

PIP2001 Capstone Project
Viva-Voce

PROJECT TITLE : AI vs. Human: Academic Essay Authenticity Challenge

Batch Number: CSE-G171

Under the Supervision of,

STUDENT NAME	STUDENT RNO
ARUSH U RAI	20211CSE0579
SRUSHTI S K	20211CSE0623
PRANITHA R SHEKAR	20211CSE0626
HEMANTH S K	20211CSE0635

Ms. Kayal Vizhi V
Assistant Professor
School of Computer Science and Engineering
Presidency University

Name of the Program: Computer Science and Engineering

Name of the HoD: Dr. Asif Mohammed H B

Name of the Program Project Coordinator: Mr. Amarnath J L & Dr. Jayanthi K

Name of the School Project Coordinators: Dr. Sampath A K / Dr. Abdul Khadar A / Mr. Md Ziaur Rahman

Content

- Abstract
- Literature Survey
- Objectives
- Existing Methods-Drawbacks
- Proposed Method
- Architecture Diagram
- Modules
- Hardware and Software Details
- Algorithm
- Results
- Time Line by Gantt Chart
- Conclusion
- References
- Github Link
- Project work mapping with SDG

Abstract

- The increasing prevalence of **AI-generated content**, fueled by advanced models like OpenAI's GPT-3 and GPT-4, has made distinguishing between AI-written and human-written essays a critical challenge. The **AI vs Human: Essay Validator** is a novel solution that combines cutting-edge technologies, including **AWS Textract** for text extraction from images and **OpenAI GPTs** for text analysis, to automate the process of essay validation. Users can upload images of essays, which are processed to extract text and determine its origin—AI-generated or human-written. The application is designed with an intuitive **React.js frontend**, a scalable **Flask backend**, and robust integration with cloud services. This tool holds significant promise in education, publishing, and content moderation by ensuring content authenticity, while also shedding light on the transformative impact of AI in writing and communication.
- **Keywords:** AI-Generated Content, Human-Written Text, OpenAI GPT, AWS Textract, Flask Framework, Natural Language Processing, Content Validation.



Literature Survey

- **Modern Authorship Attribution Techniques:**

Authorship attribution has been a significant area of research, with techniques evolving from traditional stylometric methods to advanced machine learning approaches.

E. Stamatatos provides an extensive survey of modern techniques, highlighting the potential of AI in identifying authorship through linguistic patterns and stylistic features [1].

- **AI-Generated Text and Human-Like Prose:**

Generative models, such as GROVER, have demonstrated their ability to create human-like text. S. Gehrmann et al. emphasize the challenges these systems pose for distinguishing AI-generated content and propose solutions to enhance the reliability of detection systems [2].

- **Pre-Trained Language Models:**

J. Devlin et al.'s introduction of BERT marked a breakthrough in NLP by utilizing bidirectional transformers for deep contextual understanding. This model has paved the way for advancements in text classification and analysis, enabling systems like **AI vs Human: Essay Authenticator** to perform accurate content classification [3].

- **Transformer-Based Models:**

The transformer architecture proposed by A. Vaswani et al. underpins the most significant advancements in NLP. The introduction of attention mechanisms has enhanced the ability of AI systems to process large text datasets efficiently [4].



Literature Survey

- **AWS Textract for Text Extraction:**
AWS Textract provides a robust solution for extracting text from images and scanned documents. Its integration into applications like this ensures accurate and efficient text extraction for further processing [6].
- **OpenAI GPT Models:** OpenAI's GPT models have set the benchmark for generative AI capabilities. The GPT-4 API documentation highlights the model's ability to understand and analyze complex text structures, making it an ideal choice for content validation systems [7].
- **Plagiarism Detection Tools:** Tools like Turnitin and Copyscape have long been used for detecting plagiarism and ensuring content originality. However, these tools primarily focus on matching text to known sources, whereas this project goes a step further by identifying AI-generated content [8, 11].
- **Advancements in Robust NLP Models:** RoBERTa, introduced by X. Liu et al., offers a robustly optimized version of BERT for pre-training, improving text representation and analysis. This advancement has contributed to higher accuracy in language-based applications [9].
- **Multi-Task Learning in AI:** Y. Zhang and Q. Yang explore the benefits of multi-task learning, which allows AI systems to generalize across tasks, making them more versatile. This principle underlies models like GPT-3 and RoBERTa, enabling them to adapt to various text analysis tasks [10].



Literature Survey

- **The Role of AI in Education:** AI has transformed the educational landscape by enabling advanced tools for content evaluation and plagiarism detection. The Turing Institute's research on AI in education emphasizes the need for systems like **AI vs Human: Essay Authenticator** to maintain academic integrity [12].
- **Open-Source AI Platforms:**
Frameworks like TensorFlow and Python have made it easier to implement machine learning models for real-world applications. These tools are instrumental in building scalable and efficient systems, such as the backend of this project [13, 14].



Objectives

- **To automate the detection of AI-generated essays** using advanced machine learning and natural language processing techniques.
- **To provide an easy-to-use platform** where users can upload essay images and receive results in real-time.
- **To leverage AWS Textract** for accurate and scalable text extraction from images.
- **To utilize OpenAI GPT** for analyzing linguistic patterns and determining essay authenticity.
- **To support educational institutions** in maintaining academic integrity and preventing misuse of AI-generated content.



Existing Methods-Drawbacks

1. Manual Detection:

•Drawbacks:

- Time-intensive and requires significant expertise.
- Subjective and prone to human bias.
- Inconsistent accuracy when analyzing large datasets.

2. Heuristic Algorithms:

•Drawbacks:

- Limited ability to handle complex AI-generated content.
- Ineffective for nuanced linguistic patterns.
- Often rely on metadata, which is easily manipulated.

3. Traditional OCR Systems:

•Drawbacks:

- Struggle with low-quality images and handwritten text.
- Lack integration with AI-based classification models.
- Limited scalability for processing large datasets.



Proposed Method

The **AI vs Human: Essay Authenticator** addresses the limitations of existing methods through:

1.Image Upload and Processing:

1. Users upload images of essays via a React.js interface.

2.Text Extraction:

1. The uploaded image is sent to AWS Textract, which extracts text with high accuracy.

3.AI Classification:

1. The extracted text is analyzed by OpenAI GPT-3, which classifies it as AI-generated or human-written.

4.Real-Time Results:

1. Results are displayed on the frontend, including the extracted text and classification outcome.

This method ensures scalability, reliability, and ease of use for end users.



Modules

- **1. User Interface Module (React.js):**
 - Accepts image uploads.
 - Displays extracted text and classification results.
 - Provides a user-friendly experience with progress indicators.
- **2. Backend Processing Module (Flask):**
 - Manages communication with AWS Textract and OpenAI GPT-3.
 - Handles routing, validation, and text processing.
 - Ensures secure API interactions.
- **3. Text Extraction Module (AWS Textract):**
 - Extracts text from images, even in low-quality conditions.
 - Converts extracted text into a machine-readable format for further processing.
- **4. AI Analysis Module (OpenAI GPT):**
 - Analyzes text for linguistic patterns and stylistic elements.
 - Classifies the text as AI-generated or human-written.

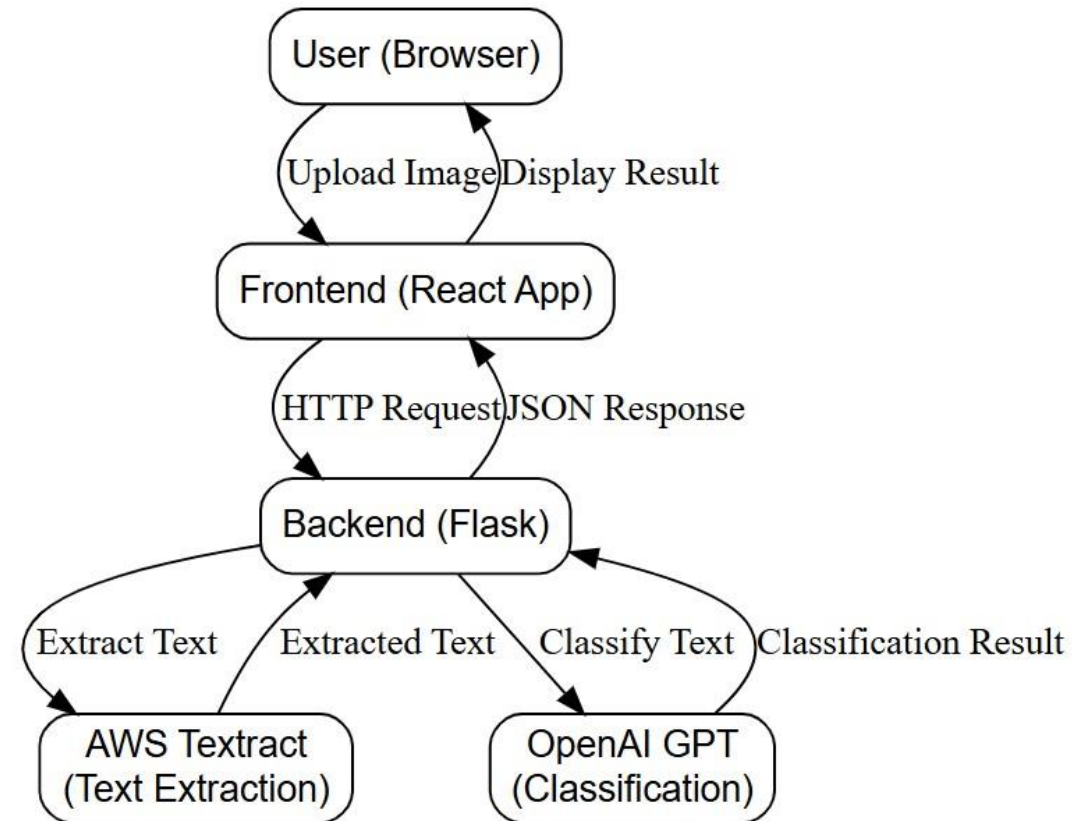


Hardware and Software Details

- **Hardware Requirements:**
- **Processor:** Intel i5 or higher.
- **RAM:** 8GB or more.
- **Storage:** Minimum 20GB free space.
- **Network:** Stable internet connection for API calls.
- **Software Requirements:**
- **Operating System:** Windows 10, macOS, or Linux.
- **Backend:** Python 3.8+, Flask.
- **Frontend:** React.js.
- **Cloud Services:** AWS (Textract, S3).
- **AI API:** OpenAI GPT.



Architecture Diagram



System Design & Implementation

- Layered Architecture:**

- Input Layer:** User uploads essays (text or images). OCR (AWS Textract) extracts text from images; structured content is retrieved for further processing.
- Processing Layer:** Text is analyzed by AI-based models (OpenAI GPT); results are classified as AI-generated or human-written. Anomalies in text quality (like gibberish or empty data) are flagged.
- Output Layer:** Results are displayed to users with options for download or email. Performance insights are logged for reporting.

- Web App Deployment:**

- Frontend:** A responsive, user-friendly interface created using ReactJS, allowing essay uploads and real-time result display.
- Backend:** Flask APIs that integrate with AWS Textract for OCR and OpenAI GPT for classification.
- Data Layer:** Cloud storage (AWS S3) ensures secure handling of uploaded essays and classification results.



System Design & Implementation

- AI Augmentation:**

- OpenAI GPT models analyze essays for patterns, providing accurate classification of the text.
NLP integration helps identify nuanced text patterns and detect anomalies.

- Deployment Workflow:**

- Development involves building modular components for scalability.
- Hosting is managed on AWS EC2 or Heroku for reliability.
- Monitoring tools track API performance, storage utilization, and user activity to ensure system stability.



Algorithm

Start of the Algorithm
BEGIN

Step 1: Accept User Input
IF user uploads an essay image:
 Validate the file format (JPEG, PNG, PDF)
 IF file format is invalid:
 Display error message ("Invalid file format")
 RETURN
 ENDIF

 Save the uploaded image to a temporary storage location

Step 2: Text Extraction using AWS Textract
 Upload the image to AWS S3
 Call AWS Textract to extract text from the image
 IF Textract fails to extract text:
 Display error message ("Text extraction failed")
 RETURN
 ENDIF
 Store the extracted text

Step 3: Text Classification using OpenAI GPT
 IF extracted text is empty:
 Display error message ("No text found in the uploaded image")
 RETURN
 ENDIF

 Send the extracted text to OpenAI GPT API for classification
 Receive the response from GPT
 Extract the classification result (AI-generated or Human-written)

Step 4: Display Results
 Display the extracted text to the user
 Display the classification result (AI-generated or Human-written)


Step 5: Handle Errors and Feedback
 IF any errors occur during the process:
 Log the error for debugging
 Display an appropriate error message to the user
 ENDIF
END

Results

AI vs Human : Essay Validator

 Upload Your Essay Image

Choose File No file chosen

 Upload and Check



Results

Upload Your Essay Image

Choose File

AI.jpg

Upload and Check

Uploading image to server...

Extracted Text:

Title: The Role of Technology in Modern Education The rapid advancements in technology have significantly transformed every aspect of human life, including education. In recent years, technology has revolutionized traditional learning environments, enabling students and educators to engage in dynamic and interactive educational experiences. From online learning platforms to advanced artificial intelligence tools, the integration of technology has opened new avenues for improving access to education and personalizing the learning process. One of the most profound impacts of technology in education is the democratization of knowledge. Online platforms such as Coursera, Khan Academy, and edX have made high-quality educational resources available to learners across the globe. These platforms eliminate geographical and financial barriers, allowing individuals from diverse backgrounds to pursue their educational aspirations. Moreover, tools like video conferencing and virtual classrooms have facilitated remote learning, particularly during the COVID-19 pandemic, when traditional in-person education was not feasible. Artificial intelligence (AI) plays a pivotal role in modern education. AI-driven systems can analyze student performance, identify learning gaps, and recommend personalized learning paths. For instance, adaptive learning platforms adjust the difficulty level of content based on a student's understanding, ensuring effective knowledge retention. Furthermore, AI-powered chatbots and virtual tutors provide instant assistance to students, making learning more accessible and engaging.

Download as .txt



Results

Extracted Text:

Date Page Essay Writting Planning and writing an essay Read the question or essay title carefully to make sure you understand exactly what IS required. Brainstorming Quickly note down some ideas on the topic as you think of them. Then write down some vocabulary that you know you will need to write about this subject. Planning If you are asked to discuss a topic or give your opimon it TS important to organise your thoughts and present your aguments clearly in paragraphs, and to work out the structure of your essay before you start to write.

 Download as .txt

Prediction:

The analyzed text displays several patterns indicative of AI generation. The sentences exhibit a formal, academic tone typical of AI writing, although there are several syntax errors which are uncharacteristic of advanced AI like GPT-4. The emotional tone is neutral and lacks any emotional depth. The text lacks personal pronouns, which humans often use, and seems to merely provide instructions without any use of creativity or novelty. There's a lack of real-world context or examples to make the instructions more relatable. The text also shows signs of repetitiveness in the theme ie., how to write an essay. Result: AI-generated Confidence: 65% Confidence Percentage: 75%



Timeline of the Project (Gantt Chart)

GANTT CHART				
Project Stages	WEEK 1	WEEK 2-3	WEEK 4-5	WEEK 6-7
I. PLANNING • Preparation Phase	<ul style="list-style-type: none">Define scope and goals.Collect and preprocess data.Set up development tools.			
II. EXECUTION • Development Phase		<ul style="list-style-type: none">Extract features and select models.Train and tune classifiers.Evaluate model performance.		
III. MONITORING • Testing Phase			<ul style="list-style-type: none">Test with new data.Refine models based on feedback.	
IV. COMPLETION • Reporting Phase, Submission and Review				<ul style="list-style-type: none">Prepare reports and presentations.Submit findings.Address reviewer feedback.



Conclusion

- The **AI vs Human: Essay Authenticator** successfully integrates modern AI technologies to automate the validation of essay authenticity. By combining **AWS Textract** and **OpenAI GPT**, it provides a scalable, accurate, and user-friendly solution for distinguishing between AI-generated and human-written text. Future enhancements include multi-language support, deeper integration with educational platforms, and improved model accuracy for nuanced text detection. This project represents a significant step toward maintaining content authenticity in the era of AI-generated text.



References (IEEE Paper format)

- E. Stamatatos, "A Survey of Modern Authorship Attribution Techniques," *J. Assoc. Inf. Sci. Technol.*, vol. 64, no. 1, pp. 29–47, Jan. 2013. doi: 10.1002/asi.22787.
- S. Gehrmann, Y. Deng, and A. M. Rush, "GROVER: A Generative Pretrained Transformer for Text Generation with Human-like Prose," *Proc. 57th Annu. Meeting Assoc. Comput. Linguistics*, pp. 349–357, 2020. doi: 10.18653/v1/P19-1064.
- J. Devlin, M. W. Chang, K. Lee, and K. Toutanova, "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," *Proc. NAACL-HLT 2019*, pp. 4171–4186, 2019. doi: 10.18653/v1/N19-1423.
- A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, Ł. Kaiser, and I. Polosukhin, "Attention is All You Need," *Proc. Neural Inf. Process. Syst. (NeurIPS) 2017*, vol. 30, pp. 5998–6008, 2017. doi: 10.48550/arXiv.1706.03762.
- BERT Team, "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," *Google AI Blog*, Nov. 2018. [Online]. Available: <https://ai.googleblog.com/2018/11/bert-pre-training-of-deep.html>.
- AWS Textract, *Amazon Web Services (AWS) Textract Documentation*, 2024. [Online]. Available: <https://docs.aws.amazon.com/textract/latest/dg/Welcome.html>

References (IEEE Paper format)

- OpenAI, "OpenAI GPT-4 API Documentation," 2024. [Online]. Available: <https://beta.openai.com/docs/>.
- Turnitin, "Turnitin: Plagiarism Checker and Writing Feedback Tool," 2024. [Online]. Available: <https://www.turnitin.com/>.
- X. Liu, T. Sun, X. Qiu, and X. Huang, "RoBERTa: A Robustly Optimized BERT Pretraining Approach," *Proc. 2019 Conf. Empirical Methods Nat. Lang. Process. (EMNLP)*, pp. 1958–1970, 2019. doi: 10.18653/v1/D19-1152.
- Y. Zhang and Q. Yang, "A Survey on Multi-Task Learning," *IEEE Trans. Knowl. Data Eng.*, vol. 34, no. 6, pp. 394–413, Jun. 2018. doi: 10.1109/TKDE.2018.2873884.
- Copyscape, "Copyscape: Plagiarism Detection Service," 2024. [Online]. Available: <https://www.copyscape.com/>.
- The Turing Institute, "The Future of AI in Education," 2024. [Online]. Available: <https://www.turing.ac.uk/research/research-projects/future-ai-education>.
- Python Software Foundation, "Python Programming Language," 2024. [Online]. Available: <https://www.python.org/>.
- TensorFlow, "TensorFlow: An End-to-End Open Source Machine Learning Platform," 2024. [Online]. Available: <https://www.tensorflow.org/>.



Publication

Published URL: <https://ijirt.org/Article?manuscript=172179>

Acceptance mails:

Dear HEMANTH S K,
Welcome to IJIRT!

Your manuscript has
been **Accepted** for publication
in the **International Journal of
Innovative Research in
Technology(IJIRT)**.

Paper Id: 172179

Paper Title: "AI vs Human :
Academic Essay Authenticity
Challenge"

Review Status: Accepted

Dear HEMANTH S K,
Welcome to IJIRT!

We are pleased to confirm that we have received
your payment for the processing fee related to
your paper titled "**AI vs Human : Academic
Essay Authenticity Challenge**" with Paper ID
"**172179**". Your paper will be processed and
published within a maximum of 10 working days.

Additionally, you can download the soft copy of
your certificate by logging in to the following link:

[Author Home](#)



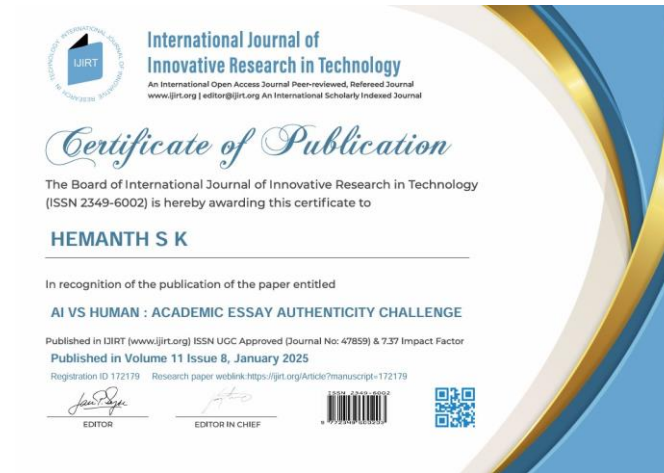
**PRESIDENCY
UNIVERSITY**

Private University Estd. in Karnataka State by Act No. 41 of 2013



Publication

Certificates:



GITHUB LINK

<https://github.com/hemsk89/Capstone-CSE-G171>



**PRESIDENCY
UNIVERSITY**
Private University Estd. in Karnataka State by Act No. 41 of 2013



Project work mapping with SDG



Project work mapping with SDG

(SDG) 4: Quality Education, by:

- Promoting academic integrity through automated essay validation.
- Assisting educators in identifying AI misuse in assignments.
- Encouraging ethical AI use in educational environments.



Thank
You!

