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Smart Teacher (Automated Assignment Evaluator)

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Abstract: - This research paper presents the design and implementation of an Automation Tool named as "Smart Teacher" designed using Python. It is a project aimed at automating the grading process for students' coding assignments, alleviating the manual workload of instructors, and providing timely feedback to students. This tool evaluates students' source files and delivers results or grades accordingly. The project offers code evaluation in various languages, granting students the flexibility to write code in their preferred programming language. The paper discusses the challenges faced during the development process and the solutions that were implemented to overcome them.

Keywords: - Web Application, Flask, Subprocessing, Automation, Grading, Python

I. INTRODUCTION

In today's fast-paced world, automation systems play a crucial role in education by offering numerous benefits that align with the demands of modern learning environments. This project is designed to eliminate faculty's Manual work, inconsistency, and subjectivity in grading students' coding assignments, decreasing workload and stress. It primarily targets educators, instructors, and academic institutions across various educational levels. The faculty simply needs to log in and grant students access to upload their files for grading. Students can upload a zip file containing all their files and subsequently review their grades on their respective profiles. The website or platform is straightforward to navigate and does not necessitate any prerequisite knowledge for utilization.

II. PROBLEM FORMULATION

In IT field education, learning coding is crucial as it forms the foundation for understanding how software works and how to create innovative solutions to real-world problems as a fundamental aspect of their learning journey, students are assigned numerous coding assignments throughout their degree tenure to hone their skills and deepen their understanding of coding principles. These assignments serve as invaluable practice sessions, allowing students to reinforce theoretical concepts through practical application. The challenge is how professors can efficiently review and evaluate assignments from many students and provide feedback to students within a limited timeframe, manually checking each coding assignment for every student would impose a significant burden on faculty members, consuming valuable time and resources. To alleviate this challenge, automation tools for grading coding assignments can be employed. These tools streamline the grading process by automatically analyzing students' code submissions based on predefined criteria and evaluation rubrics. Overall, embracing automation for grading coding assignments enables faculty members to focus their time and expertise on providing targeted support and guidance to students, ultimately enriching the learning experience.

III. LITERATURE REVIEW

LeetCode is an online platform for coding interview preparation. The service provides coding and algorithmic problems intended for users to practice coding. LeetCode has gained popularity among job seekers and coding enthusiasts as a resource for technical interviews and coding competitions. Leetcode uses the same algorithm to test the driver's code against various test cases to test the accuracy of the source code.

The execution of source code against various test cases is a critical phase in the software development process, ensuring that applications perform as expected under different scenarios. This testing phase encompasses several steps, methodologies, and objectives aimed at verifying the code's correctness, efficiency, and security.

Online assessment platforms have revolutionized the way programmers learn, improve, and showcase their coding skills. These platforms offer a wide range of services, from interactive coding assignments to competitive programming challenges, and have become integral to both educational sectors and the software industry. This literature review synthesizes research findings, and practical observations about online coding platforms, highlighting their educational value, community impact, and challenges.

IV. METHODOLOGY

The methodology involves explaining how the tool or platform works, what features it has, and how the system is designed. This tool is essentially a website that starts with a login page offering two options: logging in as a user or logging in as a faculty. For faculty login, upon accessing the website, they are directed to a dashboard where they have the option to create an assignment. When a faculty member clicks on this option, they are prompted to enter the required information such as the assignment name, and the number of questions, and to upload both the sample test cases file and the output file for evaluating students' code. On the other hand, when students log in to the website, they are directed to their dashboard, where they can see the assignments assigned to them by their respective faculty members. Upon opening an assignment, students are given the option to upload a file. In this section, students are required to upload a zip file containing all their source code instead of individual files, which helps lessen the burden of uploading multiple files separately. The student simply needs to upload the file and click on the submit button, and they are all set. Once they click the submit button, the tool automatically conducts the entire evaluation process. The score or grade is then sent directly to the student's profile. They can easily view their marks on their dashboard. This was all about the user flow, and steps taken by the user to perform their task on the website.

The common tools were utilized for the development. For the front end, I employed HTML, CSS, and JavaScript. These languages are fundamental for creating the visual and interactive elements of a website. For the backend, I utilized Python, a versatile programming language known for its ease of use and extensive libraries. Specifically, I employed Flask, a web framework for Python, to streamline the development process. Flask provided the necessary tools and structure to build robust backend functionalities for our web application. By leveraging these tools, we were able to efficiently develop our project.

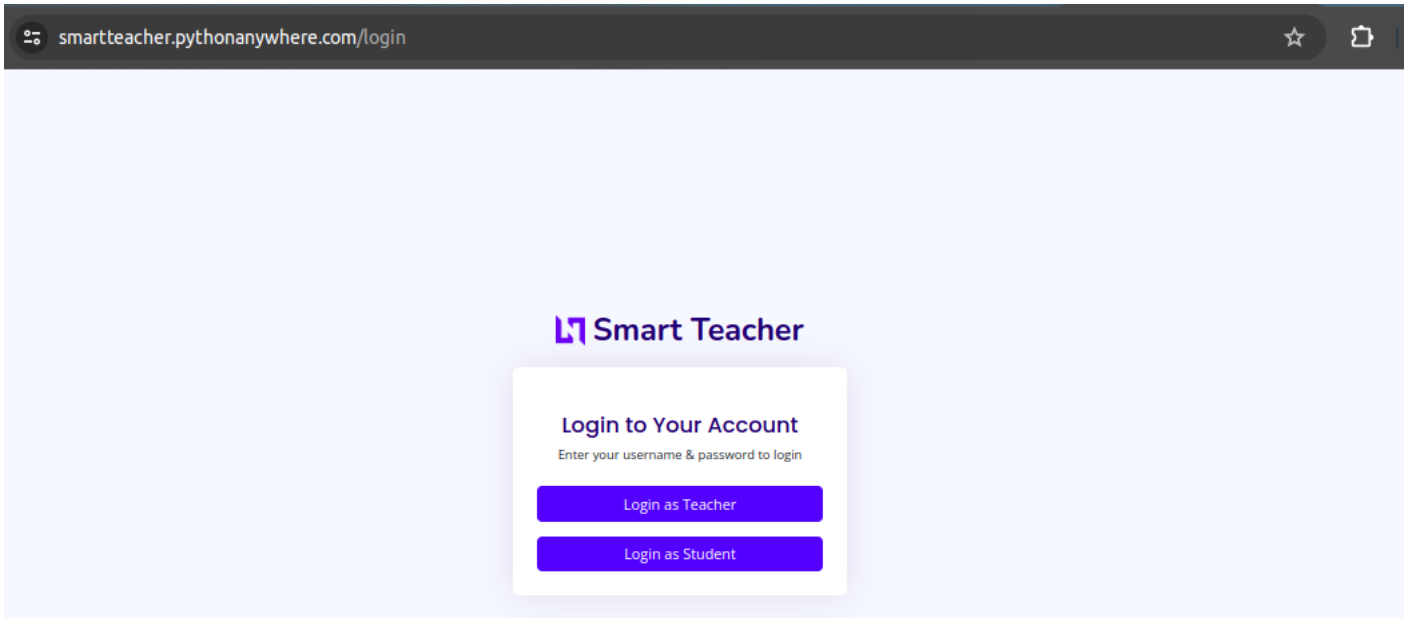

Figure -1: Representation of login page for students and teachers to view their respective dashboards

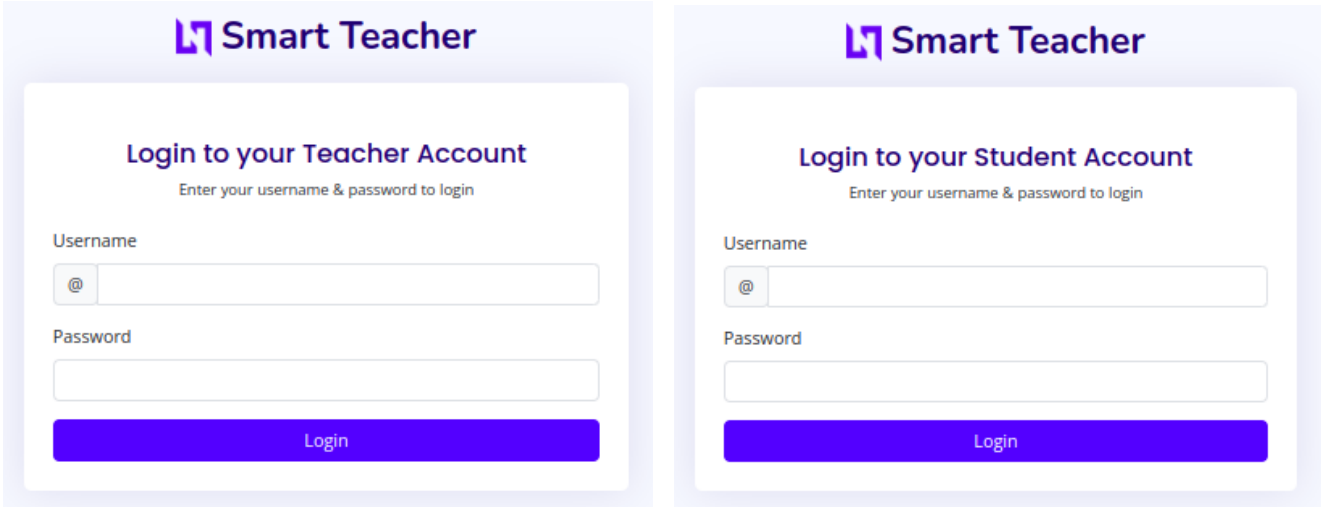

Figure -2: Representation of credentials authentication for both students and teacher

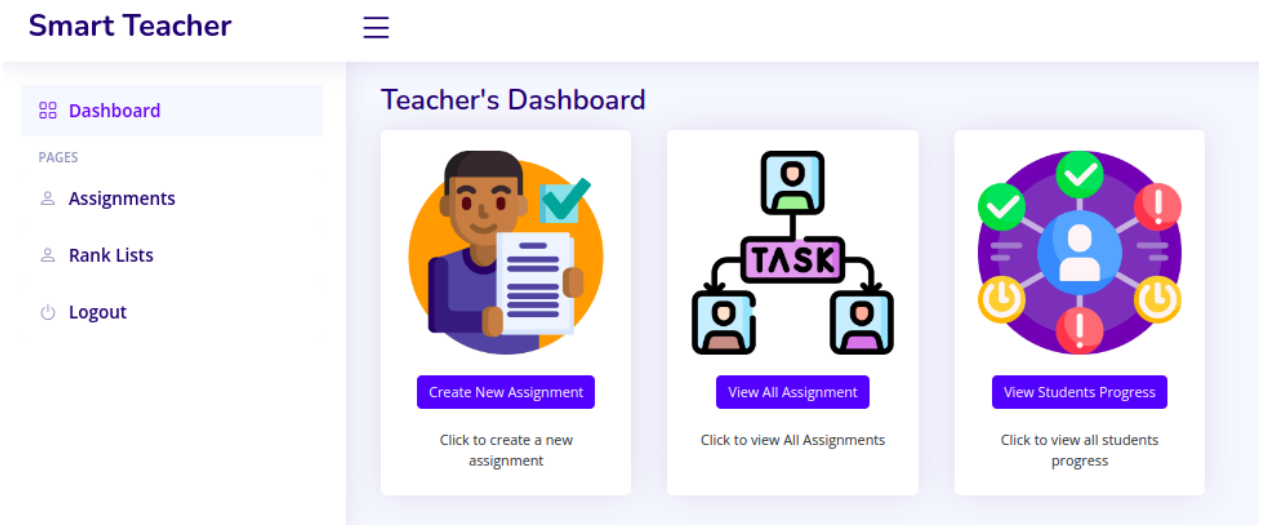

Figure -3: Representation of the teacher's dashboard to create, view, and track the status of assignments.

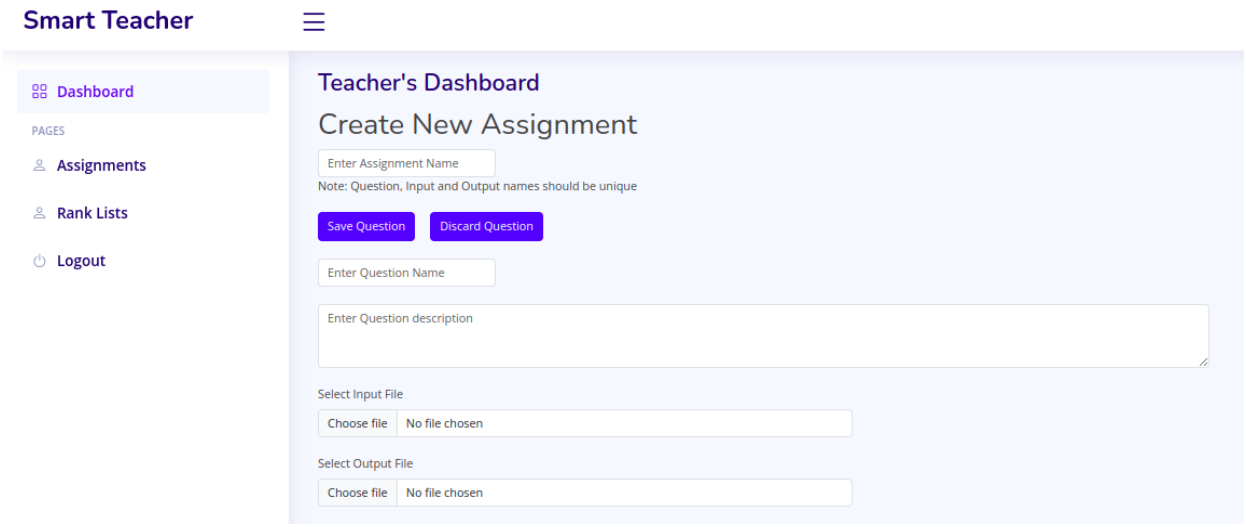

Figure -4: Representation of the assignment creation page

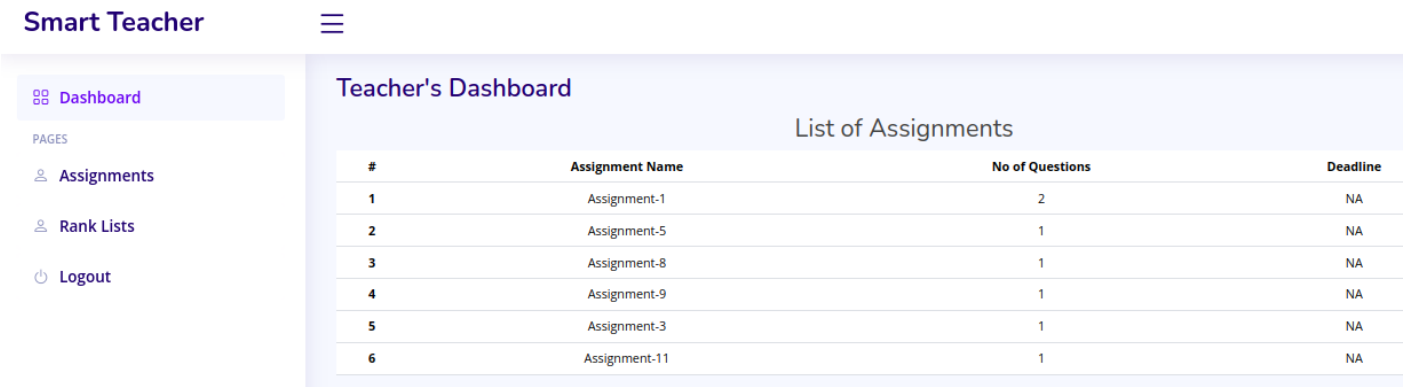

Figure -5: Representation of the list of assignments

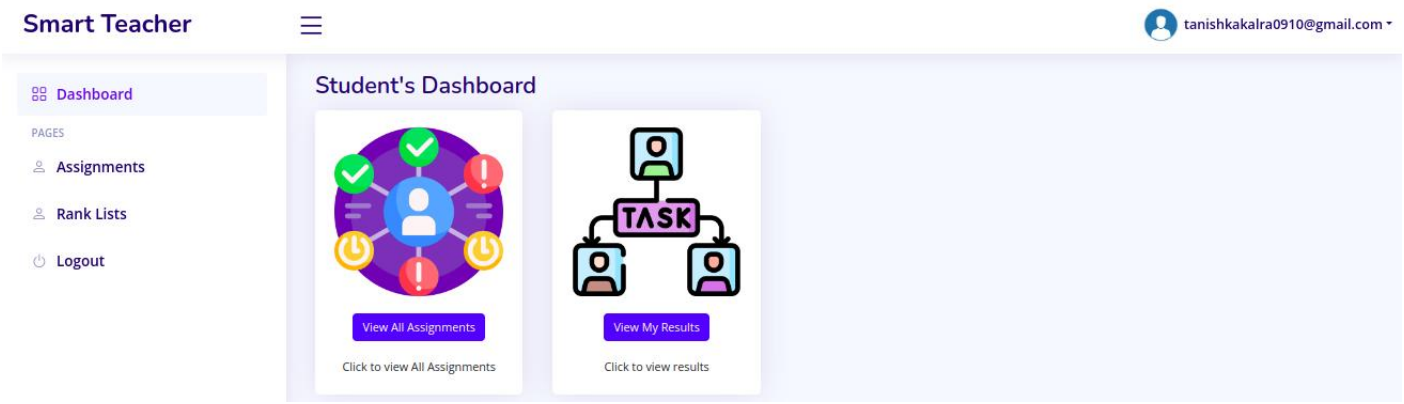

Figure -6: Representation of the student's dashboard

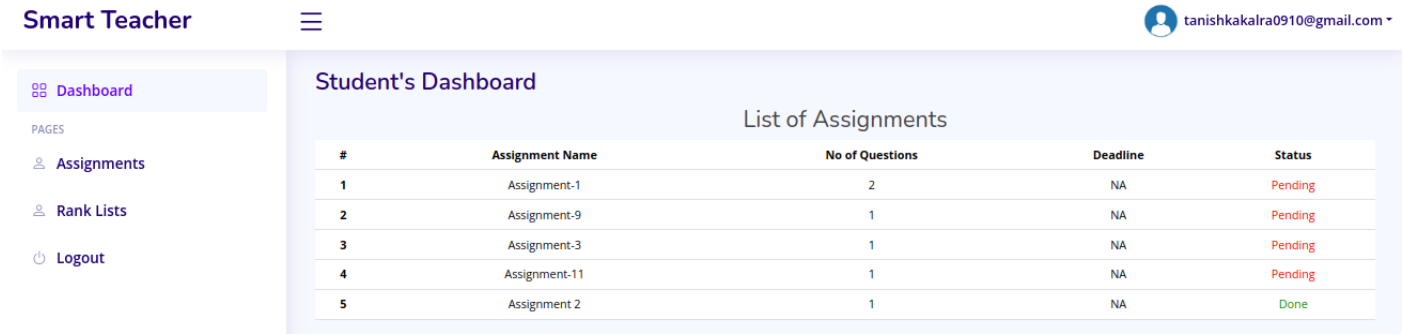

Figure -7: Representation of the assignment assigned to the student and their status

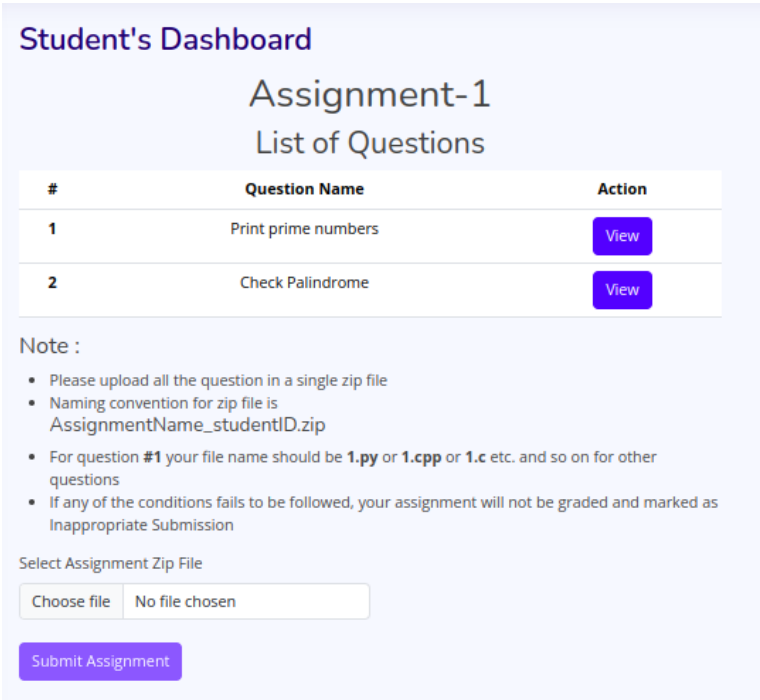

Figure -8: Representation of the submission page of the assignment

V. CONCLUSION

This project comes under the category of Software development and web application development. Overall, Smart Teacher provides a powerful and flexible solution for institutions dealing with programming data structures and algorithms. I will be looking to improve performance, security, and scalability in the future. While there may be some challenges associated with execution time and timeout for the source files uploaded by the students, those cases will be handled in the next release.

VI. ACKNOWLEDGMENT

The success and outcome of this project required a lot of guidance and assistance from many people and I am extremely privileged to have got this all along with the completion of my project. All that I have done is only due to such supervision and assistance and we would not forget to thank them.

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VII. REFERENCES

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[2] **https://flask.palletsprojects.com/en/3.0.x/**

[3] **https://api.jquery.com/**

VIII. BIOGRAPHIES

I am Tanishka Kalra, a Final Year Student at Acropolis Institute of Technology and Research, Indore, India. My area of interest is software/product development. I am curious about various domains such as Backend Development, Data Analytics, and Salesforce. I have an internship experience of 6 months, and looking forward to contributing and learning in the field of software development.
I am keen on solving problems with technology and thus I solve problem statements on various coding platforms such as Leetcode, Geeksforgeeks, and Hackerrank.