



Project Report

Deploy

Welcome to PandaProctor

Please choose your login type

I want to Log in as:

☒ Student ☐ Admin

Username

Enter username

Password

Enter password

Login

Register

Mamoona .

PandaProctor

A Streamlit-Based Client-Server Quiz Application Using Socket Programming

Github link of project: <https://github.com/Mamoonalatif/OnlineExaminationSystem/tree/main>

- **Introduction**

This report presents the development and implementation of "PandaProctor," a real-time quiz-based client-server application built using Python's socket programming and Streamlit. The project aims to provide an interactive quiz-taking environment for students, featuring login/registration, quiz administration, and real-time communication with a backend server.

- **Objectives**

- To design and develop a reliable client-server model using Python sockets.
- To integrate Streamlit for a modern and user-friendly frontend interface.
- To enable real-time quiz participation and result tracking.
- To implement secure login and registration functionalities.
- To allow admins to manage quizzes and monitor student scores.

- **Tools & Technologies Used**

- **Programming Language:** Python 3.x
- **Frontend:** Streamlit
- **Backend Communication:** Python Socket Programming
- **Data Storage:** CSV files

- **System Architecture**

The application is divided into two major components:

Server:

- Listens for client requests continuously using sockets.
- Processes commands such as login, register, fetch questions, save scores, etc.
- Stores and retrieves data from CSV files.

Client (Streamlit):

- Displays UI for login, registration, quiz, and admin dashboard.
- Sends requests to the server using a socket connection.
- Displays quiz questions, receives answers, shows feedback, and plots student performance.

• Functional Modules

Login/Registration:

- Users can register with unique usernames.
- Login checks credentials against stored CSV records.

Quiz Participation:

- Students can select and attempt quizzes.
- Answers are validated, and scores are stored.

Admin Panel:

- Admin can view student scores.
- Add, delete, or update quiz questions.
- Visualize overall class performance.

Admin Dashboard UI

Panda Proctor Admin Dashboard

Navigation

- Dashboard
- Manage Questions
- Settings
- Log Out

Choose Action

- Display Questions
- Add Question
- Modify Question
- Delete Question


Manage Questions

Existing Questions

ID	Text	Options
0	1 What is the time complexity of Binary Search?	$O(n)$ $O(\log n)$ $O(n^2)$ $O(1)$
1	2 Which data structure is used to implement a queue?	Array Linked List Stack Heap
2	3 What is the space complexity of Merge Sort?	$O(n)$ $O(\log n)$ $O(n \log n)$ $O(1)$
3	5 What is the time complexity of QuickSort in the worst case?	$O(n)$ $O(n \log n)$ $O(n^2)$ $O(\log n)$
4	7 What is the best-case time complexity of Bubble Sort?	$O(n)$ $O(n \log n)$ $O(n^2)$ $O(1)$
5	8 What does BFS stand for?	Breadth-First Search Binary First Search Breadth-First Search Binary First Search
6	9 What is the space complexity of the Breadth-First Search algorithm?	$O(n)$ $O(n \log n)$ $O(\log n)$ $O(1)$
7	10 Which of the following is a divide and conquer algorithm?	QuickSort Bubble Sort Selection Sort Insertion Sort
8	11 Which of the following is the correct syntax for a for loop?	for(i=0; i<S; i++) for(i=0; i<S; i++) for(i=0; i<S; i++) for(i=0; i<S; i++)
9	12 What is the correct data type to store a single character in C++?	char int string float

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Panda Proctor Admin Dashboard



Navigation

- Dashboard
- Manage Questions
- Settings
- Log Out

Choose Action

- Display Questions
- Add Question
- Modify Question
- Delete Question

Manage Questions

Add New Question

Question ID

1

Question Text

Options (separate with '|')


Correct Answer

Concept

Deploy

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Panda Proctor Admin Dashboard



Navigation

- Dashboard
- Manage Questions
- Settings
- Log Out

Choose Action

- Display Questions
- Add Question
- Modify Question
- Delete Question

Manage Questions

Modify an Existing Question

Select Question ID

1

Question Text

What is the time complexity of Binary Search?

Options (separate with '|')

$O(n)|O(\log n)|O(n^2)|O(1)$

Correct Answer


B

Concept

Deploy

<

Panda Proctor Admin Dashboard



Navigation

- Dashboard
- Manage Questions
- Settings
- Log Out

Choose Action

- Display Questions
- Add Question
- Modify Question
- Delete Question

Manage Questions

Delete a Question

Select Question ID to delete

1

Delete

Deploy

- **Socket Communication Protocol**

The client and server communicate using a simple JSON-based protocol over sockets. Each message contains an "action" field along with associated data.

Sample Request:

```
{  
  "action": "login",  
  "username": "student1",  
  "password": "1234"  
}
```

Sample Response:

```
{  
  "status": "success",  
  "message": "Login successful"  
}
```

- **Error Handling & Validation**

- Client side: Invalid input warnings, empty field checks.
- Server side: User existence checks, duplicate registration prevention.
- Robust error handling for socket disconnections and timeouts.

- **Security Measures**

- Passwords are matched securely during login.
- Limited access: Admin-only features are protected.
- Input sanitization to avoid malformed data.

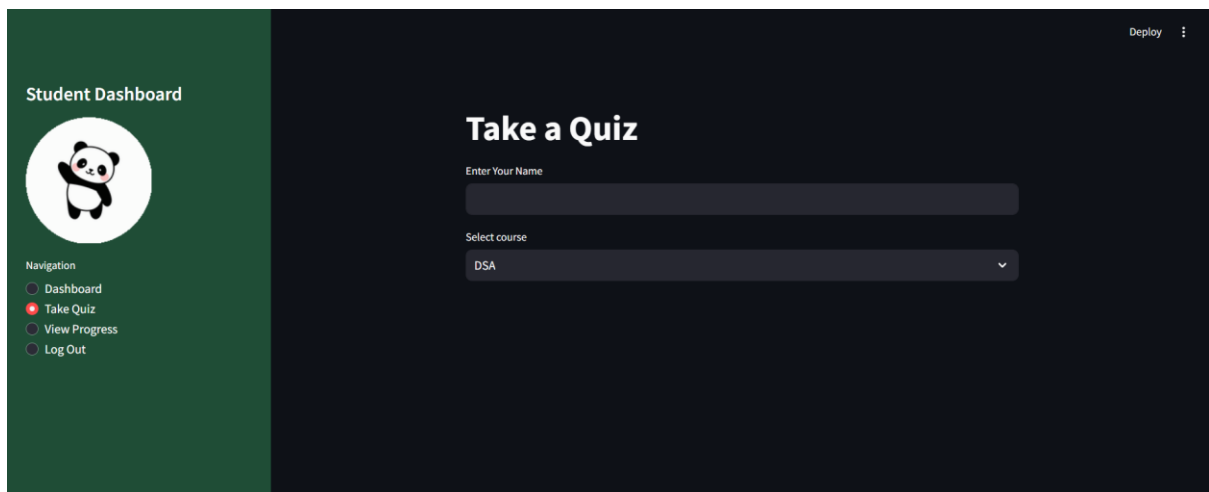
Output

Login and Registration Page

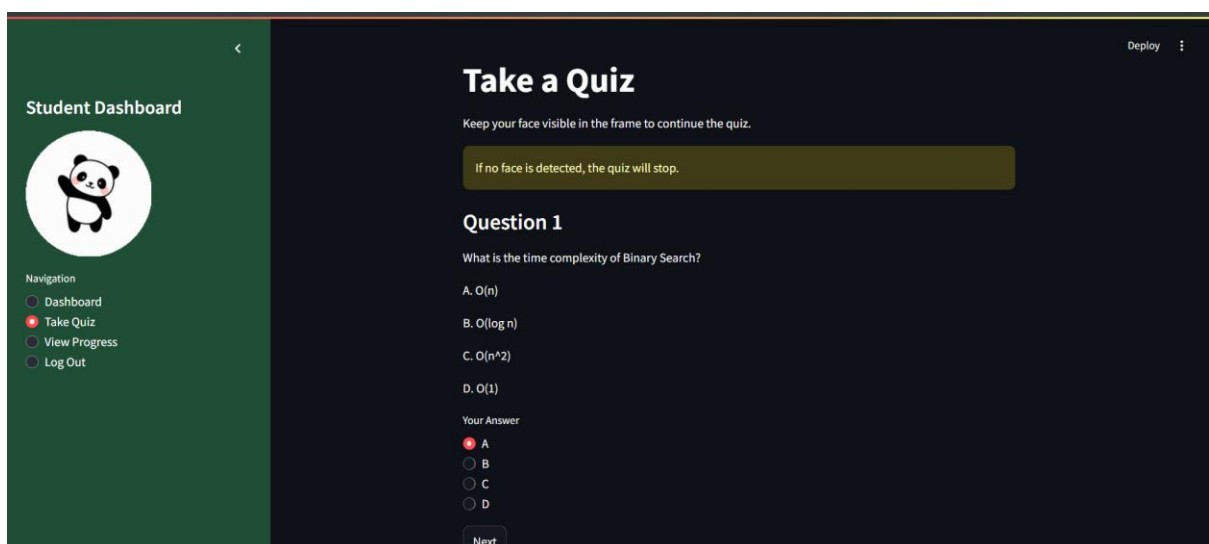


The screenshot shows the PandaProctor login and registration interface. At the top, a dark blue header contains a 'Deploy' button and a menu icon. The main background is yellow with a large, 3D-rendered panda character on the right. The text 'Welcome to PandaProctor' is centered at the top. Below it, the 'Register' section is active, showing 'Register as:' with radio buttons for 'Student' (selected) and 'Admin'. There are input fields for 'New Username' (placeholder: 'Choose a username') and 'New Password' (placeholder: 'Choose a password' with an eye icon for toggling visibility). At the bottom of the form are two buttons: 'Submit Registration' and 'Back to Login'.

Student Quiz Panel

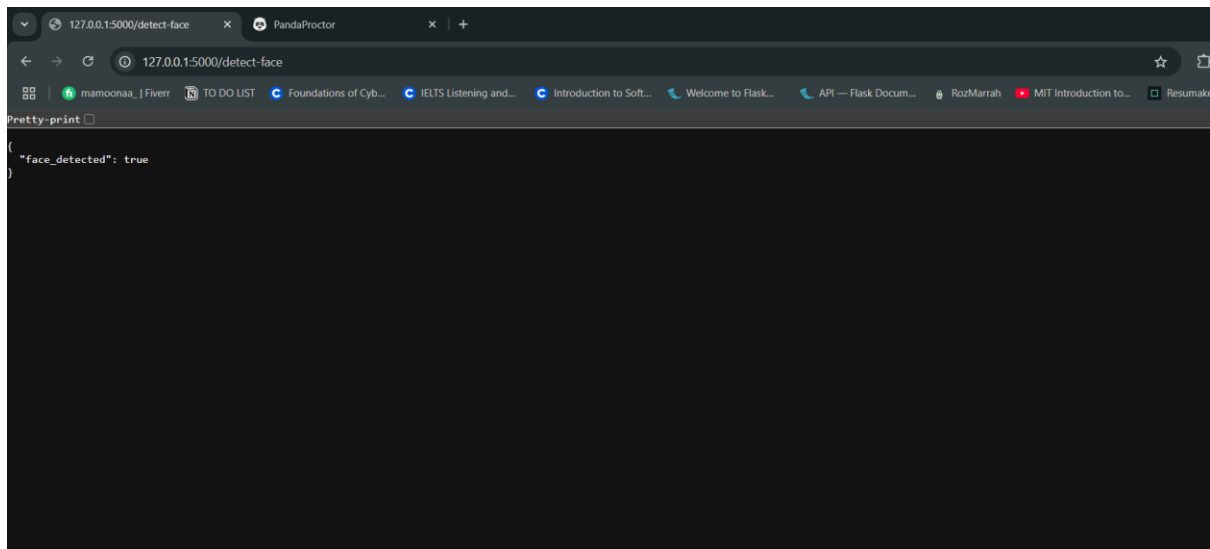


The screenshot shows the 'Take a Quiz' panel for a student. On the left is a dark green sidebar titled 'Student Dashboard' with a panda icon and a navigation menu: 'Dashboard', 'Take Quiz' (selected), 'View Progress', and 'Log Out'. The main area has a dark blue background with the title 'Take a Quiz'. It includes an 'Enter Your Name' input field and a 'Select course' dropdown menu currently set to 'DSA'. A 'Deploy' button and menu icon are in the top right corner.



This screenshot shows the quiz interface in progress. The sidebar remains the same. The main area is titled 'Take a Quiz' and includes a face-detection instruction: 'Keep your face visible in the frame to continue the quiz.' Below this is a yellow warning box that says 'If no face is detected, the quiz will stop.' The first question is 'Question 1: What is the time complexity of Binary Search?' with four multiple-choice options: A. $O(n)$, B. $O(\log n)$, C. $O(n^2)$, and D. $O(1)$. Under 'Your Answer', option A is selected. A 'Next' button is at the bottom.

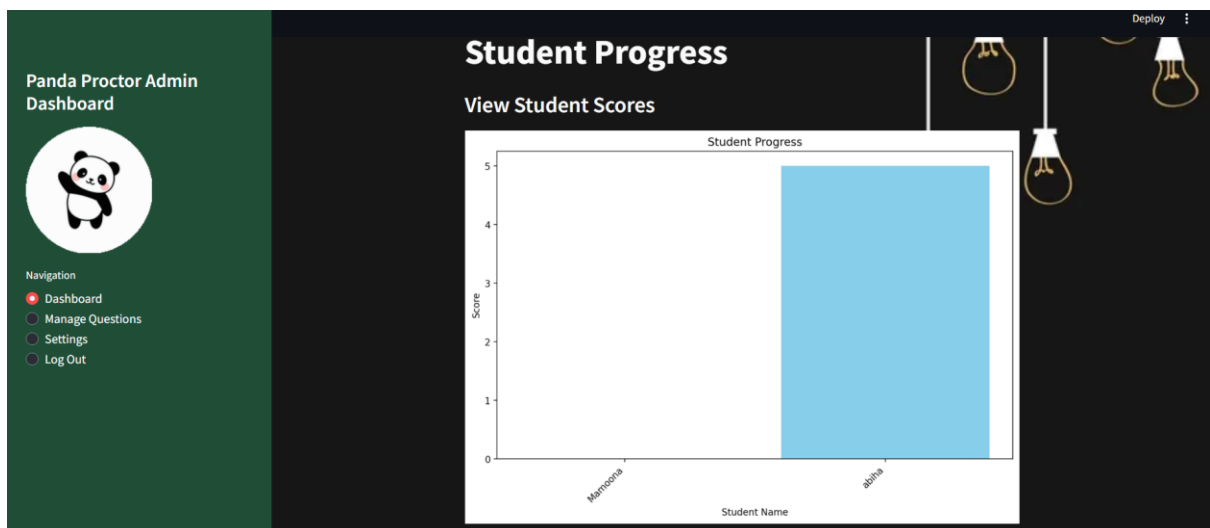
Detect-face function running in background



The screenshot shows a web browser with the address bar at `127.0.0.1:5000/detect-face`. The browser tabs include "PandaProctor" and several other open pages. The main content area displays a JSON response from a REST client, with a "Pretty-print" button. The response is:

```
{
  "face_detected": true
}
```

Admin Dashboard with Performance Graphs



Challenges Faced

- Implementing real-time communication using sockets in a Streamlit environment.
- Maintaining session states across socket requests.
- Managing CSV-based storage without concurrency issues.

Conclusion

The project successfully demonstrates the creation of a real-time quiz system using socket programming and a modern UI via Streamlit. It highlights the practicality of network communication and client-server models in academic applications. With further improvements like database integration and encryption, it can be scaled for larger use cases.

- **Future Enhancements**

- Migrate from CSV to a database system (e.g., SQLite or PostgreSQL).
- Add timer functionality for quizzes.
- Introduce student feedback and result history tracking.
- Implement authentication and encryption.

References

GeeksForGeeks. *SocketProgramming In Python*. n.d.

<https://www.geeksforgeeks.org/socket-programming-python/>.

streamlit.io. *Streamlit Documentation*. n.d. <https://docs.streamlit.io/>.