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# A Web-Based Platform for Predicting Student Careers using Machine Learning with Learning Resources for Computer Science Domains

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***Abstract:*** ***A web-based application designed to help students and enthusiasts learn computer science fundamentals, where they can test themselves on basic computer science and domain-specific questions which will help them to know their strengths and weaknesses. They can also receive suggestions and roadmaps for their preferred career path. Advanced Machine Learning techniques are used in this application. These learning resources can assist and guide students to pursue various domains according to their affinity and preference.***
***Keywords: Predictive Classification, Career Development, Data Analysis, Aptitude Test, Career Roadmap, Job Role Exploration***

## I. INTRODUCTION

In today's fast-paced digital world, where technology is advancing at an exponential rate, choosing the right career path can be a daunting task for students. With numerous career options available, students often find it challenging to make informed decisions and to find learning resources in one place. To address this issue, we present an online career prediction system that uses skill assessment tests and machine learning techniques to suggest a suitable career domain for students, along with learning resources to pursue their interests. This web-application will focus on domains in the software industry and computer science.

Our system provides students with an interactive platform that allows them to take skill assessment tests in different subject areas, including computer fundamentals, networking, programming, database skills, and more. The tests are designed to evaluate students' knowledge in these subjects and provide them with a score based on their performance. Using machine learning algorithms, we analyze the test results and suggest a career domain that aligns with their strengths and interests.

To further assist students in their learning journey, our system also provides links to study resources for the subjects covered in the tests. Additionally, we will offer links to specific career domains along with their learning paths, enabling students to explore and learn about potential career options.

## II. LITERATURE REVIEW

In the research paper titled “Need for Study and Career Counseling in Computer Science”, The paper highlights the significance & impact of study & career counseling for computer Science Students. The difficulties & challenges the students face when trying to advance in this field are discussed. The counseling has benefits like developing crucial Skills for their Paths. Overall, the authors advocate for increased importance of counseling to help students make informed decisions & succeed in their field.

The research paper titled “"Career Development: The Use of Aptitude Tests" by S. S. Asnani and S. P. Singh” discusses the value and need of aptitude tests in career development for the students, including its part in helping the students to find and recognize their strengths and weaknesses, selecting the suitable career paths, and develop the necessary skills for advancement in the said career path. The authors also argue the challenges associated with the use of aptitude tests, such as reliability, validity and test bias and recommend that the aptitude tests be held along with other career advancement tools such as career counseling.

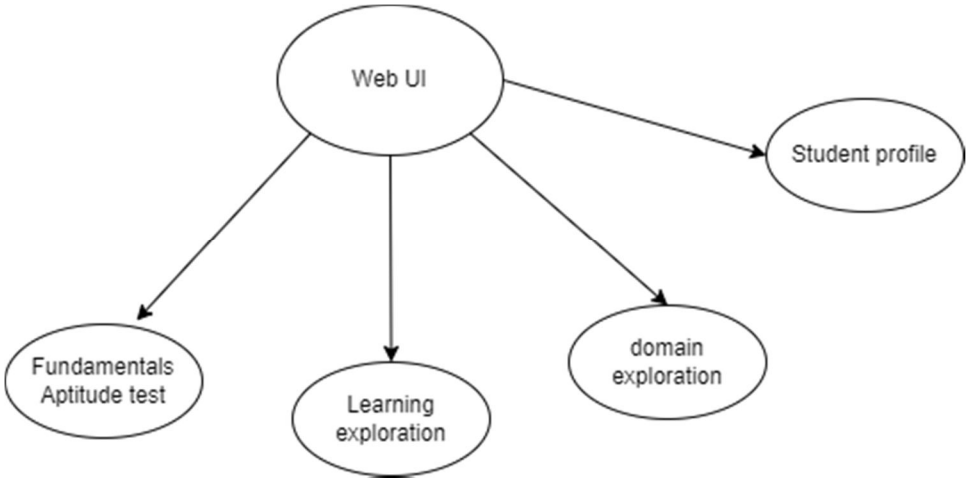
## III. METHODOLOGY

### *A. Web User Interface*

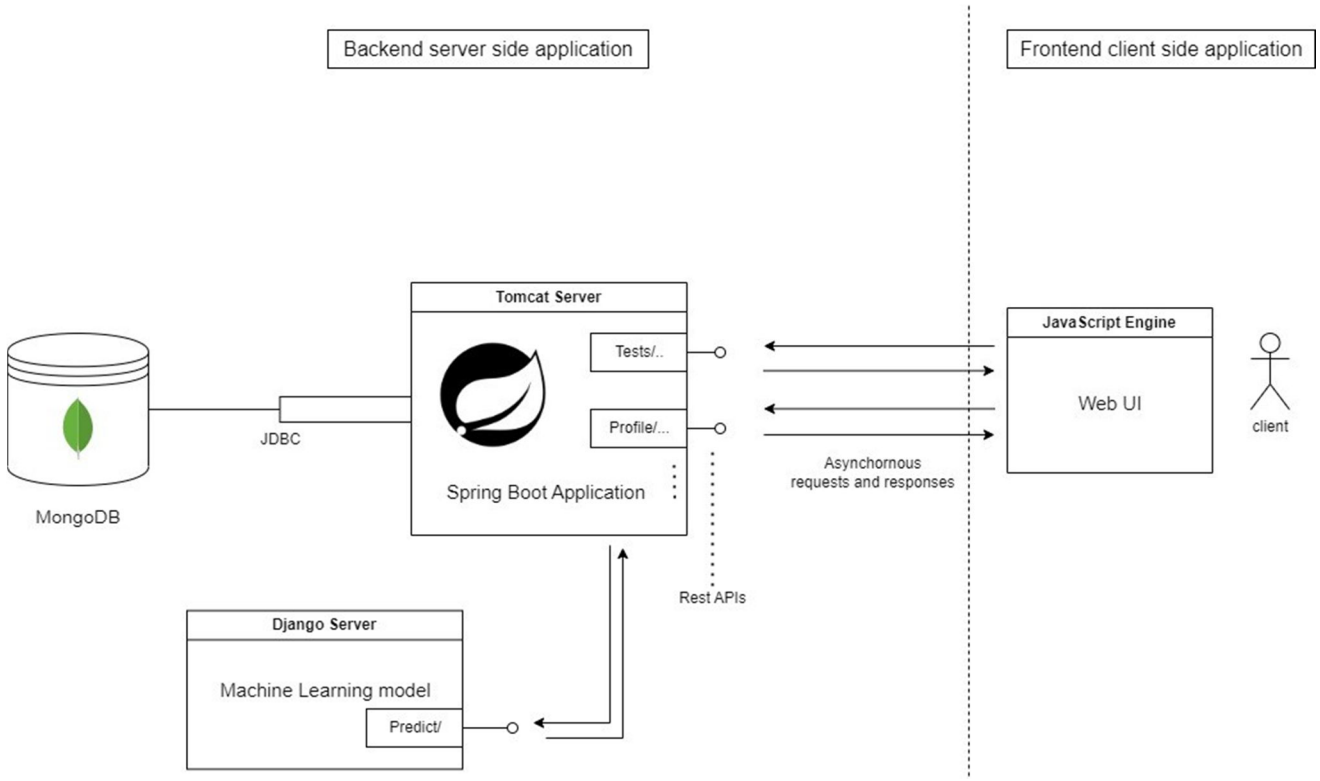
The Web UI will help the user navigate to various pages of the web application, they can visit the fundamentals aptitude test page where they can give the test to check out which domain, they are suitable for. They can head over to the learning resources tab where they can go through various learning resources for different subjects and technologies.

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They can also navigate to domain exploration tab where they can see various learning paths and technologies and get information as to how to pursue career in those domains. A student profile page will also be visible where the student can track his learning progress and test history.




*B. Architecture*




*1)* The client-side application will be developed using React JS which is a popular JavaScript framework used to design interactive web pages, it will run on any browser that supports running JavaScript.

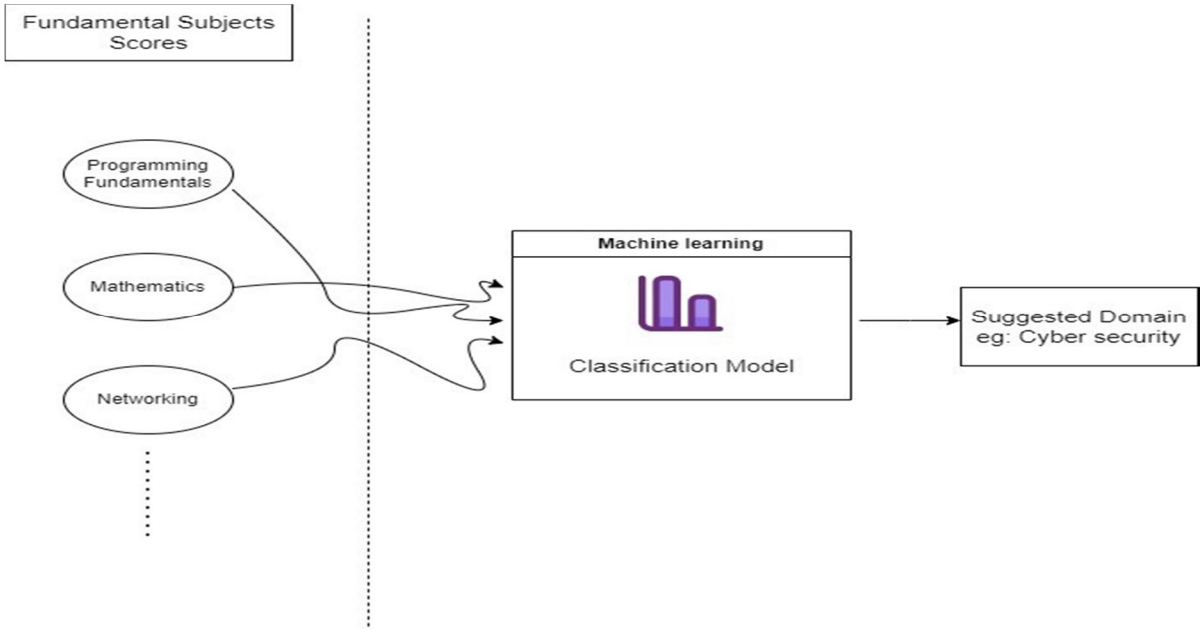
*2)* The Backend will be communicated with the help of Rest APIs by the frontend by asynchronous API calls which will exchange data in JSON (JavaScript Object Notation) format. These APIs along with the application logic modules will be developed using Spring Boot which will run on a Tomcat server.

*3)* The machine learning classification model will be deployed on a Django server running on the same machine but with a different port, the Spring Boot application will communicate with Django server using API calls to get prediction results by providing subject scores in JSON format and then getting suggested domain as JSON response from the server.

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4) The data storage for the application will be achieved by using the MongoDB NoSQL database running on a different port which will be responsible for storing application data such as student data, test questions etc.
5) Spring Boot application will use JDBC connectors to generate a data pipeline between Mongo DB database and the Spring Boot application.

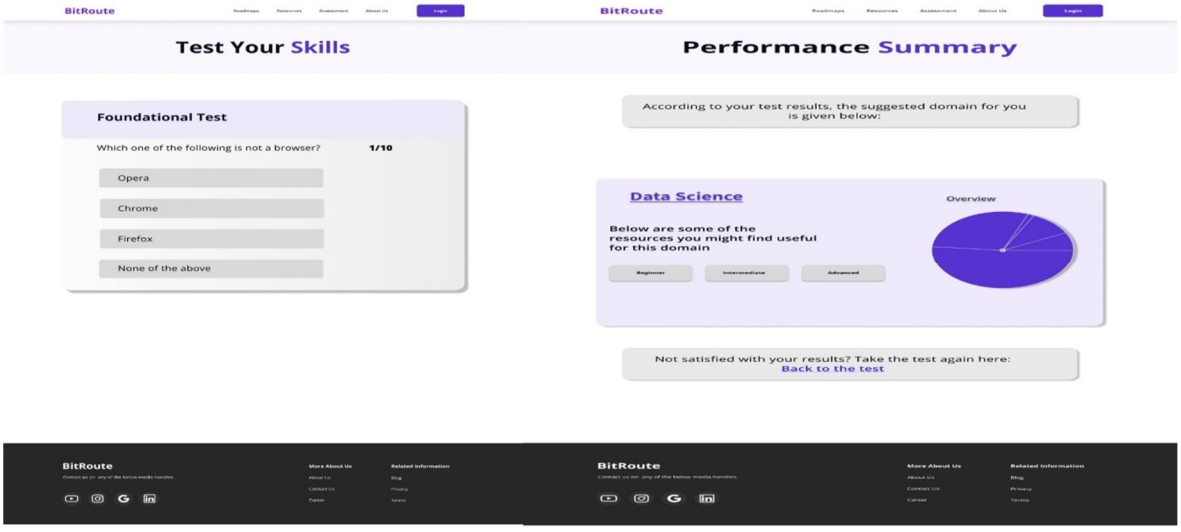
### C. *Classification Model*




The classification model is responsible for providing results for the fundamental aptitude test.
The percentage results of different fundamental subjects will be fed to the model, in return the machine learning classification model will classify the student into the suitable domain. This model will use machine learning methods of classification like decision trees deployed by random forest library in python or logistic regression to achieve classification results based on fundamental subject scores.

### D. *Results*

Below are some generated images that represent the user interface of the web application.



## IV. CONCLUSIONS

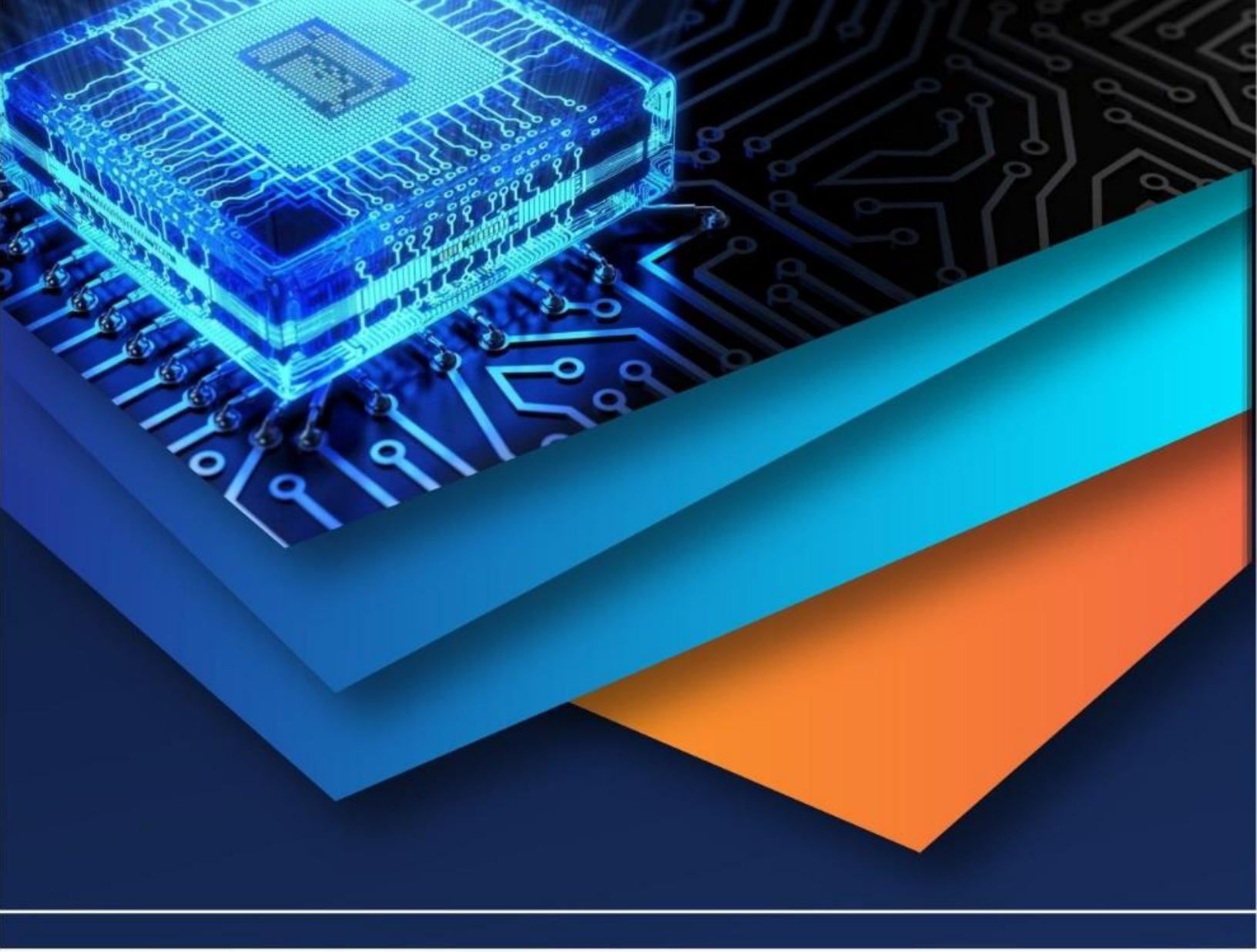
In this survey paper, we observed how a machine learning model-based aptitude test results presented in a web-based platform along with learning resources can assist and guide students to pursue various domains.

## V. ACKNOWLEDGMENT

This endeavor wouldn't have been possible without the following individuals and organizations and their contributions to this research project. Firstly, we would like to express our deepest gratitude to our research supervisor, Prof. Dheeraj Patil, for his patience and guidance throughout this project. We'd like to acknowledge the Department of Information Technology of Nutan Maharashtra Institute of Information Technology for providing and supporting this research project. Lastly, we are also grateful to our colleagues, who provided help for this research project. We appreciate the knowledge and help they brought to this project.
We would like to thank everyone who has been a part of this project.

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