Invigilator: A Fool-Proof approach to Online Examinations

User Manual

This is a basic version of a web application developed to track malpractices taken up by students during examinations in the online mode and alert online Invigilators of the same. Since the app has been developed only to portray some basic live proctoring features, there may be some drawbacks in applying this app at this stage for conducting real examinations. Some of the issues are mentioned in this document.

Download all the files (for running the web application) in this folder to a directory, which will be referred to as the base directory henceforth:
https://drive.google.com/drive/folders/1Y_dhUr0GpgY1pUatocClW5WUGB1c80l0?usp=sharing

Alternate Repository for Live Proctoring Software (without Web Application; usage instructions are specified within):
https://drive.google.com/drive/folders/1yEuN2lXqyBbju9CauPWTuEpz4a9VyHrq?usp=sharing

Install Anaconda 3 and Python Version > 3.0 on your system.

Changes to make in code to *Register a New Student*

1. Add an image of the new student to be registered in the database at: “subjapp/static/uploads” with name.jpg format.
2. Add the name with the same case (upper or lower) at lines 32 and 47 of camera.py file (by opening it in a text editor) in subjapp folder in base directory.

Note:

a. Name at Line 32 is used to compare the live images captured during the exam with the image in the database with that name. Useful to avoid errors when look-alike twins appear for exam.
b. If both images are alike above a certain prefixed threshold, the face is recognized. Else, ‘Unrecognized Person!!’ alert message is displayed.

c. Feature to be added in future to take name from log in information instead of having to change line 32 for every user.
d. Name at Line 32 is used to maintain a record of registered student names. Any new student can be added by simply adding his/ her name to this list.

Changes in directories:

All directories have been changed to the relative, rather than absolute form. If you still face any run-time errors, make necessary changes.

The steps to launch *Invigilator* app locally from any machine using Anaconda Prompt are given below. Same or equivalent steps are applicable for usage in Spyder, IDLE or other IDEs also.

Steps to launch *Invigilator* app

1. Enter the 'app_coding' directory where run.py file and subjapp folder are located.
2. Install necessary packages to run application using pip install command:
    a. pip install flask-wtf // for Register and Login forms
    b. pip install email_validator // for email field of forms
    c. pip install flask-sqlalchemy // for database management
    d. pip install flask-bcrypt // to encrypt passwords during login
    e. pip install opencv-python
    f. pip install numpy
    g. pip install scipy
    h. pip install random
    i. pip install dlib
    j. pip install DateTime
    k. pip install face-recognition

Note:

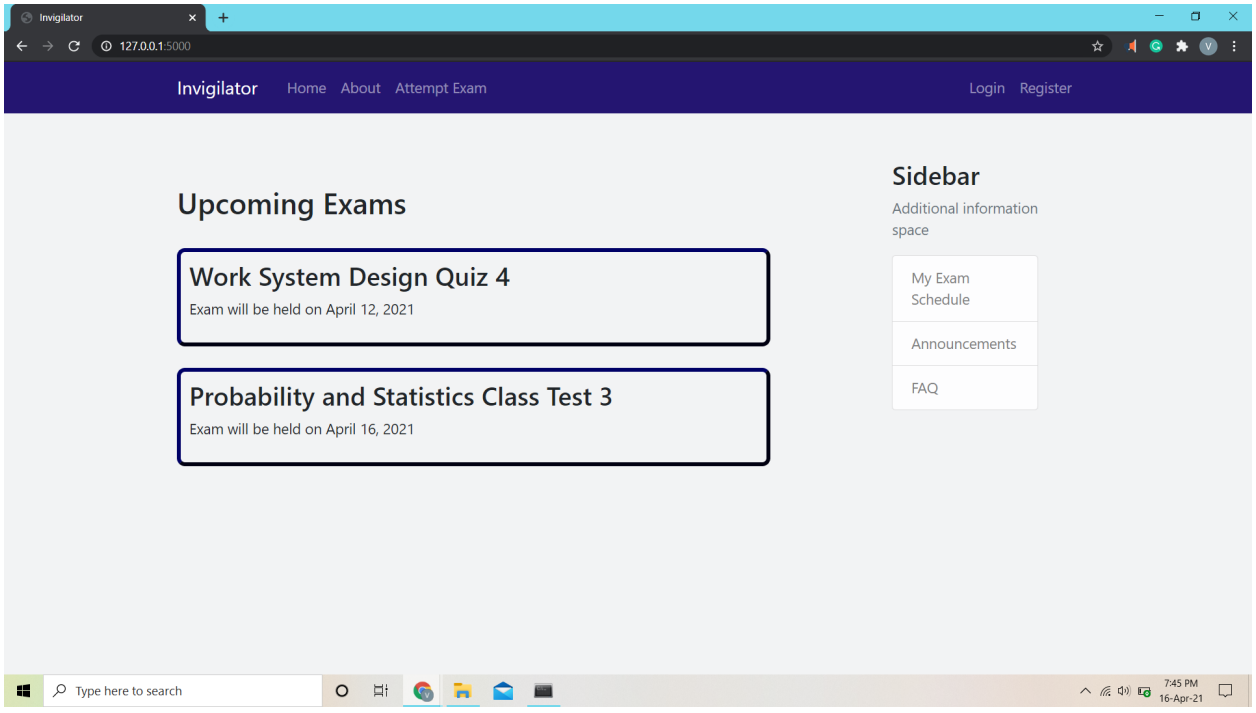
a. If any error comes up while running, as:

'**ModuleNotFoundError: ___** module not found'

install that package using pip install or suitable command by searching on Google.

b. Optionally, a new virtual environment can also be created, in which all these packages can be installed, so that it can be reused every time to run the same or similar codes.
c. If you face problems while installing dlib, search on Youtube (https://www.youtube.com/watch?v=pHrgi8QLcKk), StackOverflow, and try installing it from GitHub directly (https://github.com/davisking/dlib). Help on dlib installation: https://learnopencv.com/install-dlib-on-windows/

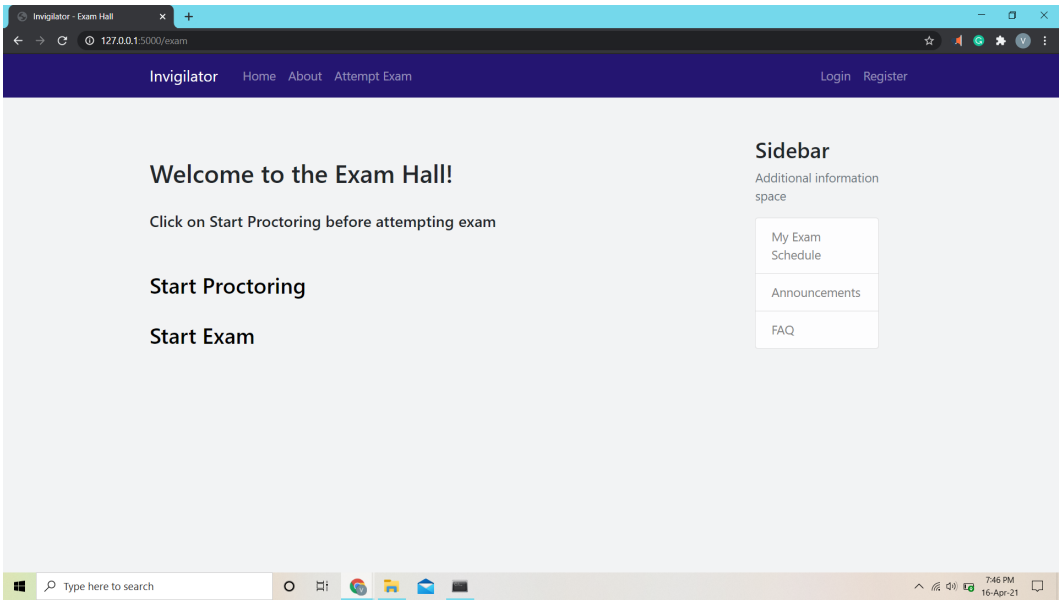
3. Type the following in the command line: 'set FLASK_APP=run.py' → 'set FLASK_ENV=development' → flask run
4. Open local server (http://127.0.0.1:5000/). The Invigilator Web Application gets launched.

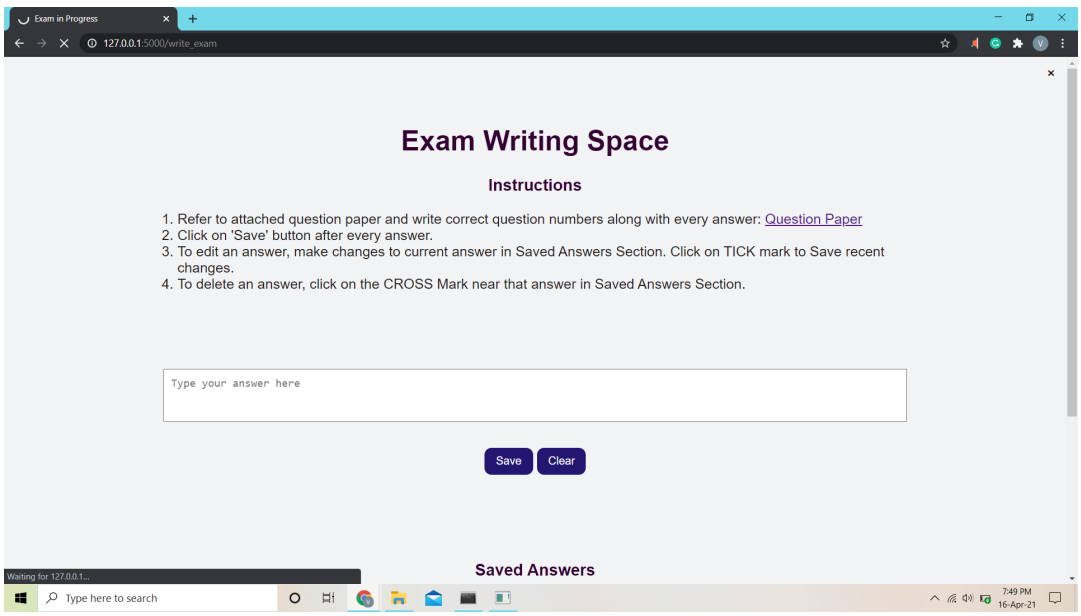


Using the Web Application

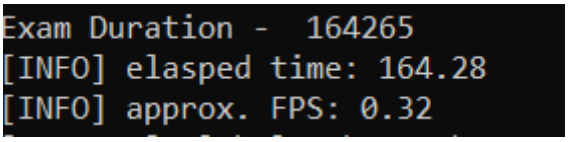
1. To attempt an exam:
   Click on '**Attempt Exam**' Tab in Menu Bar → '**Start Proctoring**' → Camera turns ON → '**Start Exam**' → Read Instructions and write exam referring to Question Paper (Right-Click and Open in New Tab) attached in Instructions Section.

   Note: To view live video capture, open 'frame' () minimized in Task Bar (after 'Start Proctoring' is selected)





2. Once the exam is over, press ‘Q’ key (stops video capture) or ‘Ctrl + C’ (deactivates app). Exam Duration (in milliseconds) is shown on Anaconda Prompt:



   Calculations show that it takes at least 2 seconds to read or view the output.

3. Go to the base directory. All image frames captured during the exam are stored in the form of .jpg files. A new *Gazing_instances.csv* file is created in the base directory, where head twisting, gazing, several people, etc. are saved with the respective timestamps.

   Note:
   a. The Gazing_instances.csv file of every student can be coded to be automatically sent to the Invigilator at the end of the exam for tracking purposes. The .csv files of all students taking a course can be compiled as a single file for ease of use.
   b. This file has to be closed during the exam to work successfully. Else, it will prevent the app from starting.

Future Prospects

1. Back-end of Database for managing Registered Students and Login information is yet to be developed
2. Back-end development of software that enables it to be implemented with Moodle. The Front-End, which is the proctoring software and web pages of the application are complete.
3. Submit button and related back-end in Exam Writing Space is to be added.
4. Live proctoring has to start automatically when the student starts the exam.
5. Since students can switch off live proctoring easily using the ‘Q’ key, an alternative has to be identified that integrates this to the Submit button.