



Conduction of online examination through AI

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Abstract : Online Conduction of Examination system is a website that enables an education institute or any other institution to arrange, create and conduct examinations using an online mode of environment. The exams are conducted through the power and capabilities of Internet, Intranet and or with the help of LAN or Local Area Network modes. There are multiple challenges in conducting examinations using manual/traditional methods which cause delays such as filtering of records which is a tedious task, processing multiple results of thousands of students, corresponding each result with their respective candidate which also causes a problem. There is always a bigger chance that searching through multiple records can be a very tedious task and a possibility that a person administering the records loses a particular record. Maintaining such a system causes a hassle and stress and takes time and effort. To perform the task at hand meticulously, we use a software development life cycle also known as SDLC which is a conceptual model that is essential for a project manager and describes every stage in the development cycle of the project. Visual Studios will be used to achieve the project because of its flexibility using Python and HTML syntax for Front-End. SQLite Server will be used as the database management system.

INTRODUCTION

Facial acknowledgment is an innovation that includes grouping and perceiving human countenances, generally by planning singular facial highlights and recording the remarkable proportion numerically and putting away the information as a face print. The face recognition in your portable camera utilizes this innovation. Facial acknowledgment is an improved application bio-metric programming that utilizes a profound learning calculation to analyze a live catch or advanced picture to the put away face print to check singular personality. Notwithstanding, profound learning is a class of AI calculations that utilizes different layers to logically separate more elevated level highlights from the crude information. For instance, in picture preparing, lower layers may distinguish edges, while higher layers may recognize the ideas pertinent to a human like digits or letters or faces. Facial identification is the way toward recognizing a human face inside a checked picture; the cycle of extraction includes getting a facial district, for example, the eye separating, variety, point and proportion to decide whether the item is human. All things considered, the latest thing of face acknowledgment/recognizable proof has shown an answer around the world pandemic issue which is the novel Coronavirus broad. Numerous nations for example, China have utilized facial acknowledgment/ID innovation to distinguish tainted people with COVID-19. The element of the facial acknowledgment/recognizable proof gadget is that it can identify the internal heat level of the people in the city, and it can expect who is tainted with the infection or not through the look and the temperature of every individual on the roads and public spots.

LITERATURE REVIEW

Face Recognition is the capacity to identify and perceive an individual by their facial qualities. Face is a multidimensional and subsequently requires a ton of numerical calculations. Face acknowledgment framework is exceptionally fundamental and significant for giving security, mug shot coordinating, law implementation applications, client confirmation, client access control, and so on and is generally utilized for acknowledgment for different applications. These all applications require a proficient Face acknowledgment framework. There are numerous strategies that are as of now proposed and have low acknowledgment ability, high bogus alert rate. Henceforth the significant assignment of the exploration is to create face acknowledgment framework with improved exactness and improved acknowledgment season of a face acknowledgment framework. This paper proposes a mixture face acknowledgment calculation by consolidating two face acknowledgment methods by incorporating (PCA) rule Component Analysis, (LDA) Linear Discriminant Analysis. Jacobi strategy is utilized to figure Eigenvector that are vital for PCA and LDA calculations. Face acknowledgment, as perhaps the best uses of picture investigation, has as of late acquired huge consideration. It is because of accessibility of plausible advancements, including portable arrangements. Exploration in programmed face acknowledgment has been led since the 1960s, however the issue is still to a great extent strange. A decade ago has given critical advancement in this space attributable to progresses in face displaying and investigation strategies. In spite of the fact that frameworks have been created for face identification and following, dependable face acknowledgment actually offers an incredible test to PC vision and example acknowledgment scientists.

METHODOLOGY

Face acknowledgment/recognizable proof is an information handling innovation that ascertains the area and size of an individual's face in an outright (advanced) picture. The facial highlights are recognized and other article like trees, structures, and bodies are disregarded from the computerized picture. Face recognition could be viewed as a more by and large illustration of face confinement. In face restriction, the obligation is to discover the areas and sizes of a known number of countenances. In highlights base methodology, the product attempts to take out highlights of the picture and match it with the appearances that are in the data set. While the picture base methodology attempts to acquire a fixed match among preparing and testing pictures. The creators of this investigation show that natural eyes do a similar technique as programming acts. For instance, if there is a white clear paper, natural eyes hope to discover an item on that white clear paper. In this errand, it just takes under two second for people to understand that the paper is clear. In the event that the eyes didn't distinguish any article on the primary side of the clear paper, people attempt to flip the paper to the opposite side and the eye does likewise task as how it did on the main side of the paper.

Facial acknowledgment checking frameworks additionally use PC vision innovation to distinguish people for security purposes. The most widely recognized illustration of PC vision in facial acknowledgment is for getting cell phones. Further developed employments of facial acknowledgment and biometrics remember for private or business security frameworks that utilization interesting physiological highlights of people to check their personality. Profound learning calculations can distinguish the extraordinary examples in an individual's fingerprints and use it to control admittance to high-security regions like high-classification work environments, for example, atomic powerplants, research labs, and bank vaults.

FACE DETECTION

Face acknowledgment/ID has a wide scope of utilization all throughout the planet. The product expects to perceive faces and distinguish who is the individual that is remaining before the face acknowledgment/ID gadget. There are likewise latest things of utilizing facial acknowledgment/ID that is being utilized these days which is the temperature discovery of individuals in China and the face recognize biometrics for the clients of iPhone X gadgets. Also, the creators of this investigation acquaint the web application with recognize and distinguish faces in a designed manner that doesn't have to have full three-dimensional sides of any countenances. At last, the product can be utilized as an instrument to recognize the restored COVID-19 patients and advantage the wellbeing areas to speak with these people and take their blood plasma for the current patients and assist them with getting recuperated.

There are a few explanations behind late expanded interest in face acknowledgment, including rising public worry for security, the requirement for character confirmation in the computerized world, face investigation and demonstrating methods in sight and sound information the executives and PC amusement. In this part, we have talked about face acknowledgment handling, including significant segments, for example, face identification, following, arrangement and highlight extraction, and it calls attention to the specialized difficulties of building a face acknowledgment framework. We center around the significance of the best arrangements accessible up until this point.

The investigation of video surges of face pictures has gotten expanding consideration in biometrics. A quick benefit in utilizing video data is the chance of utilizing excess present in the video arrangement to improve still picture frameworks. Although a huge measure of examination has been done in coordinating with still face pictures, the utilization of recordings for face acknowledgment is moderately less investigated. The main phase of video-based face acknowledgment (VFR) is to perform re-identification, where an assortment of recordings is cross-matched to find all events of the individual of interest. By and large, VFR approaches can be arranged into two classifications dependent on how they influence the huge number of data accessible in a video succession: (I) grouping based and set based, where at an undeniable level, what most recognizes these two methodologies is whether they use transient data. The detailing of a probabilistic appearance-based face acknowledgment approach is reached out in. Initially, it was characterized to do acknowledgment from a solitary actually picture as recently clarified, to work with different pictures and video arrangements. In, there is the compelled subspace spread over from face pictures of a clasp into a raised frame and afterward ascertain the closest distance of two curved structures as the between-set comparability. Consequently, each test and preparing model is a bunch of pictures of a subject's face, not simply a solitary picture, so acknowledgment choices should be founded on correlations of picture sets. In, VFR task is changed over into the issue of estimating the closeness of two picture sets, where the models from a video cut build one picture set. The creators consider face pictures from each clasp as a gathering and figure VFR into the joint scanty portrayal (JSR) issue. In JSR, to adaptively get familiar with the meager portrayal of a test cut, they all the while consider the class-level and atom-level sparsity, where the previous designs the enlisted cutsutilizing the organized scanty regulariser and the last looks for a couple of related modelsutilizing the inadequate regulariser.

IMPLEMENTATION

To Capture Video-



Fig:1 (Video Capturing practical implementation)

Taking photos via webcam-

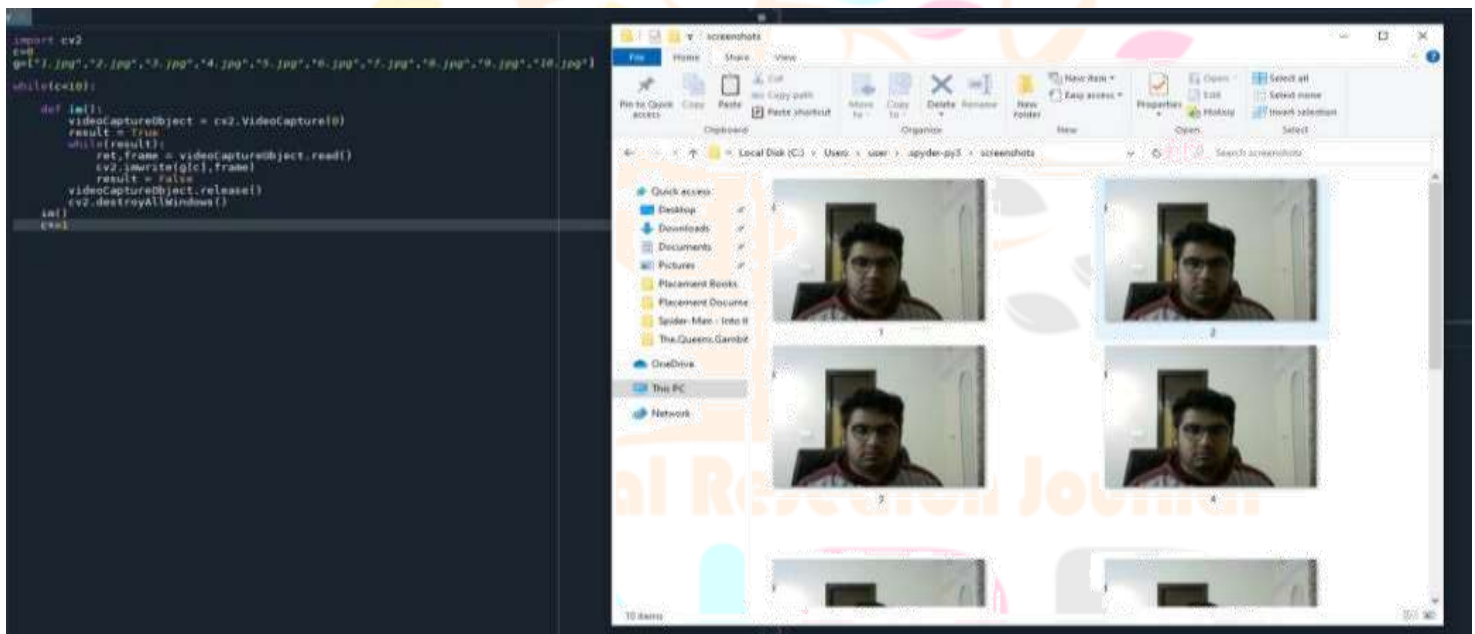


Fig:2 (Photo Snapshot Capturing)

OpenCV was introduced at Intel in 1999 by **Gary Bradsky** and the main delivery turned out in the late 2000. At the present time, OpenCV bolsters a great deal of computations identified with machine learning and computer vision and it is extending itself step by step. Python is accepted by every developer as a very useful programming language took control by Guido van Rossum, which turned out to be well known in a specific timeline primarily due to its efficiency and code optimality. It empowers the developer/programmer to channel his thoughts in only little of code without cutting down any type of functionality from it.

OpenCV is an API are used in lot of features including face detection, object detection feature extraction etc. One of the important uses of it is detecting the face of a person. Face detection has many applications in this real world such as prevention of retail crime, unlocking phones, validation of identity etc. Face recognition comes as the second part of facial detection in which we get to recognize the person whose face is to be detected.

In the implementation shown above, Frontal face detection is done using a Haar cascading function which is tracking the movement of the face with the help of the webcam. The OpenCV Package helps in the face detection functionality and in our project, it is useful in detecting the all activities and movement of a user who is appearing in the exam through our platform. The second screenshot demonstrates the functionality which is helping us to capture the snapshot of a person who is appearing in the examination. The snapshots are being taken in a particular time gap and the PNG/JPG format pictures are being generated as an output which can further be stored in the database for the future purposes. The registration page is desired to targeted for this particular functionality so that we can get a real time image of the user who is going to sit and attend the examination. The extensive Django framework will help us in the integration as well as implementation of the output we desire.

1.1 To establish face detection on a webpage which is being locally hosted

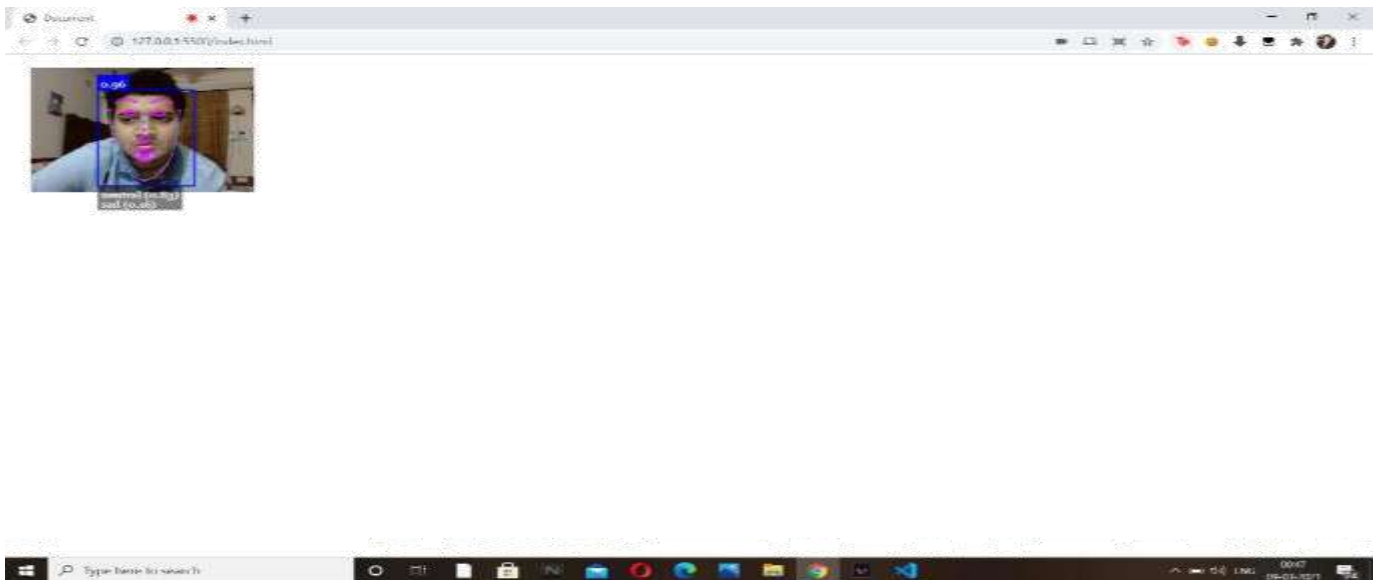


Fig:3 (Face Detection on Web Page)

1.2 Establishing face detection GUI on the pre existing HTML page

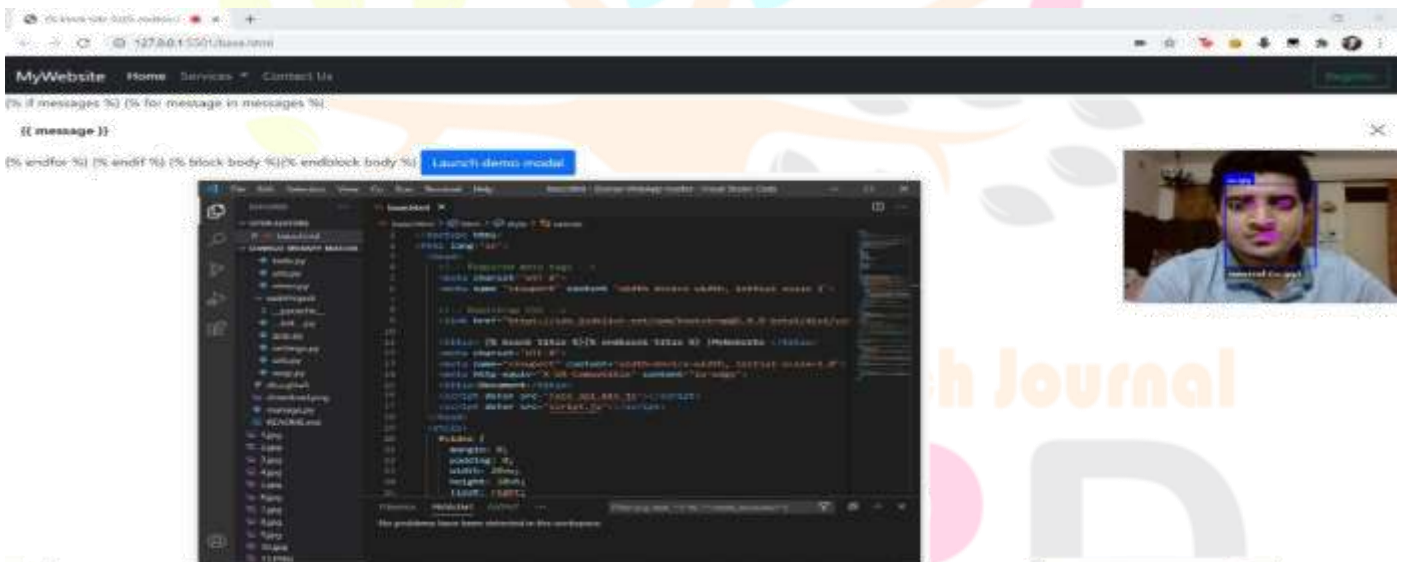


Fig:4 (Face Detection GUI with Code)

Fig:5 (Face Detection GUI)

TensorFlow is an end-to-end open-source platform for machine learning. It has a complete, adaptable environment of apparatuses, libraries, and local area assets that allows specialists to push the best in class in ML and designers effectively fabricate and send applications that are powered by machine learning.

TensorFlow was initially evolved by scientists and designers chipping away at the Google Brain group inside Google's Machine Intelligence Research association to lead AI and profound neural organizations research. The framework is adequately general to be appropriate in a various collection of different areas.

The Face APIs used above are a culmination of JavaScript API for both the face detection (FD) and face recognition (FR) in the browser that is implemented above the tensorflow.js core API. Various TensorFlow trained model are being used to project the face detection and other feature extraction techniques in this java script face API. The models used for face recognition are tiny face-detector, faceLandmark68net, faceRecognition Net and face expression net. These models are essentially for recognizing the face as well as different features like, eyes, nose, lips along with creating a square cascade which is created around the face. The expression analysis is also done as a stage of the similar process being held. The TensorFlow models are loaded through JavaScript and are finally embedded on a webpage using the power of HTML. The use of python models is integrated with webpages using JavaScript and HTML using the live local host feature of VSCode. Everything concludes in the creation of a box on a webpage showing the face of the person sitting in front of the camera. This functionality can be further incorporated in different webpages as well.

5.3 To establish webcam detection on a real time quiz environment

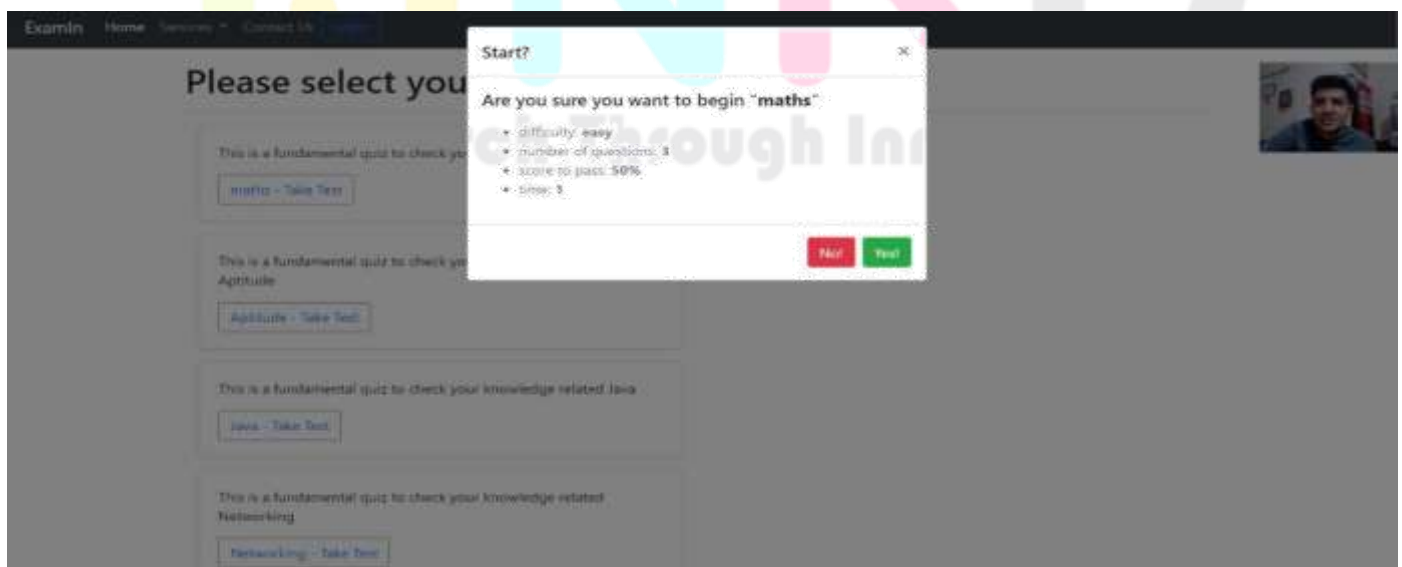


Fig:6 (Webcam and Face Detection on quiz Page of the Website)

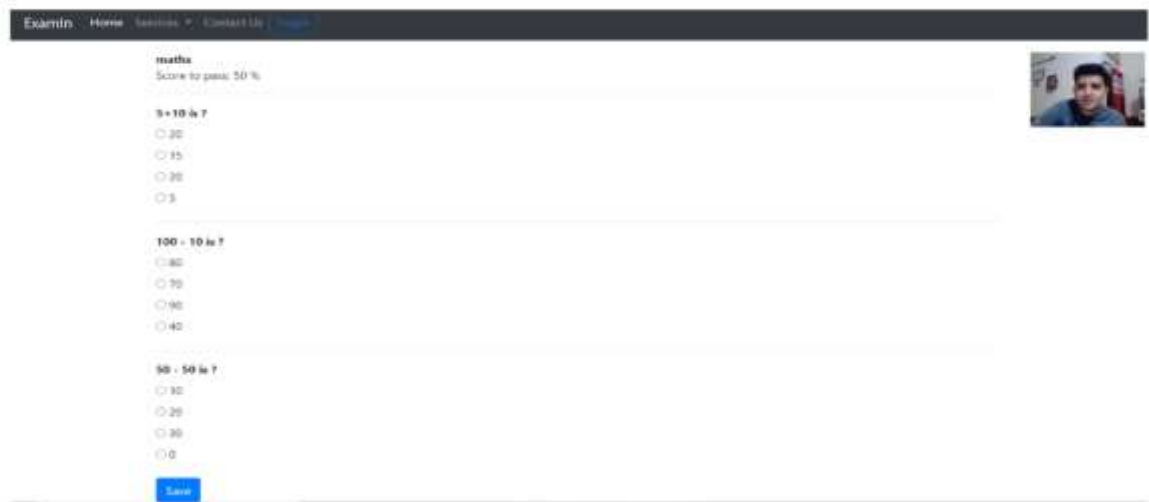


Fig:7 (Webcam face capturing during the quiz)

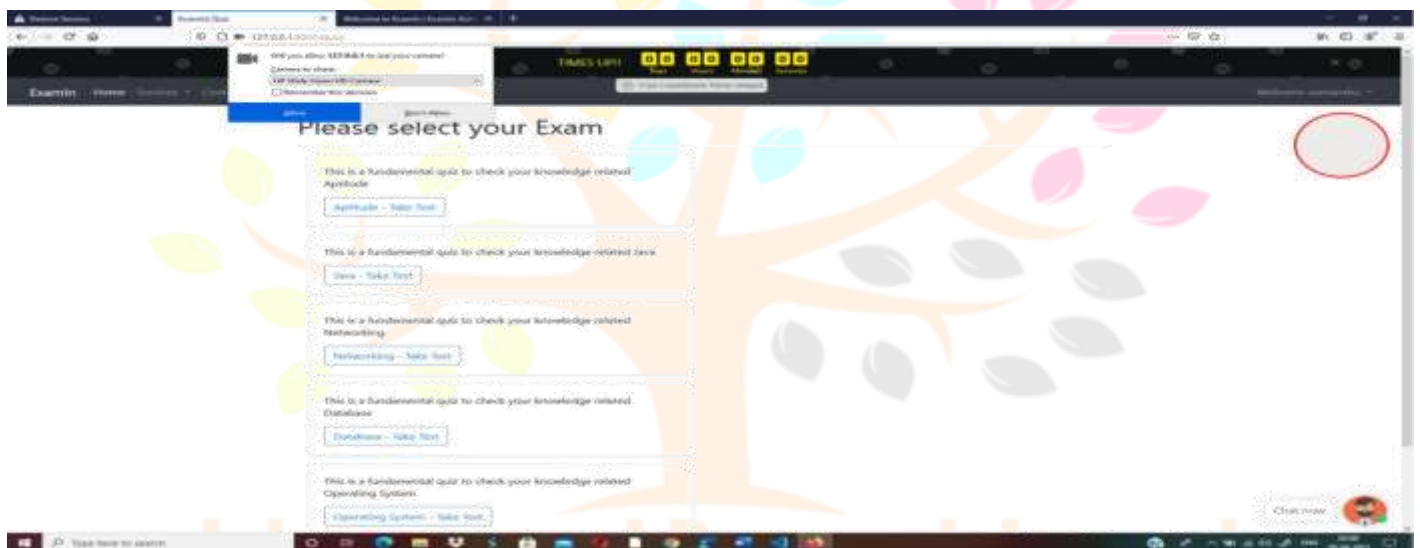


Fig:8 (Website asking camera access permission)



Fig:9 (Webcam face capturing during selection of quiz)

The Javascript functionalities that incorporate basic elements such as variables, constants etc. have a very high efficiency in establishing a proctoring solution. The querySelector and getUserMedia functions are highly potent in figuring out a solution of making up a video

canvas element, which is further used for facial recognition as well as detection. The realtime Django environment handles a lot of elements working side by side seamlessly, and the best solution of showcasing the live webcam window can be performed using JavaScript. Project integration involving backend as well as frontend functionalities is the most crucial part of its lifecycle and efficiency of the product is given the highest priority in its runtime environment. The above implementation gives all the answers to the probable questions arising due to the same. Having integrated the backend TensorFlow models along with the power of JavaScript will further improve the viability of the finished product.

The Stream API, likewise alluded to as the getUserMedia API, permits the client's camera and amplifier contributions to be spilled to a program window. Once passed to the program, the stream is commonly utilized as the "src" quality of a <video> component. Since the Stream API is as yet a generally unsupported draft, it is probably going to change after some time.

As the student clicks on take test the website asks the browser for the camera access permission without which the camera proctoring will not get started and then the student won't be allowed to take the test. As soon as the student allows to access the camera the picture of the student starts getting visible on the screen. Styles.css file is used to make student's picture visible in circular form that avoids taking extra space on the exam portal. The sides of the circle are in red colour so that the is highlighted to student. This allows the student to see himself/herself on the screen and can see whether they are sitting properly or not.

This face capturing is used on both the pages of the website starting from the page when the student starts taking test and ending on the Results page of the website. The face capturing circle is placed on the top right-hand corner making it visible clearly to the students and also avoiding them to cheat on exam. Due to its size, it takes less space on the exam screen,

This face capturing is being integrated with the Examination website as a proctoring feature to avoid any kind mischief or malpractice during the examination. For the students to give exam on our website he/she must have a PC or a laptop with camera enabled in it. If the students won't give permission to the website to access the camera, they won't then be allowed to move further in the test.

At tests led in universities, invigilation helps keep a beware of understudies. For online tests taken at home, the chance of conning increments. A few colleges have embraced a numerous decision survey design, which may likewise empower a possibility to rapidly scan the Internet for the correct answers. To keep up the veracity of a person's evaluations, as an action to assess an understudy's exhibition, invigilation gets compulsory. Administering contains man-made reasoning (AI) based calculations and devices that keep a beware of up-and-comers during on the web tests not taken at a test place.

Most usually, school or officially sanctioned character cards are to be shown by applicants before the camera to demonstrate their personality at the hour of taking the assessment. Utilization of electronic gadgets, printed material and writing material things like keen watches and pen drives is disallowed, as is the utilization of telecom gadgets like cellphones, earphones, bluetooth headphones, pagers and wellbeing groups among others.

A competitor needs to ensure that there is no clamor behind the scenes during the test. No other application or page ought to be open on the PC with the exception of the gave test programming.

Before the test starts, the picture of the understudy on the screen is contrasted and the photograph accessible in the framework, in light of which a client is permitted to proceed. Simulated intelligence-based calculations hold clients back from opening different tabs on their screen. If there should be an occurrence of numerous such endeavors, the inspect is suspended from showing up for test much of the time. The calculations additionally track the occasions understudies opened different windows, and catches encompassing sound. Any adjustment of the client's view — to one side or right — is hailed to the invigilator by a caution. Sound video web based or ceaseless catching of photographs at timespans 15 to 20 seconds, which can add up to 200 to 240 pictures in 60 minutes, is conveyed, aside from catching all movement on the client's screen.

Administering should be possible twoly: full-view and face delegating. In full-see delegating, the understudy's PC is kept as an afterthought at a reasonable vantage highlight get a perspective all over, hands, answerbook, and the cellphone used to take the test. The "full view" can likewise be gotten utilizing a telephone rather than a PC, yet has impediments, for example, stockpiling issues. In face-see delegating, an understudy takes the test on a PC, and the PC camera screens their face. The hands are not noticeable. Given the impediments of hardware and Internet network looked by understudies, most foundations have decided on this method of distant delegating. Nonetheless, there are two sorts of uprightness hazards with face see administering — there are workarounds that electronic distant delegating programming can't get. Separate gadgets, for example, cheat sheets, notes or telephones kept on or alongside workstations, which are out of perspective on the PC cameras, are more diligently to get.

Face Detection:

Face identification is a PC innovation being utilized in an assortment of uses that recognizes human appearances in computerized pictures. Face recognition likewise alludes to the mental cycle by which people find and take care of appearances in a visual scene.

Face Capturing:

Facial movement catch is the cycle of electronically changing over the developments of an individual's face into an advanced data set utilizing cameras or laser scanners. This data set may then be utilized to deliver PC designs, PC movement for films, games, or ongoing symbols.

Face Recognition:

A facial acknowledgment framework is an innovation equipped for coordinating with a human face from an advanced picture or a video outline against a data set of countenances, normally utilized to validate clients through ID check administrations, works by pinpointing and estimating facial highlights from a given picture

Face Surveillance:

This method has the ability to examine and recognize the essences of thousands or even huge number of individuals progressively.

The Facial Recognition API:

The Face Recognition and Face Detection API (by Lambda Labs) is a helpful device that empowers you to coordinate PC vision into your web and portable applications. Some applications can utilize faces as a principle or extra advance in the verification cycle.

Use of OpenCv:

OpenCV utilizes AI to find faces inside an image. Since faces are so confounded, there isn't one basic test that will advise you on the off chance that it discovered a face or not. All things considered, there are a huge number of little examples and highlights that should be coordinated. The calculations break the assignment of recognizing the face into a huge number of more modest, reduced down errands, every one of which is not difficult to address. These errands are additionally called classifiers.

For something like a face, you may have at least 6,000 classifiers, all of which should coordinate for a face to be recognized (inside mistake limits, obviously). In any case, in that lies the issue: for face location, the calculation begins at the upper left of an image and drops down across little squares of information, taking a gander at each square, continually asking, "Is this a face?". Since, there are at least 6,000 tests for each square, you may have a huge number of estimations to do, which will granulate your PC to an end.

Like a progression of cascades, the OpenCV course breaks the issue of distinguishing faces into various stages. For each square, it does an extremely unpleasant and speedy test. In the event that that passes, it does a marginally more itemized test, etc. The calculation may have 30 to 50 of these stages or falls, and it will possibly identify a face if all stages pass.

Face API:

Face discovery is quite possibly the most widely recognized utilizations of Artificial Intelligence. The utilization of Facial discovery has expanded over the most recent few years.

Face-api.js has brought a JavaScript API for face discovery and face acknowledgment in the program executed on top of the tensorflow.js center API. In this instructional exercise, we will assemble the face acknowledgment application that will work in the Browser. From the face, we will anticipate the Emotion, Gender, and age.

The Face API gives the capacity to discover milestones on a distinguished face. Arrangement is deciding if a specific facial trademark is available. For instance, a face can be characterized with respect to whether its eyes are open or shut. Another model is if the face is grinning.

To make a total venture on Face Recognition, we should deal with 3 extremely particular stages:

- Face Detection and Data Gathering
- Train the Recognizer
- Face Recognition

Haar Cascade Classifier:

Item Detection utilizing Haar highlight based course classifiers is a powerful article discovery strategy proposed by Paul Viola and Michael Jones in their paper, "Fast Object Detection utilizing a Boosted Cascade of Simple Features" in 2001. At that point we need to extricate highlights from it. Fortunately, OpenCV accompanies a coach just as an identifier. In the event that you need to prepare your own classifier for any article like vehicle, planes and so on you can utilize OpenCV to make one.

DISCUSSION OF RESULTS

The result that the major project is a Online Examination website that makes use of machine learning to improve interaction.



Fig:10 (Home Page of the Website)



Fig:11 (Database showing Registered Students)

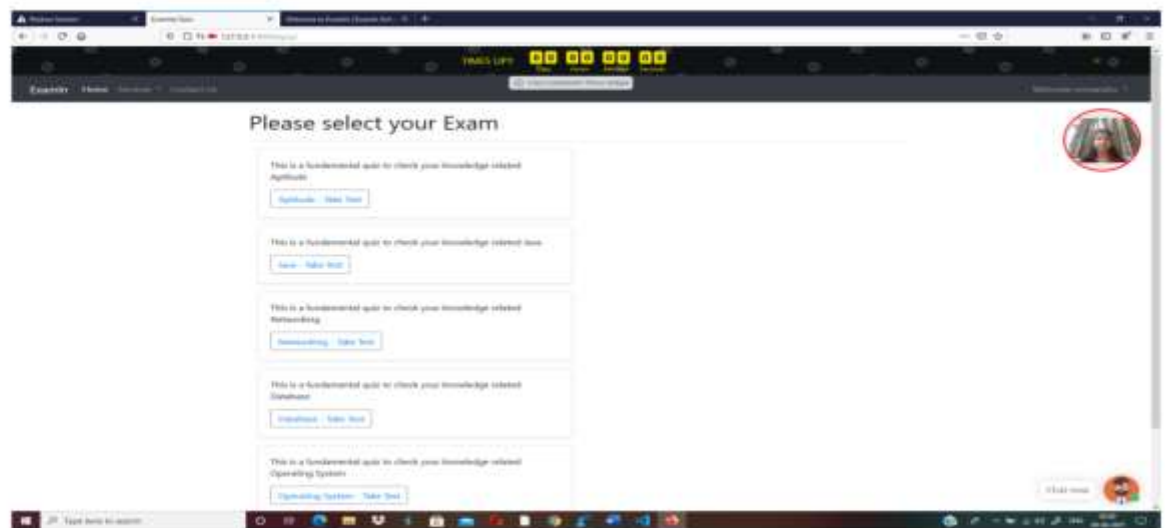


Fig:12 (Database showing all the Quizzes created)

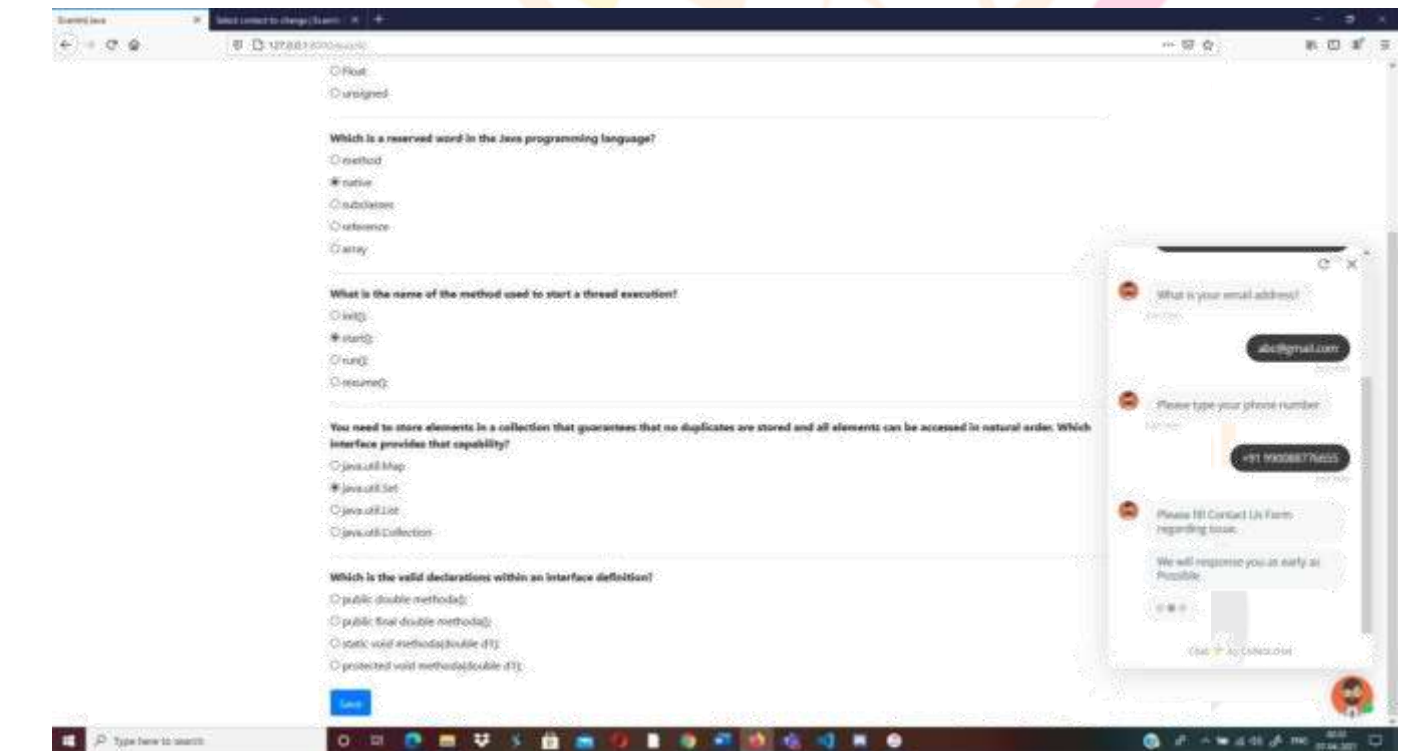


Fig:13 (Showing Chatbot on Questions page)



Fig:14 (Webcam face capturing during selection of quiz)

RESULT ANALYSIS

We have created a simpler and efficient way to conduct examinations in contrast to the offline way of conducting examination and any other that requires manual proctoring. Even though there is always a scope of improvement, we have created a web app that can be scaled and multiple different functions in the form of modules can be added.

Our solution is very good at tackling the problem on the hand and perfect for the small demographic we targeted. Multiple choice questions are monitored with ease in our system.

CONCLUSION

In our project report we go over about how we came to a solution that solved a major problem that we faced during the COVID-19 pandemic. The process of examination really suffered during those times. Even though large institutes were able to make needs met, small institutes and coaching centres really struggled. As multiple examinations were either postponed or completely cancelled, small institutes that don't have the financial resources can use our product without any hassle if a similar situation arises in the future.

Our product requires minimal resources i.e. only web camera and stable internet connection to attempt the examination. Even with minimal resources, the web app showed great accuracy.

This project was done by students of Amity University, Noida under the guidance of Dr Debjani Ghosh whose valuable contribution shaped the direction we wanted to take with our project. We thank all the researchers that have worked in multiple areas especially in face detection that is a critical functionality of our project.

FUTURE PROSPECTS

The longevity of a project and the ability to maintain it over a span of multiple really tests the worth of it. Futures prospects of our project were given a major thought. The web application can be scaled and maintained even though we were limited by our industry experience, knowledge and other multiple factors.

The database can be scaled, and multiple security features can be added to handle traffic. Our limited capital forced us to be creative in our solution to handle traffic and to ensure both client side and server side are protected from different attacks.

The front end was made with accessibility in our mind. Multiple changes can be made easily if required. Search engine optimization was also a major factor in our design.

The backend is also able to perfectly handle networking and communication between client side and server side. Chatbot is a user-friendly feature that provides relief to the candidate in the case of distress.

The data is also secured and encrypted however new security features can always be added to keep up with the high industry standards.

Face detection uses a highly optimized algorithm to provide solution to our problem however privacy can always be improved with new research.

Sound detection can also be added to our project. This further ensures examination ethics and other core values that we need to follow in our life. With some work, our project can be scaled easily as the framework used is future friendly and we can target a larger demographic.

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