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2024-2025

A PROJECT REPORT

ON

"QUESTION PAPER AI ANALYZER WITH STUDY MATERIAL"

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
IN THE
PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE
OF

BACHELOR OF ENGINEERING (COMPUTER ENGINEERING)

BY

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SCOD 09

2.MR. HITESH SANJAY KHARE

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UNDER GUIDANCE OF

MRS. TRUPTI DESHMUKH

DYP DPU

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DECLARATION OF THE STUDENT

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources.

I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea / data / fact / source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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2024-2025

CERTIFICATE

This is to certify that the project work entitled "**QUESTION PAPER AI ANALYZER WITH STUDY MATERIAL**" is a bonafide work carried out by,

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in the partial fulfilment of the requirements for the subject Project Based Learning (SE , IVth Semester) of degree of Bachelor of Engineering in the Second Year Computer Engineering of Savitribai Phule University,Pune Academic Year 2024-25.

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PROJECT APPROVAL

The project report entitled "QUESTION PAPER AI ANALYZER WITH STUDY MATERIAL" submitted by,

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Is found to be satisfactory and is approved for the Degree of Batchlor of Engineering (Computer Engineering).

MRS. TRUPTI DESHMUKH

Guide

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Date-

Place-

ACKNOWLEDGEMENT

I take this opportunity to thank my project guide **MRS. TRUPTI DESHMUKH** and PBL Lab Faculty **MRS. ASHWINI JADHAV** for providing us the opportunity to implement this project. Our interaction with guide and PBL Faculty has been of immense help in defining our PBL Project work goals and in identifying to achieve them.

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This is a great pleasure and immense satisfaction to express my deepest sense of gratitude and thank to PBL Coordinator, all Computer Department Faculties and thanks to everyone who has directly or indirectly helped us in completing this project work successfully.

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Abstract

In today’s digital era, Digital education has provided the availability of online study material platforms. The existing platforms suffer and contain drawbacks such as poor personalization, outdated content, lack of inactivity and inefficient search functionalities. These limitations affect students' ability to efficiently prepare for exams and learn concepts effectively. To solve this challenge, we developed the AI Driven study material platform that enhances the learning experience through NLP and Machine Learning. This developed system will provide personalized study plan, AI powered chatbot, predictive analysis of question papers, interactive learning tools and a community discussion forum for peer-to-peer learning with self-paced features. Additionally we will offer a well structured, mobile friendly and responsive UI allowing students to study anytime, anywhere.. The students will be able to ask questions, share resources, and engage in subject discussions, creating a community-driven learning experience. Machine learning and NLP are used in the system that will provide the most relevant and optimized study plan as per the use case of the user and the time remaining and preparation deadline. The predictive analysis module helps students to focus on important topics based on past question papers and improve exam preparation and good academic performance. The AI chatbot will be able to provide study plans and mock tests to prepare for examinations. Additionally, an AI-powered chatbot answers queries of the users with subject related issues, suggests relevant YouTube video lectures, provides study plans, mock tests and also helps users in finding relevant resources on our platform.. The goal of the system is to create a smart, easy-to-use platform that helps student’s study better and succeed in their exams and score good marks and excel in their academics.

Keywords- Keywords: AI in Education, Personalized Learning, Study Material Platform, Machine Learning, Natural Language Processing, Predictive Analytics, Chatbot, Exam Preparation, Open Access Learning, Digital Education.

Contents

---INTRODUCTION---

The objective of this project is to develop a comprehensive educational website for university students, providing free study materials, curated YouTube video links, and interactive learning resources. The platform aims to enhance accessibility to quality education by integrating a chatbot for academic assistance and, if feasible, a student community for discussions and knowledge sharing. This initiative seeks to foster collaborative learning, improve academic performance, and create a supportive online ecosystem for students.

1.1 OVERVIEW:

This project provides a study platform leveraging AI technology to support university students in studying curriculum for free and to prepare for exams in an efficient manner through question paper analysis .

Some features include:

AI Chatbot - for academic questions, study plans, and video suggestions .

Question Paper Analysis - a tool that uses NLP ML to predict major exam topics covered.

Personalized Learning - a suggested concept/distance based on student needs.

Study Hub - a calender for notes/books/previous papers (i.e. Google Drive storage).

Community Forum - a space for students to support each other with answers to questions, unexpected studying scenarios, and student feedback.

Secure and Scalable Tech Stack- uses React, Node.js, FastAPI, MongoDB, and Vercel.

The platform represents an accessible, self-pacing, and collaborative for university students to study smartly and prepare for better performance.

1.2 BACKGROUND:

With the advent of online education, numerous websites provide study material but with limitations such as inadequate personalization, irrelevant content, and restricted access because of the high subscription fees. Students, particularly during examination times, find it difficult to get authentic and well-organized resources that suit their individual academic requirements.

1.3 MOTIVATION:

The drive for this project is to narrow the gap between students and high-quality academic content by developing a free, AI-based learning platform. The objective is to enable learning to become more efficient, personalized, and accessible through intelligent capabilities such as a chatbot, predictive question analysis, and personalized suggestions.

1.4 PURPOSE AND OBJECTIVE:

The objective of this project is to create an AI-based centralized study platform offering:

1.Free availability of organized study materials
2.Query resolution using an AI-based chatbot
3.Prediction analysis of question papers
4.Relevant video and material suggestions based on personal needs
5.Peer-to-peer learning and discussion through communities
6.The core goal is making students study efficiently, not painstakingly, and enhancing academic grades with customized learning experiences.

1.5 PROBLEM DEFINATION:

Students are unable to find relevant study materials, particularly during the time of exams. Existing platforms are either not personalized or paid. There is a call for an intelligent, free platform that can study past question papers, suggest suitable resources, and offer AI-based academic assistance in an easy manner.

1.6 ORGANIZATION OF REPORT:

---LETERATURE REVIEW---

Several studies have highlighted the role of **AI and chatbots** in improving digital learning. This section reviews key works that support our project's features.

1. Chatbots in Education: A Systematic Review
Okonkwo & Ade-Ibijola – Analyzes 53 papers on chatbot use in education. Supports AI chatbots for answering queries and improving engagement.

2. Chatbot Adoption in Indian Higher Education
Explores how chatbots enhance student interaction and learning. Validates our chatbot's role in academic assistance.

3. Educational Chatbot Impact
Ait Baha et al. – Shows how AI chatbots improve motivation and knowledge retention. Backs our chatbot's personalized support.

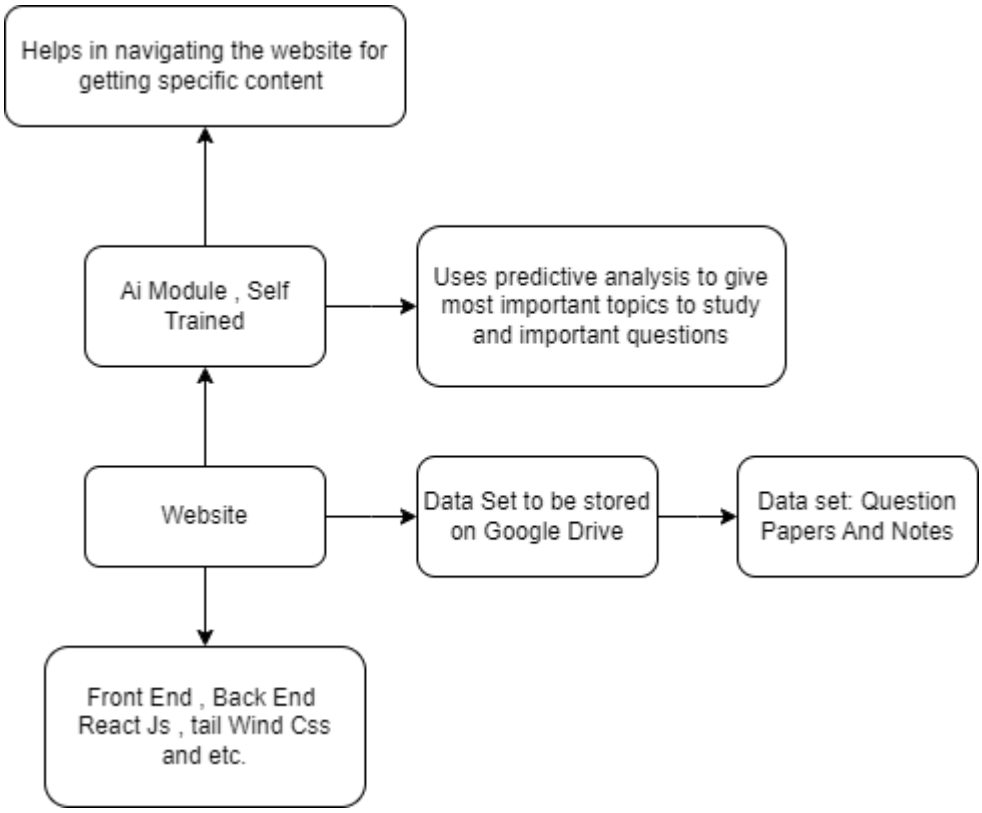
4. Personalized Learning via Machine Learning
Joel Alanya-Beltran – Discusses ML-based recommendation systems. Aligns with our use of AI for video and material suggestions.

5. Community Management System for Learning
Highlights the value of centralized forums for peer discussion. Supports our platform's community-driven approach.

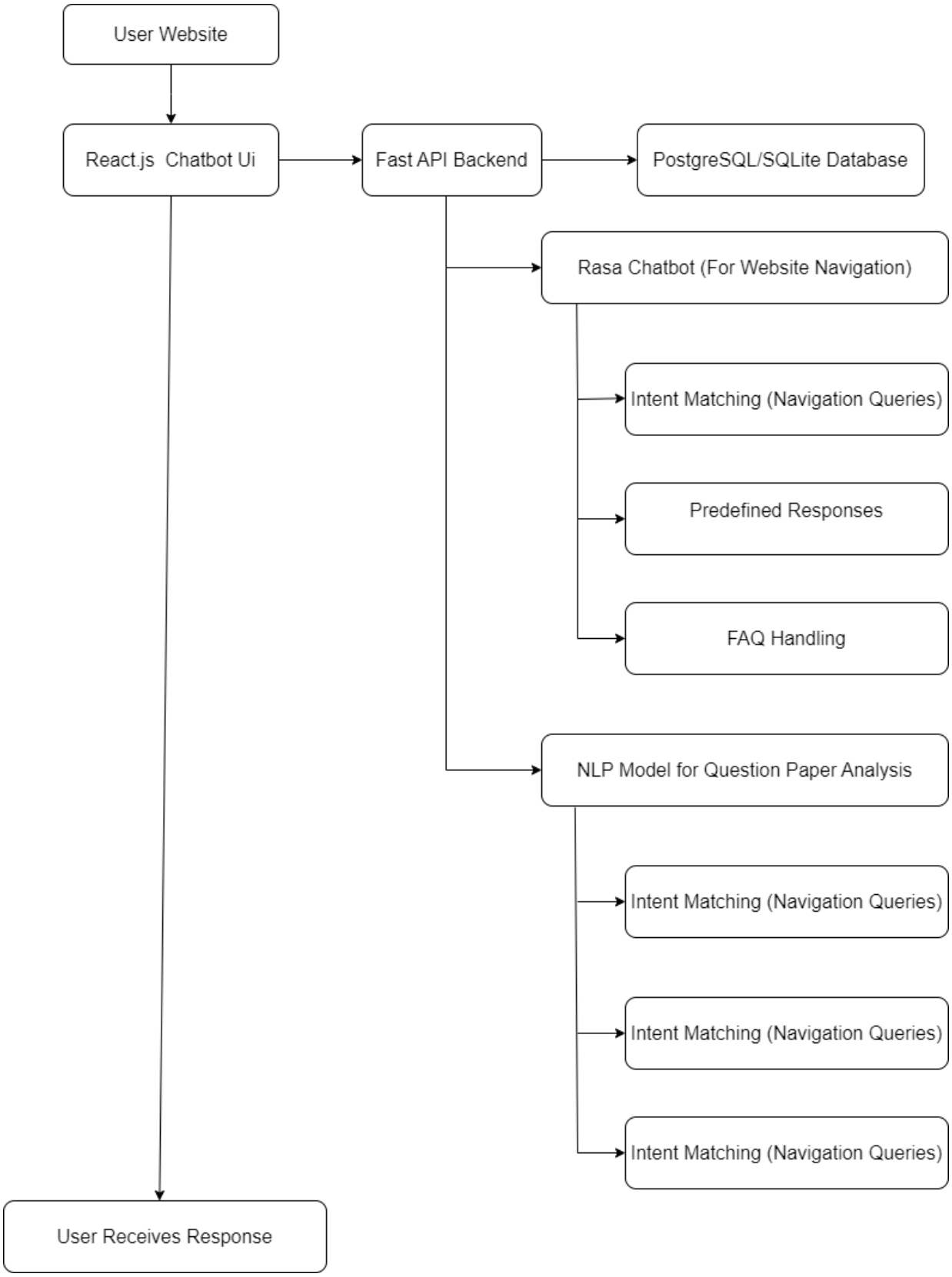
These studies confirm that **AI chatbots, ML recommendations, and collaborative learning** are effective tools in modern education—forming the backbone of our platform.

---SYSTEM DESIGN---

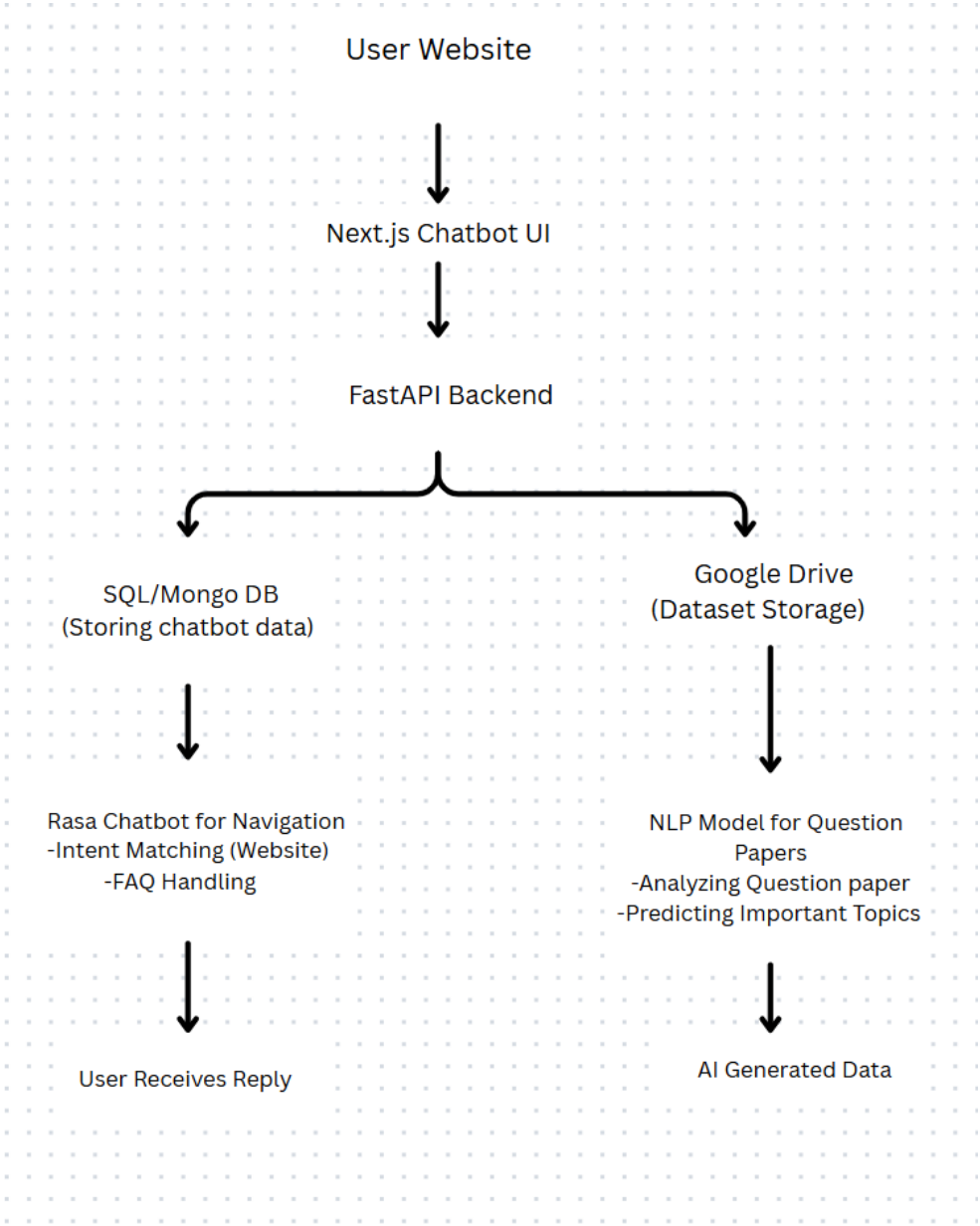
3.1 BLOCK DIAGRAM OF SYSTEM:



3.2 COMPONENTS OF SYSTEM:



3.3 WORKFLOW OF SYSTEM:



---IMPLEMENTATION AND TESTING---

This subsection explains the real development and testing of all features of the study platform powered by AI. The system was built using a combination of modern web technologies, machine learning algorithms, and cloud storage integration.

4.1 Implementation

a) Frontend Development

Built with Next.js and Tailwind CSS styled to create a clean, responsive UI. Features chatbot interface, dashboard, study resource viewer, and discussion forum.

b) Backend Development

Deployed with Node.js, FastAPI, and ML for handling user requests, chatbot queries, and ML interactions .Google Drive API integrated for file storage and retrieval.

c) AI Chatbot (Rasa/ BotPress)

Built using Rasa for NLP-based intent detection and query resolution. Predefined intents for navigation, FAQs, and academic query resolution provided. Integrated with backend for dynamic answer generation and study plan generation.

d) Question Paper Analyzer

NLP pipeline built with spaCy and NLTK. Used TF-IDF and deep learning (BERT/LSTM) to examine question papers and retrieve most asked topics.

e) Recommendation System

Used collaborative filtering to recommend YouTube videos and documents based on user activity and interest. Trained on dummy user interaction datasets for testing.

4.2 TESTING

a) Unit Testing

Chatbot response, API end-points, and form submission units were tested individually using Postman and test scripts in Python.

b) Integration Testing

Ensured smooth interaction between frontend, backend, and AI modules.Verified data transfer from chatbot to backend and correct retrieval of study resources.

c) User Testing

Conducted sessions with students for testing accuracy of chatbot, content recommendation, and ease of use. Employed the feedback in optimizing intent processing and UI elements. Successful testing and implementation of every module ensured functionality, accuracy, and simplicity in use of the platform and brought a reliable and prudent study friend to students.

---CONCLUSION AND FUTURE SCOPE---

5.1 Conclusion:

The project successfully delivers an **AI-powered educational platform** that helps students access **free study materials**, receive **personalized recommendations**, and improve exam preparation through **question paper analysis**. The integration of an **AI chatbot**, predictive analysis, and a community forum makes learning more efficient, interactive, and accessible.

5.2 Future Scope:

- Enhance the **chatbot** with voice input and multilingual support.
- Expand the **recommendation system** using real-time learning behavior.
- Introduce **mobile app support** for broader accessibility.
- Integrate **live classes, quizzes**, and **performance analytics** for deeper learning insights.

---REFERENCES---

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- AI and chatbot development using Official Rasa, TensorFlow,Py PdF2, sckit-learn documentations
- Authentication and security best practices from OAuth documentation.
- Hosting and deployment guides from Vercel and Google Drive.
- Research on student learning challenges and digital education trends