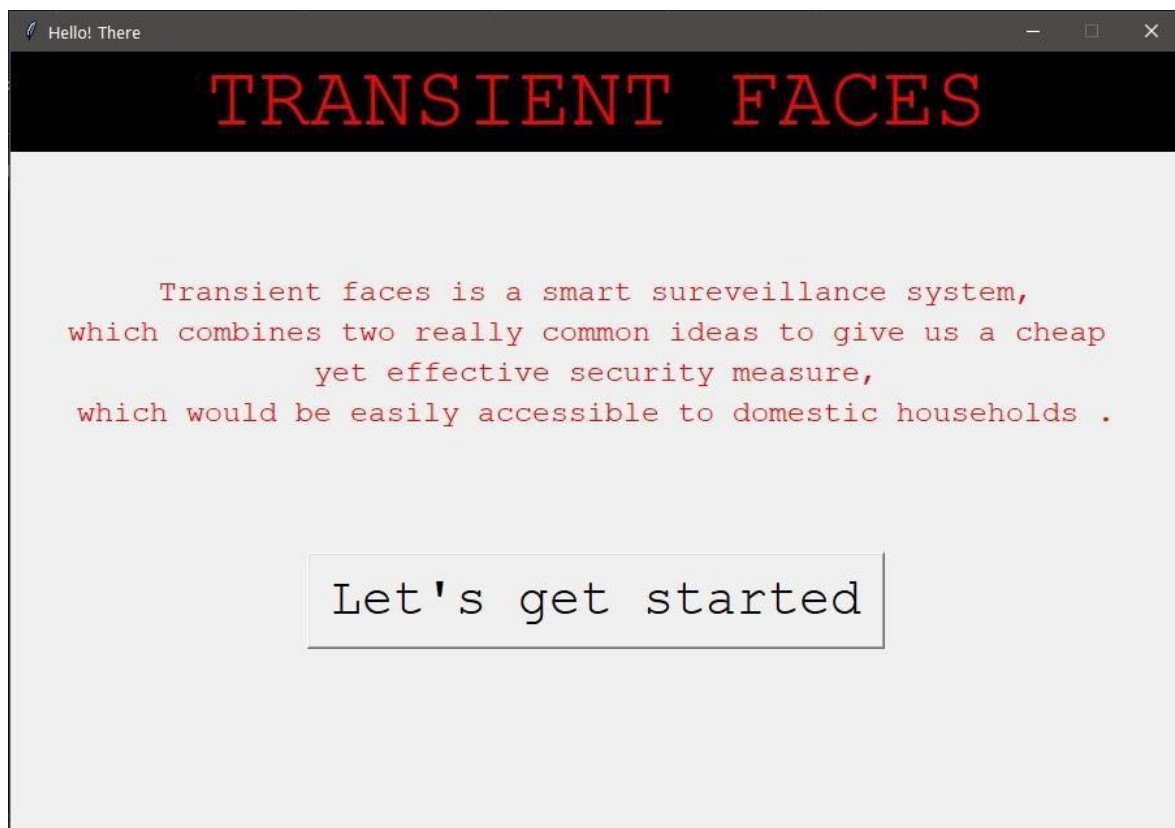


Fig 1: User interface of Transient faces.

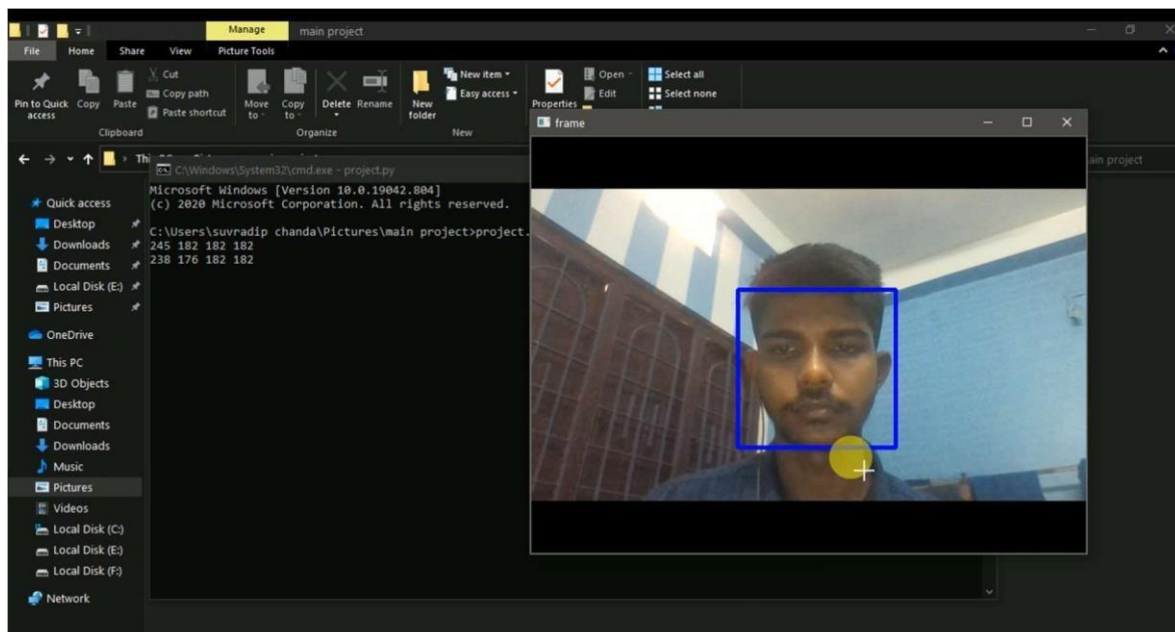


Fig 2: Face detection and capturing image.

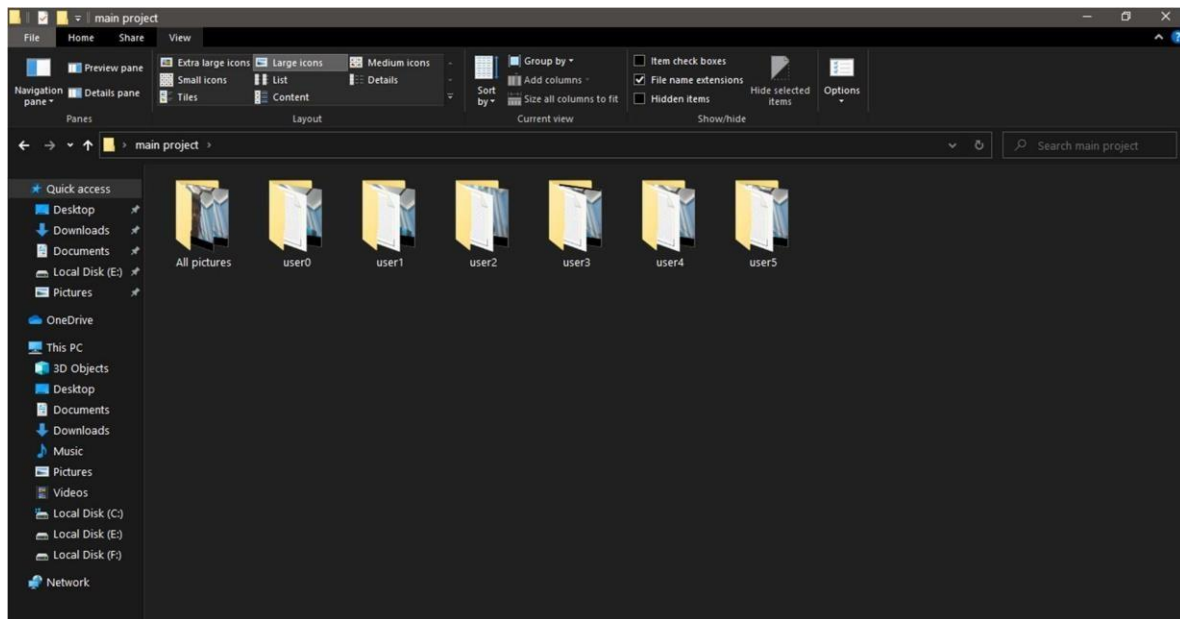


Fig 3: creating user folders for storing image and the doc file.

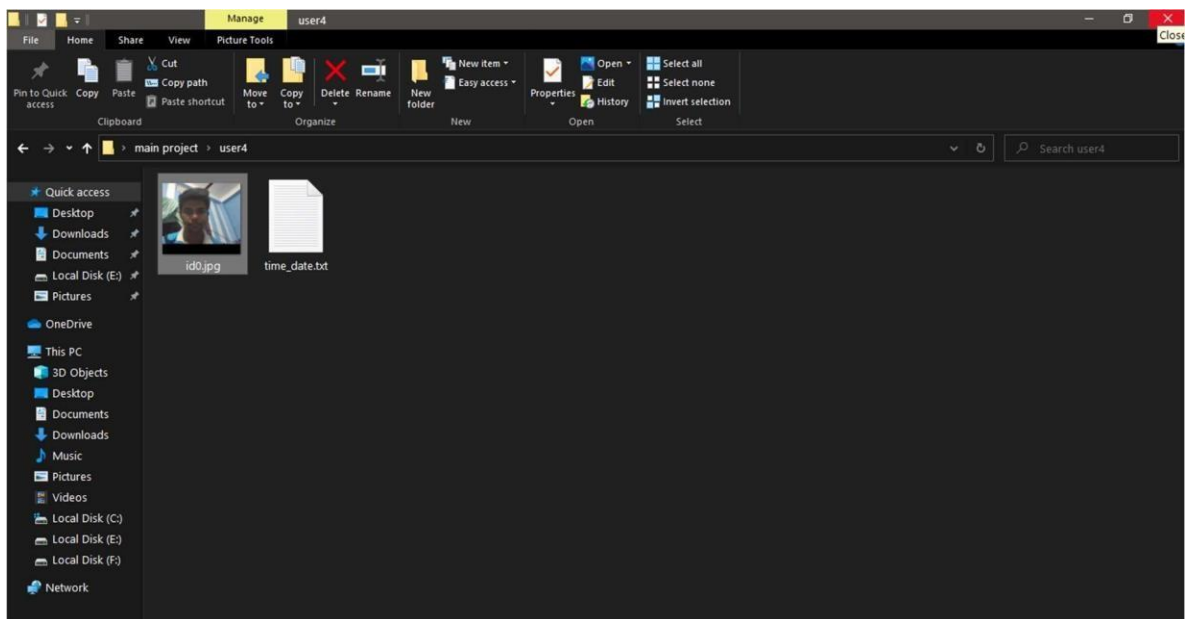


Fig 4: Image and doc file for each user.

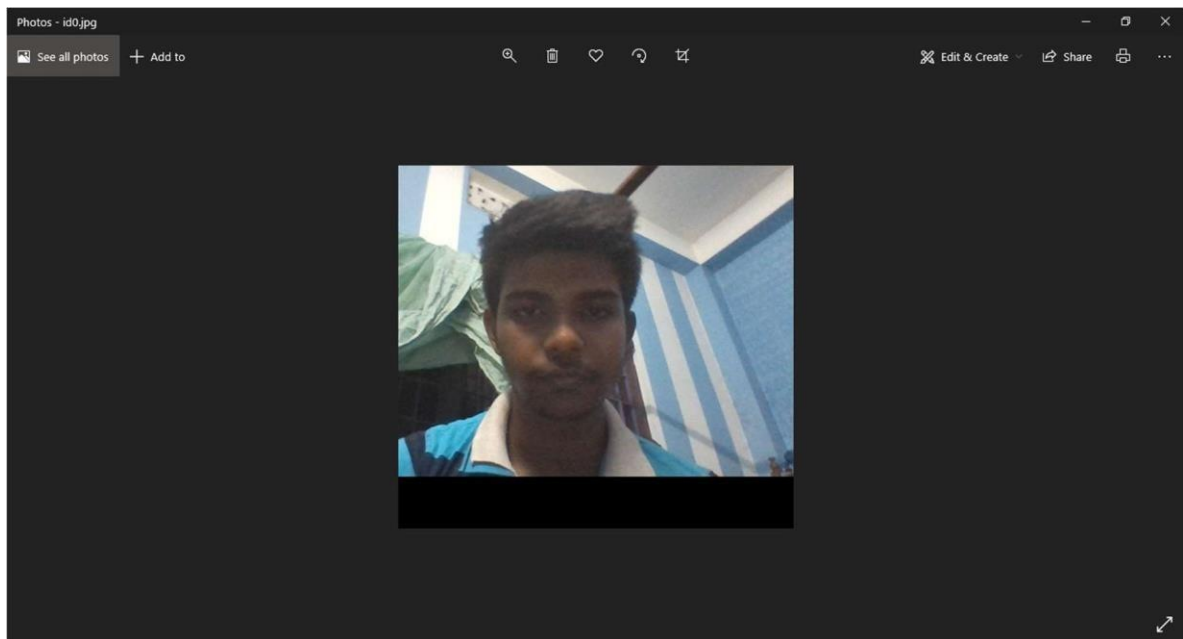


Fig 5: Demo image of one user.

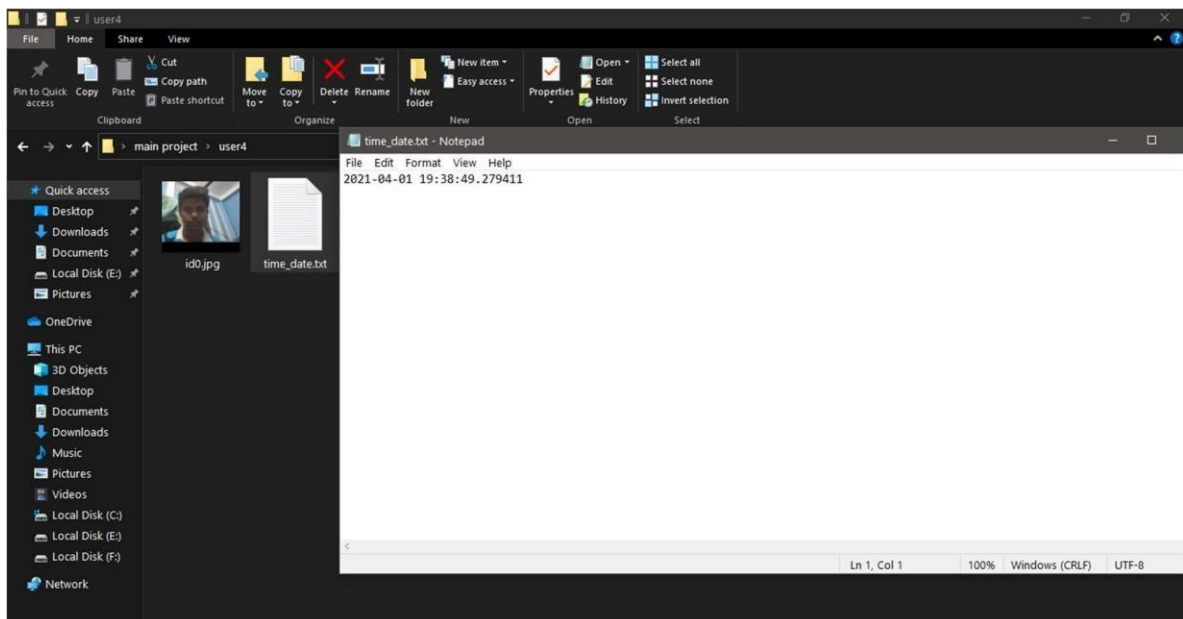


Fig 6: Time and date of the user visit.

Paper:

Transient Faces a new economical security alternative using OpenCV

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Abstract- Nowadays people are more dependent on others. And more numbers people visit others houses for various reasons. For tracking of people who have visited is a major concern for so many people as a topic is included which is security. This data helps to manage and make a record of people who visit the home and may be useful for any kind of thing. This will help the owner of the house to take a record of people and they can characterize the people according to their priority and they can contact them easily. No doubt CCTV is playing a very good role to manage this kind of work, but it takes so much time to manage CCTV data and very hard to go through the whole clip. The proposed system is used to take a record of people who visit our home on a particular day along with time.

KEYWORDS: CCTV, Security, Data.

I.INTRODUCTION

Machine learning is a very common term used by almost everyone nowadays. This topic can be defined as a scientific procedure of an advanced computing system designed for specific work. The human face is more complex than other objects as the human faces are dynamic objects which consist of many colors and forms. Facial detection is commonly used in various places for various operations. However, the detection of faces is required a high-level algorithm to detect faces efficiently.

OpenCV is an Open-source software library for computer vision and machine learning. Various infrastructures were built in OpenCV to provide powerful tools for computer vision applications and to increase the use of computer vision and machine learning commercially. As OpenCV is open-source, the developers can easily modify the codes according to their requirements. For face detection, OpenCV plays a great role as it already has built-in libraries which can be used almost in all programming languages. The built-in libraries help users to work efficiently with computer vision.

The core basic idea behind Haar classifier object detection is that the Haar-like features. These features are used for changes in distinction values between adjacent rectangular groups of pixels. The contrast variance between the pixel groups is used to determine relative dark and light areas. Haar features can easily be managed by increasing or decreasing the size of the group of pixels being examined. By using these features detection of objects of various sizes can be done.

II.

LITERATURE SURVEY

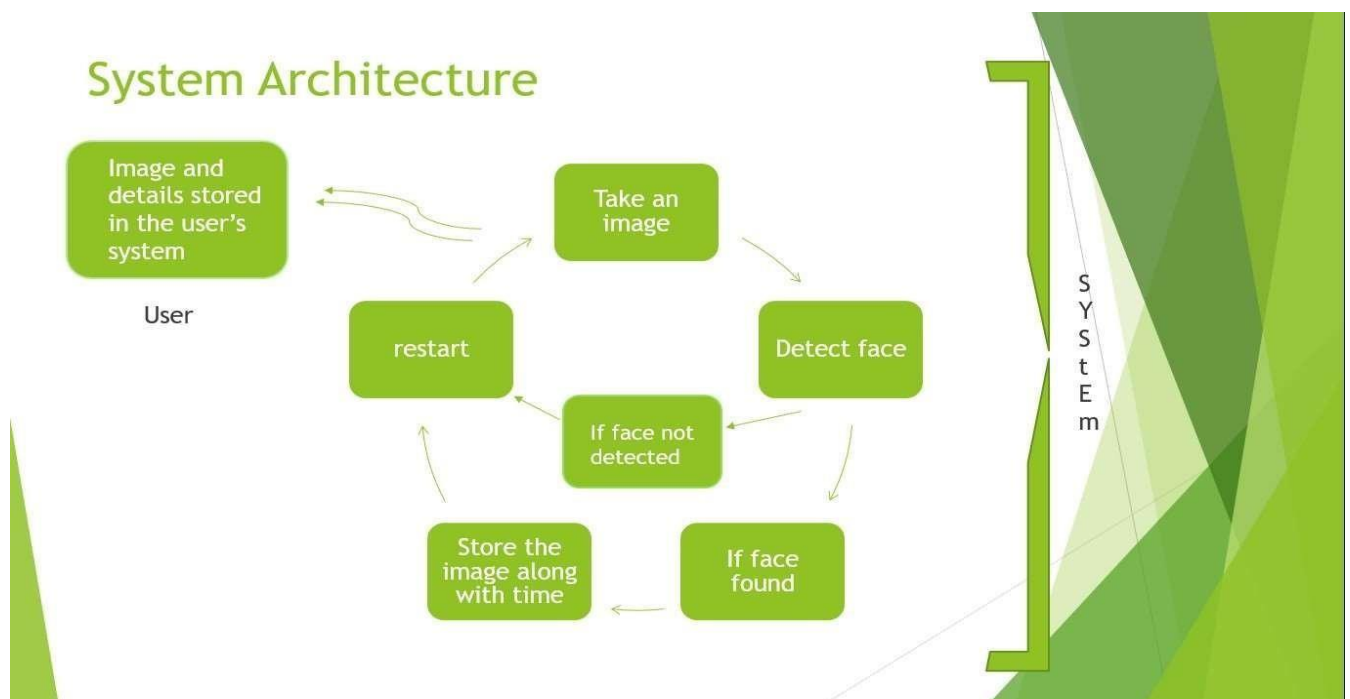
From many years only, computer vision and machine learning become a very common term as many people are coming up with different kinds of ideas about facial detection and computer vision. Nowadays Facial detection is used

in almost every small big companies. The author of the paper illustrates that how face detection can be used for tracking faces and used for further operation. As the computer vision technology is not a new name. So many people have implemented various great ideas in terms of making something efficient and useful. As the field is so large, A lot of things can be achieved by using various tools and infrastructures of OpenCV in projects. Nowadays facial detection is commonly used by the high-tech companies like Microsoft, Amazon, Google, Intel etc. All these companies use facial detection for various purpose but the basic idea for all the operation is same.

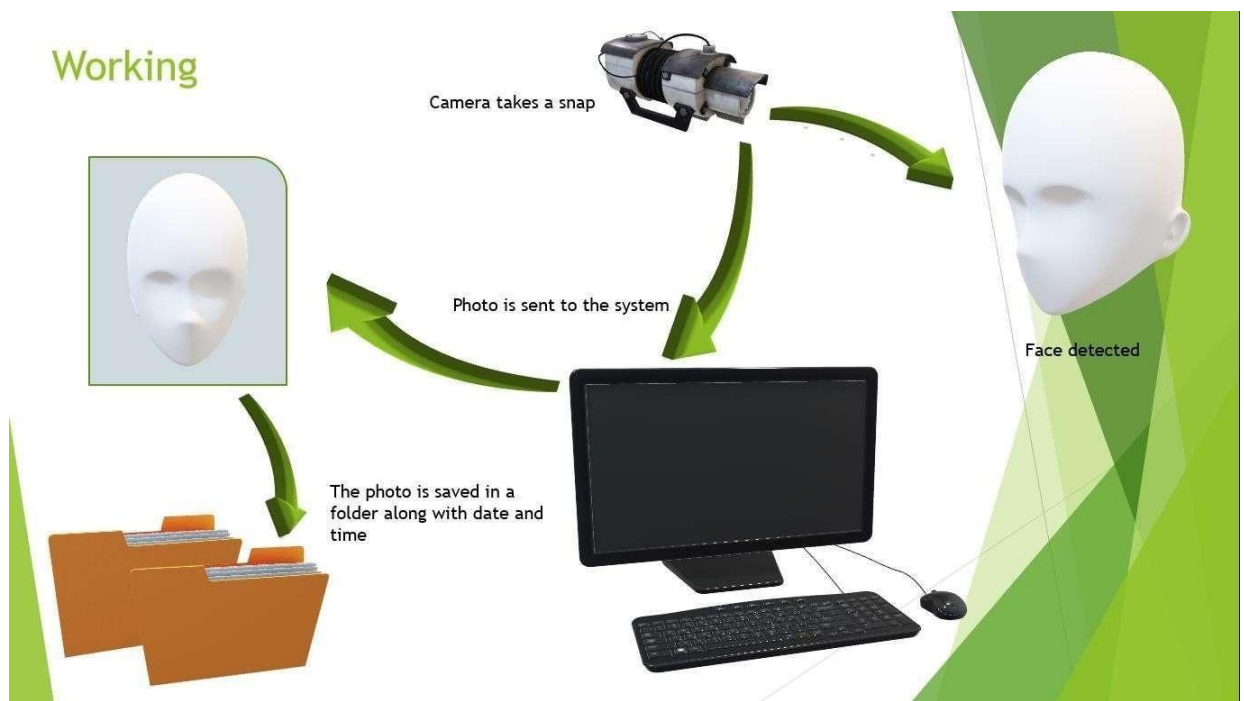
III.

PROPOSED METHOD

As the security is becoming a very essential aspect of our life and as the threats are increasing daily the security system in houses should be advanced. As a lot of persons are visiting our homes every day, it's very hard to track the person who have visited our home. It's very hard to go through the CCTV data every day and find out how many people have visited our home. So here we are introducing our house management system to track down number of people who have visited our home using facial detection and OpenCV. It is very useful as the data is very less and easy to manage. For face detection we have used haar cascade classifiers for identifying the faces. This project cannot replace CCTV technology. But it can be used as an alternative.



In the system architecture, the camera will take a frame after a given time and it will check whether there is any person present in the photo, if anything found then it will take the picture of the person and save it along with the date and time.



IV. RESULTS AND DISCUSSION

To implement the system, we need to use haar cascades and the picture will be classified using cascade classifier. When a person come near the camera the picture will be taken and later the picture will be used for finding faces. If the system finds out any photo, it will be saved under a folder along with time and date.

V. CONCLUSION

The intension of the project is to manage and create a record of people who visit the house or flat along with time and date, which will help to manage the people according to their priority easily. It is very efficient way to manage as CCTV is not very efficient in terms of memory and time. This security system easily identifies peoples and make a record of the people by taking the person's photo along with his/her visiting time and date. As this system only store the people of who have visited the house, so it is very eco-friendly security system.

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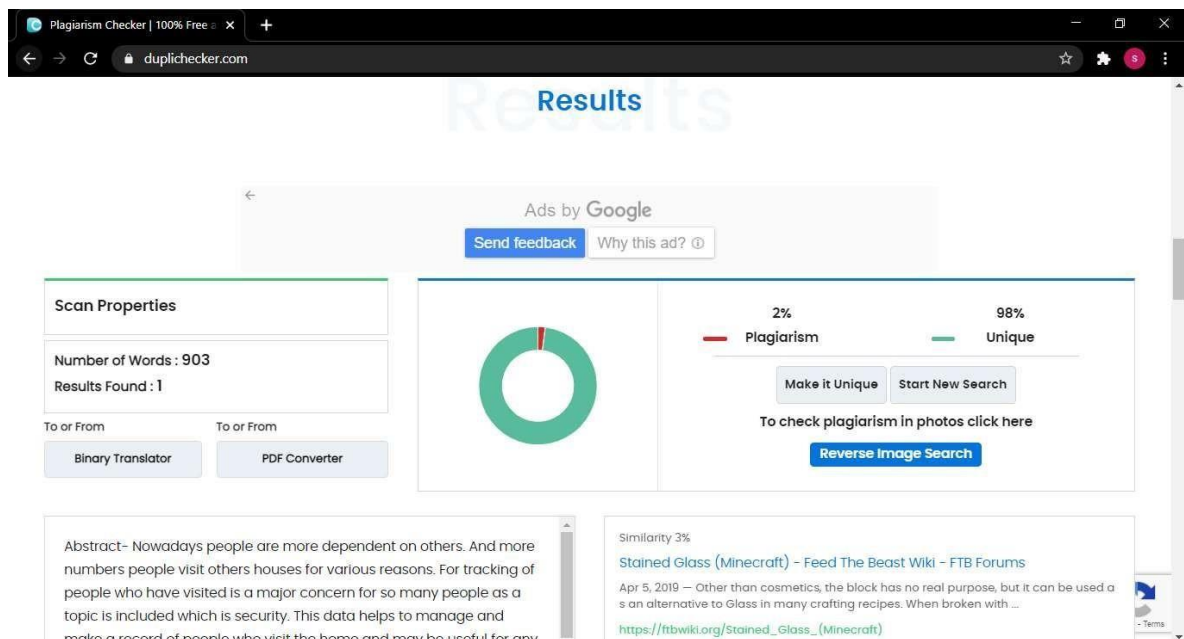


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