(All of those are code pasted as text and are not an image they just have a black background)

➢ Data Collection File (.py)

```
import math
from cvzone.HandTrackingModule import HandDetector
import cv2 as cv
import numpy as np
import time

cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)
Detector = HandDetector(maxHands=1)


offset = 20
imgsize = 300
counter = 0

folder = "E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Data/ISL DATA/asd"

while True:
    Success, img = cap.read()
    hands, img = Detector.findHands(img)
    img = cv.flip(img, 1)

    if hands:
        hand = hands[0]
        x, y, w, h = hand['bbox']
        x = 1280 - x
        x = x - w

        imgextra = np.ones((imgsize,imgsize,3), np.uint8)*255
        imgcrop = img[y - offset:y + h + offset, x - offset:x + w + offset]

        ratiohw = h/w # if the value is > 1 height is greater else Width is greater

        if ratiohw > 1: #Height is greater
            k = imgsize / h
            wcal = math.ceil(k * w)
            imgResize = cv.resize(imgcrop, (wcal, imgsize))
            wgap = math.ceil((imgsize-wcal)/2)              #Put the image in the Middle
```

```
            imgextra[:, wgap:wcal+wgap] = imgResize         #Putting in the
white Image
        else:            #Width is greater
            k = imgsize / w
            hcal = math.ceil(k * h)
            imgResize = cv.resize(imgcrop, (imgsize, hcal))
            hgap = math.ceil((imgsize-hcal)/2)              #Put the image in
the Middle
            imgextra[hgap:hcal+hgap, :] = imgResize         #Putting in the
white Image

        cv.imshow("ImageCropWhite", imgextra)
    cv.imshow("Image",img)

    key = cv.waitKey(1)
    if key == ord("s"):
        counter += 1
        cv.imwrite(f'{folder}/Image_{time.time()}.jpg',imgextra)
        print("Number of images Saved :- ",counter)
```

➢ Welcome Page File (.py)

```
import cv2 as cv
import cvzone as cz
from cvzone.HandTrackingModule import *

################################################################################
########
#Setting Window
cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)

Detector = HandDetector(maxHands=1)

background_img = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/welcome background/background_img.png")
background_img2 = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/welcome background/background_img_2page.png")

count = 0
while True:
    SUCCESS, img = cap.read()
    img = cv.flip(img, 1)
```

```
    hand, img = Detector.findHands(img)

    img_first = cv.addWeighted(img, 0.12, background_img, 1, 0)



    ################################################################################
#############
    #Writing Text on the Screen
    cv.putText(img_first, 'Sign Language', (510, 360), 0, 1.4, (69, 68, 68),
3)
    cv.putText(img_first, 'Recognition', (510, 405), 0, 1.4, (69, 68, 68), 3)
    cv.putText(img_first, 'Wave your Hand to Start', (440, 650), 0, 1, (84,
82, 82), 3)
    cv.putText(img_first, 'Creator', (1165, 670), 0, 0.8, (115, 109, 109), 1)
    cv.line(img_first, (1165, 675), (1260,675), (115, 109, 109), 1)
    cv.putText(img_first, 'Vedant A. Rajpurohit', (1005, 708), 0, 0.8, (115,
109, 109), 2)
    ################################################################################
#############

    if hand:
        hand1 = hand[0]
        lmlist = hand1["lmList"]
        x1, y1 = lmlist[8][:2]
        fingers = Detector.fingersUp(hand1)

        if fingers == [1,1,1,1,1]:
            count += 1
            if count == 20:
                cv.destroyWindow("Image")
                img = background_img2
                recta = img.copy()
                cv.rectangle(recta, (0,0), (1280,720),(0,0,0),-1)
                img = cv.addWeighted(recta, 0.5, img, 0.5, 0)
                cv.putText(img, 'Loading...', (370, 350), 0, 4, (255, 255,
255), 4)
                cv.imshow("Image",img)
                cv.waitKey(1)
                print("Go to next Page")
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/main.py").read())

    cv.imshow("Image",img_first)

    cv.waitKey(1)
```

➢ Interface Page File (.py)

```
import cvzone as cz
import cv2 as cv
from cvzone.HandTrackingModule import *
Detector = HandDetector(maxHands=1)

asl_img = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/welcome background/ASL_back.png")
isl_img = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/welcome background/ISL_back.png")
num_img = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/welcome background/numbers_back.png")
################################################################################
########
#Setting Window
cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)
flag = 0

while True:
    SUCCESS, img = cap.read()
    img = cv.flip(img, 1)

    hand, img = Detector.findHands(img)
    if hand:
        hand1 = hand[0]
        lmlist = hand1["lmList"]
        x1, y1 = lmlist[8][:2]
        fingers = Detector.fingersUp(hand1)
        if fingers[1] and fingers[2]:  #Both Fingers UP

            #ASL Game
            if 115<=x1<=415 and 60<=y1<=360:
                flag = 1
                cv.destroyWindow("Image")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
                print("Go to next Page")
            if 100<=x1<=400 and 50<=y1<=350:
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/ASL_Main_File/ASL Detection.py").read())

            #ISL Game
            if 850<=x1<=1160 and 90<=y1<=430:
```

```
                flag = 1
                cv.destroyWindow("Image")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
                print("Go to next Page")
            if 885<=x1<=1140 and 130<=y1<=380:
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/ISL_Main_File/ISL Detection.py").read())

            #Numbers Game
            if 450<=x1<=750 and 90<=y1<=420:
                flag = 1
                cv.destroyWindow("Image")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
                print("Go to next Page")
            if 490<=x1<=720 and 130<=y1<=380:
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Numbers_Main_File/Numbers Detection.py").read())

    if flag == 0:
        img[100:400, 50:350] = asl_img
        img[100:400, 450:750] = num_img
        img[100:400, 850:1150] = isl_img
    cv.putText(img, 'Select Any from the 3', (img.shape[0]//2-150, 600), 0,
2.4, (255, 255, 255), 3)
    cv.imshow("Image", img)
    key = cv.waitKey(1)
    if key == ord('q'):
        cv.destroyWindow("Image")
        break
```

➢ ASL Detection File (.py) for video processing and alphabets prediction from video

```
import math
from cvzone.HandTrackingModule import HandDetector
from cvzone.ClassificationModule import Classifier
import cv2 as cv
import numpy as np
import time
from playsound import playsound

cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)
Detector = HandDetector(maxHands=1)
classifer = Classifier("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/ASL CNN Model/Sign Language ASL
Classifier_main1.h5","E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/ASL CNN Model/labels.txt")

offset = 20
imgsize = 300
counter = 0
count = 0
labels =
["A","B","C","D","E","F","G","H","I","J","K","L","M","N","O","P","Q","R","S","
T","U","V","W","X","Y","Z"]
folder = "E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Data/ASL
DATA/F"
tutorial = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Images_Hand_Signs_Tutorials/ASL_Hand_Signs_1.png",1)
while True:
    Success, img = cap.read()
    img = img.copy()
    hands, img = Detector.findHands(img)
    img = cv.flip(img, 1)
    if hands:
        hand = hands[0]
        x, y, w, h = hand['bbox']
        x = 1280 - x
        x = x - w

        imgextra = np.ones((imgsize,imgsize,3), np.uint8)*255
        imgcrop = img[y - offset:y + h + offset, x - offset:x + w + offset]

        ratiohw = h/w # if the value is > 1 height is greater else Width is
greater
```

```
        if ratiohw > 1: #Height is greater
            k = imgsize / h
            wcal = math.ceil(k * w)
            imgResize = cv.resize(imgcrop, (wcal, imgsize))
            wgap = math.ceil((imgsize-wcal)/2)              #Put the image in
the Middle
            imgextra[:, wgap:wcal+wgap] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        else:             #Width is greater
            k = imgsize / w
            hcal = math.ceil(k * h)
            imgResize = cv.resize(imgcrop, (imgsize, hcal))
            hgap = math.ceil((imgsize-hcal)/2)              #Put the image in
the Middle
            imgextra[hgap:hcal+hgap, :] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        #Going Back to interface Options
        cv.rectangle(img, (0, 0), (90,90), (0, 0, 255), cv.FILLED)
        cv.putText(img, "X", (15,73),cv.FONT_HERSHEY_SIMPLEX, 3, (255, 255,
255), 5)
        lmList = hands[0]['lmList']
        x1,y1 = lmList[8][0:2]
        fingers = Detector.fingersUp(hands[0])
        if fingers[1] and fingers[2]:
            if 1170<=x1<=1280 and 0<=y1<=150:
                cv.destroyWindow("Image")
                cv.destroyWindow("Tutorial")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
            if 1180<=x1<=1280 and 0<=y1<=100:
                print("Loading....")
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/main.py").read())

        cv.putText(img, labels[index], (x, y-20), cv.FONT_HERSHEY_COMPLEX, 2,
(255,0,255), 2)
        count += 1
        if count % 20 == 0:
            if labels[index] == "A":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/A.mp3")
                    count = 0
            elif labels[index] == "B":
```

```
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/B.mp3")
                    count = 0
            elif labels[index] == "C":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/C.mp3")
                    count = 0
            elif labels[index] == "D":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/D.mp3")
                    count = 0
            elif labels[index] == "E":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/E.mp3")
                    count = 0
            elif labels[index] == "F":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/F.mp3")
                    count = 0
            elif labels[index] == "G":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/G.mp3")
                    count = 0
            elif labels[index] == "H":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/H.mp3")
                    count = 0
            elif labels[index] == "I":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/I.mp3")
                    count = 0
            elif labels[index] == "J":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/J.mp3")
                    count = 0
            elif labels[index] == "K":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/K.mp3")
                    count = 0
            elif labels[index] == "L":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/L.mp3")
                    count = 0
            elif labels[index] == "M":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/M.mp3")
                    count = 0
            elif labels[index] == "N":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/N.mp3")
                    count = 0
```

```
            elif labels[index] == "O":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/O.mp3")
                    count = 0
            elif labels[index] == "P":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/P.mp3")
                    count = 0
            elif labels[index] == "Q":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/Q.mp3")
                    count = 0
            elif labels[index] == "R":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/R.mp3")
                    count = 0
            elif labels[index] == "S":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/S.mp3")
                    count = 0
            elif labels[index] == "T":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/T.mp3")
                    count = 0
            elif labels[index] == "U":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/U.mp3")
                    count = 0
            elif labels[index] == "V":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/V.mp3")
                    count = 0
            elif labels[index] == "W":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/W.mp3")
                    count = 0
            elif labels[index] == "X":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/X.mp3")
                    count = 0
            elif labels[index] == "Y":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/Y.mp3")
                    count = 0
            elif labels[index] == "Z":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ASL Sounds/Z.mp3")
                    count = 0
    cv.imshow("Image",img)
    cv.imshow("Tutorial", tutorial)
    cv.waitKey(1)
```

➢ ISL Detection File (.py) (for video processing and Indian alphabets (Varnmala) prediction from the video

```
import math
from cvzone.HandTrackingModule import HandDetector
from cvzone.ClassificationModule import Classifier
import cv2 as cv
import numpy as np
from playsound import playsound
from PIL import ImageFont, ImageDraw, Image


cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)
Detector = HandDetector(maxHands=1)
classifer = Classifier("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/ISL CNN Model/Sign Language ISL
Classifier_main1.h5","E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/ISL CNN Model/labels.txt")
fontpath = "E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Data/ISL DATA/kurti-dev-040-bold.ttf"
font = ImageFont.truetype(fontpath, 54)

offset = 20
imgsize = 300
counter = 0
count = 0
labels =
["d","[k","x","|","M","p","N","t",">","_","V","B","<",".k","r","Fk","n","u","i
","Q","c","Hk","e",";","j","y","o","l","g"]

tutorial = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Images_Hand_Signs_Tutorials/ISL_Hand_Signs_1.png",1)
while True:
    Success, img = cap.read()
    img = img.copy()
    hands, img = Detector.findHands(img)
    img = cv.flip(img, 1)
    if hands:
        hand = hands[0]
        x, y, w, h = hand['bbox']
        x = 1280 - x
        x = x - w
```

```
        imgextra = np.ones((imgsize,imgsize,3), np.uint8)*255
        imgcrop = img[y - offset:y + h + offset, x - offset:x + w + offset]

        ratiohw = h/w # if the value is > 1 height is greater else Width is
greater

        if ratiohw > 1: #Height is greater
            k = imgsize / h
            wcal = math.ceil(k * w)
            imgResize = cv.resize(imgcrop, (wcal, imgsize))
            wgap = math.ceil((imgsize-wcal)/2)              #Put the image in
the Middle
            imgextra[:, wgap:wcal+wgap] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        else:             #Width is greater
            k = imgsize / w
            hcal = math.ceil(k * h)
            imgResize = cv.resize(imgcrop, (imgsize, hcal))
            hgap = math.ceil((imgsize-hcal)/2)              #Put the image in
the Middle
            imgextra[hgap:hcal+hgap, :] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        #Going Back to interface Options
        cv.rectangle(img, (0, 0), (90,90), (0, 0, 255), cv.FILLED)
        cv.putText(img, "X", (15,73),cv.FONT_HERSHEY_SIMPLEX, 3, (255, 255,
255), 5)
        lmList = hands[0]['lmList']
        x1,y1 = lmList[8][0:2]
        fingers = Detector.fingersUp(hands[0])
        if fingers[1] and fingers[2]:
            if 1170<=x1<=1280 and 0<=y1<=150:
                cv.destroyWindow("Image")
                cv.destroyWindow("Tutorial")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
            if 1180<=x1<=1280 and 0<=y1<=100:
                print("Loading....")
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/main.py").read())

        img_pil = Image.fromarray(img)
        draw = ImageDraw.Draw(img_pil)
        draw.text((x, y-65),  labels[index], font = font, fill = (255,0,255))
```

```
        img = np.array(img_pil)
#["d","[k","x","|","M","p","N","t",">","_","V","B","<",".k","r","Fk","n","u","i","Q","c","Hk","e",";","j","y","o","l","g"]
        count += 1
        if count % 20 == 0:
            if labels[index] == "d":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/A.mp3")
                count = 0
            elif labels[index] == "[k":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/B.mp3")
                count = 0
            elif labels[index] == "x":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/C.mp3")
                count = 0
            elif labels[index] == "|":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/D.mp3")
                count = 0
            elif labels[index] == "M":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/E.mp3")
                count = 0
            elif labels[index] == "p":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/F.mp3")
                count = 0
            elif labels[index] == "N":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/G.mp3")
                count = 0
            elif labels[index] == "t":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/H.mp3")
                count = 0
            elif labels[index] == ">":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/I.mp3")
                count = 0
            elif labels[index] == "_":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/J.mp3")
                count = 0
            elif labels[index] == "V":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign Recognition/Sounds/ISL Sounds/K.mp3")
                count = 0
            elif labels[index] == "B":
```

```
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/L.mp3")
                count = 0
            elif labels[index] == "<":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/M.mp3")
                count = 0
            elif labels[index] == ".k":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/N.mp3")
                count = 0
            elif labels[index] == "r":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/O.mp3")
                count = 0
            elif labels[index] == "Fk":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/P.mp3")
                count = 0
            elif labels[index] == "n":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Q.mp3")
                count = 0
            elif labels[index] == "u":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/R.mp3")
                count = 0
            elif labels[index] == "i":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/S.mp3")
                count = 0
            elif labels[index] == "Q":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/T.mp3")
                count = 0
            elif labels[index] == "c":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/U.mp3")
                count = 0
            elif labels[index] == "Hk":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/V.mp3")
                count = 0
            elif labels[index] == "e":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/W.mp3")
                count = 0
            elif labels[index] == ";":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/X.mp3")
                count = 0
```

```
            elif labels[index] == "j":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Y.mp3")
                count = 0
            elif labels[index] == "y":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Z.mp3")
                count = 0
            elif labels[index] == "o":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Z1.mp3")
                count = 0
            elif labels[index] == "l":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Z2.mp3")
                count = 0
            elif labels[index] == "g":
                playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/ISL Sounds/Z3.mp3")
                count = 0

    cv.imshow("Image",img)
    cv.imshow("Tutorial", tutorial)
    cv.waitKey(1)
```

➢ Numbers Detection (.py) (for video processing and numbers prediction from the video)

```
import math
from cvzone.HandTrackingModule import HandDetector
from cvzone.ClassificationModule import Classifier
import cv2 as cv
import numpy as np
import time
from playsound import playsound

cap = cv.VideoCapture(0)
cap.set(3,1280)
cap.set(4,720)
Detector = HandDetector(maxHands=1)
classifer = Classifier("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/Numbers CNN Model/Sign Language Numbers
```

```
Classifier_main1.h5","E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Model/Numbers CNN Model/labels.txt")

offset = 20
imgsize = 300
counter = 0
count = 0
labels = ["1","10","2","3","4","5","6","7","8","9"]

tutorial = cv.imread("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Images_Hand_Signs_Tutorials/Numbers_Hand_Signs_1.png",1)
while True:
    Success, img = cap.read()
    img = img.copy()
    hands, img = Detector.findHands(img)
    img = cv.flip(img, 1)
    if hands:
        hand = hands[0]
        x, y, w, h = hand['bbox']
        x = 1280 - x
        x = x - w

        imgextra = np.ones((imgsize,imgsize,3), np.uint8)*255
        imgcrop = img[y - offset:y + h + offset, x - offset:x + w + offset]

        ratiohw = h/w # if the value is > 1 height is greater else Width is
greater

        if ratiohw > 1: #Height is greater
            k = imgsize / h
            wcal = math.ceil(k * w)
            imgResize = cv.resize(imgcrop, (wcal, imgsize))
            wgap = math.ceil((imgsize-wcal)/2)              #Put the image in
the Middle
            imgextra[:, wgap:wcal+wgap] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        else:             #Width is greater
            k = imgsize / w
            hcal = math.ceil(k * h)
            imgResize = cv.resize(imgcrop, (imgsize, hcal))
            hgap = math.ceil((imgsize-hcal)/2)              #Put the image in
the Middle
            imgextra[hgap:hcal+hgap, :] = imgResize         #Putting in the
white Image
            prediction, index = classifer.getPrediction(imgextra)

        #Going Back to interface Options
        cv.rectangle(img, (0, 0), (90,90), (0, 0, 255), cv.FILLED)
```

```
        cv.putText(img, "X", (15,73),cv.FONT_HERSHEY_SIMPLEX, 3, (255, 255,
255), 5)
        lmList = hands[0]['lmList']
        x1,y1 = lmList[8][0:2]
        fingers = Detector.fingersUp(hands[0])
        if fingers[1] and fingers[2]:
            if 1170<=x1<=1280 and 0<=y1<=150:
                cv.destroyWindow("Image")
                cv.destroyWindow("Tutorial")
                img[:] = (0, 0, 0)
                cv.putText(img, 'Loading...', (300, 400),
cv.FONT_HERSHEY_SIMPLEX, 5, (0, 0, 255), 5)
                cv.imshow("Image",img)
                cv.waitKey(1)
            if 1180<=x1<=1280 and 0<=y1<=100:
                print("Loading....")
                exec(open("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/InterFace/main.py").read())

        cv.putText(img, labels[index], (x, y-20), cv.FONT_HERSHEY_COMPLEX, 2,
(255,0,255), 2)
        count += 1
        if count % 20 == 0:
            if labels[index] == "1":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/1.mp3")
                    count = 0
            elif labels[index] == "2":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/2.mp3")
                    count = 0
            elif labels[index] == "3":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/3.mp3")
                    count = 0
            elif labels[index] == "4":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/4.mp3")
                    count = 0
            elif labels[index] == "5":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/5.mp3")
                    count = 0
            elif labels[index] == "6":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/6.mp3")
                    count = 0
            elif labels[index] == "7":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/7.mp3")
                    count = 0
```

```
            elif labels[index] == "8":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/8.mp3")
                    count = 0
            elif labels[index] == "9":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/9.mp3")
                    count = 0
            elif labels[index] == "10":
                    playsound("E:/Extra Codes/Python/Python Projects/Hand Sign
Recognition/Sounds/Numbers Sounds/10.mp3")
                    count = 0
    cv.imshow("Image",img)
    cv.imshow("Tutorial", tutorial)
    cv.waitKey(1)
```