AI-TEXTBOOK ANALYZER APP

SUDESHNA DAS

Date-18-05-2024

Abstract

Textbooks are widely accepted as a common feature of classroom worldwide and are important vehicles for the promotion of the curricula. Consequently, their content and structure are very important for the communication and promotion of a specific vision of the curriculum. There are many features of textbooks, some of which go unknown to the authors, which have significant impact on their target audience. The present paper describes the textbook analyser and e-textbook that uses artificial intelligence (AI) and voice/natural language technologies to analyse a textbook, increase in student learning using e-textbook together with accessibility assessments for the differently abled children to provide inclusion in education. Text book analysis is important as the students in general learning population may have an easier time to figure out how to effectively use the textbook. With the help of AI and Machine Learning the contents, lessons etc can be analysed in depth, which not only helps to do required changes in the present curriculum to meet the optimal of educational outcomes but also helps students and teachers to use the textbook in the best possible way.

1. Problem Statement

The problem statement is to apply Artificial Intelligence in analysing the features of textbook, like the contents, lessons, units etc and provide details like presence of biasness, use of grammar, alternatives to a mathematical problem etc. With of help of natural language processing the textbook analyser can be used as real time tutor by the students for mathematics and English and also will help the differently abled children to learn under the same umbrella. Students often gets stuck while solving a certain problem and quickly refer to available materials to find the solution, but with the help of AI enabled feature it can suggest the different ways a student can head to get the solution. With the NEP 2020 which focused on inclusion in education, it is important to find proper solution to include the special children in a normal school to take education. With the feature of accessibility assessment, a child may easily learn with everyone with same pace.

2. Market/ Customer/ Business Need Assessment

- **Students** in school has a tendency to find two subjects hard to grab: Mathematics for problem solving and English for grammar. As the level increases the difficulties also increases. In such a situation presence of an analyser with AI tutor is of great help.
- The situations where the analyser will be of great help are:

a. The analyser will help to analyse the content, errors etc of the mathematics and English textbook.

b. The analyser will help a student to understand the reason of using grammar in a sentence or lesson. This will greatly help students to understand lessons clearly as well as develop the tendency to use grammar correctly while saying and writing. This will develop the language competency.

- The analyser will analyse the mathematics textbook and first of all filter out error if any. When a student gets stuck while solving a problem the AI tutor can provide the different ways a student can proceed after that step.
- Textbook analyser will help the teachers and educational institutes to design the curricula and choose textbook according to the need.
- The feature of AI textbook with analyser accessibility assessment along will help Government, NGO's, Educational institutions to actively involve the special children in education.

3. Target Specifications and Characterization

Our main target is educational institutions, NGO's, students for self-practice and learning.

4. External Search

- https://huggingface.co/docs/transformers/en/index

The Hugging Face Transformers Library offers pre-trained models for NLP tasks like summarization, translation etc.

- https://www.nltk.org (to work with human data)
- https://github.com/tesseract-ocr/tesseract
- https://cloud.google.com/vision
- TTS and STT: Google Cloud Text-to-Speech, IBM Watson TexttoSpeech, Mozilla DeepSpeech
- Machine learning Frameworks: TensorFlow, PyTorch
- Accessibility Guidelines and Tools: WCAG, WAVE, ARIA
- Educational Research and Open Educational Content: NDLI, ePathshala, OER Commons
- Collaborative and Development Platforms: GitHub, Kaggle
- Cloud Services for Deployment and Scalability: AWS, GCP
- AI Tutor and Personalization Research: Reinforcement learning for Personalized Education and AI in Education
- Integration and API development: RESTful API Design and GraphQL

5. Benchmarking

The AI textbook analyser contains a modular architecture where each component interact seamlessly to provide personalized , accessible learning experiences. The components are: AI Textbook Analyzer, AI Tutor and Accessibility Assessment Module.

There are various products available: BYJU'S, Toppr, Doubtnut, Vedantu etc.

The present AI enabled text book analyzer provides specific analysis, tutoring and accessibility assessments in depth for Mathematics and English, to develop the English language proficiency and to build a strong foundation of mathematics by developing the mathematical skills.

6. Applicable Patents

1) Natural Language Processing (NLP):

- Text Analysis:
  US9454728B1 - Method and apparatus for text analysis

  Describes systems and methods for analysing text to identify relationships, sentiments, and other significant features.

  US8738534B2 - Text analysis systems and methods

  Discusses systems and methods for performing text analysis to extract key information, such as named entities and sentiment.

- Text Summarization
  US9424511B2 - Automatic text summarization

  Covers methods for automatically generating summaries of documents using NLP techniques.

  US20150106163A1 - System and method for automatic text summarization

  Describes a system that generates text summaries by identifying and extracting important sentences and phrases from a document.

- Keyword Extraction
  US8285669B2 - Method and system for keyword extraction

  Details a method for extracting keywords from text based on statistical and linguistic analysis.

  US20110184910A1 - Keyword extraction method and apparatus

  Discusses an apparatus for extracting keywords from text using a combination of linguistic and statistical techniques.

- Comprehension Assessment
  US20190109947A1 - System and method for assessing text comprehension

  Describes methods for assessing text comprehension by generating questions and evaluating answers.

US20170242072A1 - Systems and methods for assessing text readability and comprehension

Covers systems that assess the readability and comprehension level of texts to match them with appropriate reading levels.

- Additional Relevant Patents
  US10395225B2 - Methods and systems for summarizing text using machine learning

Involves using machine learning models to create summaries of text documents.
US20180247393A1 - Automated keyword extraction for content categorization

Describes a method for automatically extracting keywords from content for the purpose of categorization and indexing.

US20150046127A1 - System and method for dynamic text analysis

Discusses a system that dynamically analyses text to identify significant terms, phrases, and sentiments.

2) Machine Learning Models: Patents covering training and deployment of AI models.

3) Optical Character Recognition (OCR): OCR technology and Image Preprocessing

4)Text-to-speech (TTS) and Speech-to-Text (STT): TTS Engines and STT Algorithms

5)Accessibility Features: Alternative Text Generation, Content Layout Adjustments, Assistive Technologies

6)Interactive Learning Tools: Patents for Adaptive Learning technologies and technologies for generating and evaluating interactive content.

7) Translation and Multilingual Support: Patents for Machine Translation and Multilingual NLP.

8)User Interface and Experience: Patents on user interfaces that adjust based on user needs and preferences and Multi-Platform Support.

7. Applicable Regulations

1. Educational Regulations:

National Education Policy (NEP) 2020: Align your tool with the NEP 2020 objectives, which emphasize inclusive and equitable education, use of technology in education, and accessibility for all students.

Central Board of Secondary Education (CBSE) Guidelines: Ensure compliance with CBSE's guidelines for digital learning tools and educational content.

State Education Board Regulations: Adhere to specific state regulations and curricula requirements where the tool will be used.

2. Accessibility Standards:

Rights of Persons with Disabilities Act, 2016: Ensure the tool complies with this act, which mandates accessible education for students with disabilities.

Web Content Accessibility Guidelines (WCAG) 2.1: Follow WCAG 2.1 standards for making digital content accessible to people with disabilities.

National Institute of Open Schooling (NIOS) Guidelines: Adhere to NIOS's guidelines for creating accessible educational content.

3. Data Privacy and Security:

Information Technology (IT) Act, 2000: Comply with provisions regarding data protection and cybersecurity under the IT Act.

Personal Data Protection Bill (PDPB) 2019: Adhere to the PDPB, which regulates the processing of personal data to protect individuals' privacy.

General Data Protection Regulation (GDPR): If the tool will be used by students in Europe or involves European data, ensure compliance with GDPR for data privacy and protection.

4. AI Ethics and Governance:

NITI Aayog's National Strategy for Artificial Intelligence: Align with the strategy's principles on ethics, transparency, and accountability in AI applications.

AI for All (AIFA) Guidelines: Follow these guidelines for the responsible development and deployment of AI systems in education.

5. Environmental Regulations :

E-Waste (Management) Rules, 2016: Ensure that any hardware used in deploying the AI tool complies with these rules regarding the disposal and recycling of electronic waste.

Energy Conservation Building Code (ECBC): If the deployment involves significant infrastructure, ensure compliance with ECBC to promote energy efficiency.

Green Computing Practices: Implement green computing practices to minimize the environmental impact of your IT infrastructure, including energy-efficient servers and data centres.

6. Intellectual Property Rights:

Patent Act, 1970: Protect your innovations by adhering to the Indian Patent Act and seeking patents for your unique technologies.

Copyright Act, 1957: Ensure that the educational content used or generated by the tool respects copyright laws and obtains necessary permissions.

7. Quality Assurance and Certification:

ISO/IEC 27001: Obtain certification for information security management to ensure robust data protection practices.

ISO 9001: Implement quality management systems to ensure the product meets educational and regulatory standards.

By adhering to the above mentioned regulations and guidelines, one can develop an AI-enabled textbook analyser with AI tutor and accessibility assessments that is compliant, ethical, and sustainable.

8. Business Model

1. Subscription-Based Model

Target Audience: Schools, universities, educational institutions, individual students, and parents.

Structure:

Monthly/Yearly Subscriptions: Offer different subscription tiers based on the features and services provided. For example:

Basic Plan: Access to textbook analysis and basic AI tutor features.

Premium Plan: Includes comprehensive AI tutoring, advanced accessibility features, personalized learning paths, and detailed analytics.

Institutional Plan: Customized plans for schools and universities with bulk licensing options.

Benefits: Recurring revenue stream and strong customer retention.

2. Freemium Model

Target Audience: Individual students and teachers looking for cost-effective solutions.

Structure:

Free Tier: Provide basic features such as simple text analysis, basic summarization, and limited AI tutoring.

Paid Premium Features: Advanced features like detailed accessibility assessments, personalized learning paths, in-depth analytics, and priority support.

Benefits: Attracts a large user base with free features and converts a percentage to paying customers.

3. Enterprise Licensing

Target Audience: Educational institutions, government education departments, and corporate training programs.

Structure:

Annual Licensing Fees: Institutions pay a yearly fee for a specified number of user licenses.

Custom Solutions: Offer customized solutions tailored to the specific needs of the institution, including integration with existing systems and customized content.

Benefits: High-value contracts and long-term partnerships.

4. Pay-Per-Use Model

Target Audience: Students and educators who prefer to pay only for the services they use.

Structure:

Usage-Based Fees: Charge users based on the number of pages analyzed, the number of assessments generated, or the duration of AI tutor usage.

Bundles and Discounts: Offer bundles of usage credits at discounted rates.

Benefits: Attracts users who need the service occasionally and are reluctant to commit to subscriptions.

5. Partnerships and Collaborations

Target Audience: Educational publishers, e-learning platforms, and EdTech companies.

Structure:

Revenue Sharing: Partner with content providers and platforms to integrate the AI tool and share the revenue generated.

Joint Ventures: Collaborate on developing new products or features, leveraging each other's strengths.

Benefits: Expanded reach and shared marketing efforts.

6. Government and Non-Profit Contracts

Target Audience: Government education departments, NGOs focused on education, and international educational organizations.

Structure:

Contracts and Grants: Secure contracts for implementing the AI tool in public schools or under-funded educational programs.

Corporate Social Responsibility (CSR) Initiatives: Partner with corporations to fund deployments as part of their CSR efforts.

Benefits: Stable funding sources and potential for large-scale impact.

7. Data and Insights Monetization

Target Audience: Educational researchers, policy makers, and EdTech developers.

Structure:

Analytics and Reports: Sell anonymized data insights and reports on educational trends, learning patterns, and accessibility improvements.

APIs for Developers: Provide APIs that other developers can integrate into their own applications, charging for access to the AI analysis and assessment capabilities.

Benefits: Additional revenue stream from data-driven insights and technology integration.

Value Proposition

Enhanced Learning Experience: Personalized learning paths and interactive AI tutoring tailored to each student's needs.

Accessibility: Comprehensive assessments and tools to ensure educational content is accessible to all students, including those with disabilities.

Efficiency: Automated text analysis and summarization to save educators time in content preparation and review.

Scalability: Easily scalable solution that can be implemented across various educational institutions and integrated with existing educational technologies.

Key Considerations

Market Research: Conduct thorough market research to understand the specific needs and willingness to pay of your target audience.

Pilot Programs: Start with pilot programs in select institutions to gather feedback and refine the product before a wider rollout.

Customer Support: Provide robust customer support and training to ensure smooth adoption and usage of the tool.

Continuous Improvement: Regularly update and enhance the tool based on user feedback and technological advancements.

By adopting a combination of these business models and focusing on delivering significant value to users, you can create a sustainable and profitable business for an AI-enabled textbook analyser with AI tutor and accessibility assessments in the educational sector.

9. Concept Generation

1. Ideation Phase:

1.1 Identify Needs and Goals:

- User Research: Conduct surveys, interviews, and focus groups with students, teachers, parents, and educational institutions to understand their needs, pain points, and desired features.
- Market Analysis: Analyze existing educational tools and identify gaps or areas for improvement.
- Accessibility Requirements: Identify specific needs of students with disabilities, ensuring compliance with accessibility standards.

1.2 Brainstorming Solutions:

- Collaborative Workshops: Organize workshops with educators, accessibility experts, AI specialists, and UX designers to brainstorm potential features and functionalities.

- Idea Mapping: Use techniques like mind mapping or design thinking to explore different aspects of the AI tool, including text analysis, AI tutoring, and accessibility assessments.
- Competitive Analysis: Study competitors' products to identify strengths, weaknesses, and opportunities for differentiation.

2. Concept Validation Phase:

2.1 Feasibility Study:

- Technical Feasibility: Evaluate the technical requirements and feasibility of implementing the identified features using current AI and NLP technologies.
- Regulatory Compliance: Ensure that the proposed features comply with educational, data privacy, and accessibility regulations in India and globally.

2.2 Prototyping and Testing:

- Create Prototypes: Develop low-fidelity prototypes (wireframes, mockups) to visualize the user interface and core functionalities.
- User Testing: Conduct usability testing with a small group of end users to gather feedback on the prototypes and refine the concepts accordingly.
- Iterate Rapidly: Use feedback to iterate and improve the prototypes, moving towards high-fidelity prototypes as ideas are validated.

3. Development Phase:

3.1 Minimum Viable Product (MVP):

- Define MVP Features: Identify the core features that provide the most value and differentiate the product, such as basic text analysis, AI tutoring, and key accessibility assessments.
- Agile Development: Implement the MVP using agile methodologies, allowing for incremental development and continuous feedback integration.
- Beta Testing: Release the MVP to a larger group of users for beta testing to gather more extensive feedback and identify any critical issues.

3.2 Full-Scale Development:

- Feature Expansion: Gradually add more advanced features based on user feedback and market demands, such as advanced summarization, personalized learning paths, and comprehensive accessibility tools.
- Integration and Interoperability: Ensure the tool can integrate with existing educational platforms and learning management systems (LMS).

4. Refinement and Optimization Phase:

4.1 Continuous Improvement:

- User Feedback Loop: Establish a continuous feedback loop with users to gather insights and suggestions for improvement.
- Performance Monitoring: Use analytics to monitor the tool's performance and effectiveness in real-world usage.

4.2 <u>AI and ML Optimization</u>:

- Model Fine-Tuning: Continuously refine and improve the AI and ML models to enhance text analysis accuracy, AI tutoring effectiveness, and accessibility assessments.
- New Technologies: Stay updated with advancements in AI, NLP, and educational technologies to incorporate new features and improve existing ones.

5. Launch and Scaling Phase:

5.1 <u>Marketing and Outreach</u>:

- Educational Partnerships: Partner with schools, universities, and educational organizations to promote the tool.
- Awareness Campaigns: Run targeted marketing campaigns to raise awareness among educators, students, and parents about the tool's benefits.

5.2 <u>Support and Maintenance</u>:

- Customer Support: Provide robust customer support to assist users with onboarding and troubleshooting.
- Regular Updates: Release regular updates to fix bugs, improve performance, and add new features based on user needs and technological advancements.

<u>A few Concepts for Features</u>:

<u>Text Analysis</u>

- Semantic Analysis: Analyse text to extract key concepts, themes, and summaries.
- Difficulty Assessment: Evaluate the complexity of the text to match it with appropriate grade levels.

<u>AI Tutor</u>

- Personalized Learning Paths: Create adaptive learning paths based on student performance and preferences.
- Interactive Assessments: Generate interactive quizzes and exercises tailored to the student's learning progress.

<u>Accessibility Assessments</u>

- Content Adaptation: Automatically adjust text size, contrast, and layout for better readability.
- Alternative Text Generation: Provide descriptive text for images and diagrams to assist visually impaired students.

10. Concept Development

Step 1: Requirement Gathering and Analysis

1.1 Define Objectives and Scope

Objective: Clearly define the main goals of the project, such as improving learning outcomes, providing personalized tutoring, and ensuring content accessibility.

Scope: Determine the functionalities and features the tool will offer, including text analysis, AI tutoring, and accessibility assessments.

1.2 Stakeholder Engagement

Identify Stakeholders: Include students, teachers, educational institutions, accessibility experts, and regulatory bodies.

Collect Requirements: Conduct interviews, surveys, and focus groups to gather detailed requirements from all stakeholders.

1.3 Market and Competitor Analysis

Market Research: Analyze the current market trends, demands, and gaps in educational technology tools.

Competitor Analysis: Study existing solutions to identify their strengths and weaknesses.

Step 2: Conceptualization and Design

2.1 Feature Definition

Core Features: Define the core features such as text analysis, AI-driven tutoring, and accessibility checks.

Advanced Features: Identify additional features like interactive assessments, personalized learning paths, and detailed analytics.

2.2 System Architecture

High-Level Design: Create a high-level architecture diagram showing the main components and their interactions.

Detailed Design: Develop detailed designs for each component, including data flow diagrams and system interface specifications.

2.3 Prototyping

Wireframes and Mock-ups: Design wireframes and mock-ups for the user interface.

User Testing: Conduct initial usability testing with low-fidelity prototypes to gather feedback and make necessary adjustments.

Step 3: Data Collection and Preprocessing

3.1 Data Collection

Textbooks and Educational Materials: Gather a diverse set of textbooks and educational materials across various subjects and grade levels.

Accessibility Data: Collect data on accessibility requirements, including content for visually and hearing-impaired students.

3.2 Data Preprocessing

Text Cleaning: Clean and preprocess text data, removing noise and standardizing formats.

Annotation: Manually annotate data for supervised learning tasks like text summarization and keyword extraction.

Dataset Split: Split the data into training, validation, and test sets.

Step 4: Model Development

4.1 Text Analysis Models

Text Summarization: Develop and train models for summarizing textbook content using techniques like sequence-to-sequence models or transformer-based models (e.g., BERT, GPT).

Keyword Extraction: Implement models to identify key concepts and terms from the text using NLP techniques like TF-IDF or neural embeddings.

4.2 AI Tutor Models

Adaptive Learning: Create models that personalize learning paths based on student performance data, using techniques like reinforcement learning or collaborative filtering.

Interactive Assessments: Develop models to generate and evaluate quizzes and exercises tailored to individual student needs.

4.3 Accessibility Assessment Models

Content Adaptation: Implement models that adjust text size, contrast, and layout for better readability using rule-based systems or machine learning.

Alternative Text Generation: Use image recognition and description generation models to provide alternative text for images and diagrams.

Step 5: Integration and Development

5.1 Backend Development

APIs and Services: Develop APIs and backend services to handle text analysis, tutoring, and accessibility assessments.

Database: Design and implement a database to store educational content, user data, and model outputs.

5.2 Frontend Development

User Interface: Develop the user interface based on the wireframes and mockups, ensuring it is intuitive and user-friendly.

Accessibility Features: Integrate accessibility features like screen reader compatibility and keyboard navigation.

5.3 Integration

Model Integration: Integrate the AI models with the backend and frontend components.

Testing: Conduct integration testing to ensure all components work seamlessly together.

Step 6: Testing and Validation

6.1 Unit Testing

Component Testing: Test individual components and models to ensure they function correctly.

6.2 System Testing

End-to-End Testing: Conduct end-to-end testing to ensure the entire system operates as expected.

User Acceptance Testing: Perform user acceptance testing with a group of end-users to validate functionality and usability.

6.3 Performance and Load Testing

Performance Testing: Test the system's performance under various conditions to ensure it meets the required standards.

Load Testing: Simulate high-usage scenarios to ensure the system can handle peak loads.

Step 7: Deployment and Maintenance

7.1 Deployment

Environment Setup: Set up production environments and deploy the system.

Monitoring: Implement monitoring tools to track system performance and identify issues.

7.2 Training and Support

User Training: Provide training materials and sessions for users to get familiar with the tool.

Customer Support: Set up a support system to help users with any issues or questions.

7.3 Maintenance

Regular Updates: Release regular updates to fix bugs, improve performance, and add new features.

Continuous Improvement: Use user feedback and data analytics to continuously refine and enhance the system.

Step 8: Scaling and Expansion

8.1 Scaling Infrastructure

Cloud Services: Use scalable cloud services to handle increasing loads and data storage needs.

Optimization: Continuously optimize models and infrastructure for performance and cost-efficiency.
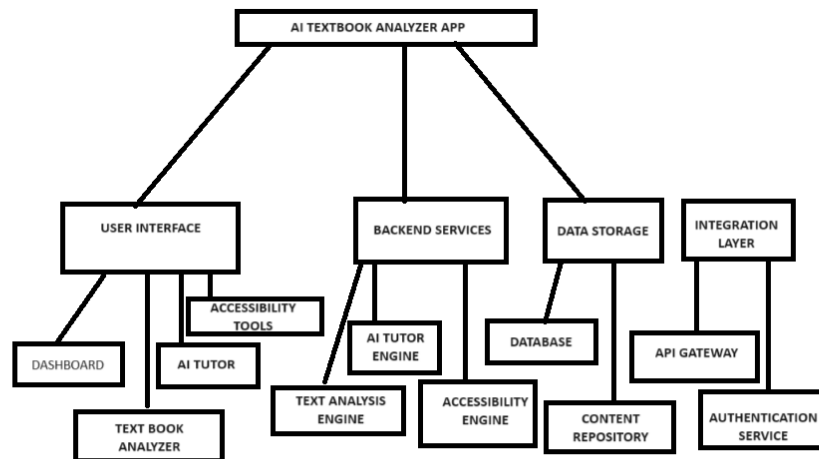
8.2 Market Expansion

Geographical Expansion: Adapt the tool for different educational systems and languages to expand into new markets.

Partnerships: Form partnerships with educational institutions, publishers, and EdTech companies to broaden reach and impact.

11. Final Product Prototype with Schematic Diagram

- Schematic Diagram

- Prototype Flow
    1. User Interaction

- Login/Sign-up: Users authenticate via the authentication service.
- Dashboard Access: Users are directed to their respective dashboards based on their role (student or teacher).

    2. Textbook Analysis

    - Upload/Select Textbook: Users upload a textbook or select one from the repository.
    - Analysis Process: The text analysis engine processes the textbook to generate summaries, keywords, and key concepts.
    - Display Results: The results are displayed on the UI under the Textbook Analyzer section.

    3. AI Tutoring

    - Lesson Personalization: The AI Tutor engine personalizes lessons based on the student's data.

- Interactive Assessments: Quizzes and assessments are generated and provided to the student.
- Feedback Loop: Student performance is fed back into the AI Tutor engine for continuous improvement.

4. Accessibility Assessments

- Content Adaptation: The accessibility engine adjusts the text size, contrast, and layout based on user settings.
- Alternative Text Generation: Descriptive texts for images are generated and displayed.

5. Data Storage and Retrieval

- Database Interactions: All user interactions and system outputs are stored in the database.
- Content Repository: Textbooks and educational content are retrieved from the content repository as needed.

12. Product Details

1. How It Works

Overview: The system leverages AI to analyse textbook content, provide personalized tutoring, and ensure accessibility for all students.

a) User Interaction

- Login/Sign-Up: Users authenticate using secure login.
- Dashboard: Students and teachers access their respective dashboards with personalized content and insights.

b) Textbook Analysis

- Upload/Select Textbook: Users upload or select a textbook from a repository.
- Analysis Process: The text analysis engine processes the content to extract key concepts, summaries, and keywords.
- Display Results: Results are displayed in the Textbook Analyzer section.

c) AI Tutoring

- Personalized Lessons: The AI Tutor provides lessons based on the student's learning progress and preferences.

- Interactive Assessments: Generates quizzes and exercises tailored to the student's needs.
- Feedback Loop: Continuous learning improvement based on student performance data.

d) Accessibility Assessments
- Content Adaptation: Adjusts text size, contrast, and layout for better readability.
- Alternative Text Generation: Provides descriptive text for images and diagrams to assist students with visual impairments.

2. Data Sources

- Textbooks and Educational Materials: Digital versions of textbooks, course materials, and educational resources.
- User Data: Information about students' learning progress, preferences, and performance.
- Accessibility Data: Standards and guidelines for making content accessible to all users.

3. Algorithms

a) Text Analysis Algorithms:
- Text Summarization: Uses transformer-based models like BERT or GPT to summarize large texts.
- Keyword Extraction: Implements techniques like TF-IDF or neural embeddings for extracting key terms.
b) AI Tutoring Algorithms:
- Adaptive Learning Paths: Machine learning models (e.g., reinforcement learning) to personalize learning paths.
- Interactive Assessments: Algorithms to generate and evaluate quizzes based on the student's progress.
c) Accessibility Algorithms:
- Content Adaptation: Rule-based systems or ML models to adjust content for readability.
- Alternative Text Generation: Uses image recognition and natural language generation to describe visual content.

4. Frameworks

a) Frontend Development: React.js or Angular.js for building dynamic and responsive user interfaces.
b) Backend Development: Node.js or Python frameworks like Flask/Django for server-side logic and API development.
c) Machine Learning and NLP:
- TensorFlow or PyTorch: For developing and training machine learning models.
- Hugging Face Transformers: For implementing advanced NLP models like BERT and GPT.
d) Database Management: PostgreSQL or MongoDB for storing user data, content, and model outputs.
e) Cloud Services: AWS or Azure for scalable infrastructure, storage, and computing power.

5. Team Required to Develop

- Project Manager: Oversees the project and coordinates between different teams.
- Product Manager: Defines product features, user stories, and prioritizes the development roadmap.
- Frontend Developers: Develop the user interface and ensure a seamless user experience.
- Backend Developers: Build the server-side logic, APIs, and database management.
- Data Scientists/NLP Engineers: Develop and train AI and NLP models for text analysis and tutoring.
- Accessibility Experts: Ensure that the platform meets accessibility standards and guidelines.
- Quality Assurance (QA) Engineers: Conduct thorough testing to ensure the system is reliable and bug-free.
- UX/UI Designers: Design user-friendly interfaces and ensure a good user experience.
- DevOps Engineers: Manage cloud infrastructure, deployment pipelines, and ensure system scalability and reliability.

13. Conclusion

The development of an AI-enabled textbook analyser with AI Tutor and accessibility assessments is poised to revolutionize the educational landscape. By harnessing the power of AI and machine learning, this project not only aims to improve academic performance but also ensures that education is accessible to all. This aligns with the broader goal of fostering a more inclusive, efficient, and effective educational environment, ultimately contributing to the advancement of global education standards.