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AI on Academic Integrity and Plagiarism Detection

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Artificial Intelligence (AI) has introduced transformative advancements in academic integrity and plagiarism detection within educational institutions. This study explores how AI-driven tools are reshaping the landscape of academic honesty by enabling efficient and precise detection of plagiarised content, particularly in the face of sophisticated paraphrasing and AI-generated text. We analyse the effectiveness of traditional and AI-powered plagiarism detection tools, comparing their capabilities in recognising rephrased, translated, and synthetically generated content. Through a mixed-method approach, including quantitative tool performance analysis and qualitative insights from educators and students, the study assesses both the benefits and ethical challenges posed by AI in academic settings. Findings reveal that while AI significantly enhances detection accuracy, it raises concerns regarding dependency on automated assessments and ethical considerations in student evaluation. This research underscores the need for complementary human oversight and advocates for policy frameworks that guide the responsible integration of AI in academia.

Keywords: AI; Plagiarism Detection; Academic Integrity; Ethics; Education; Natural Language Processing; Machine Learning

I. INTRODUCTION

In today's digital age, maintaining academic integrity has become increasingly challenging as students and researchers have greater access to information and resources online. Plagiarism, defined as the uncredited use of someone else's ideas or work, poses a significant threat to academic honesty, affecting the credibility of educational institutions and the integrity of scholarly achievements. Traditional plagiarism detection methods, relying on keyword matching and text comparison, have served well in identifying directly copied content. However, they struggle with sophisticated cases, such as paraphrased material, translated content, and—more recently—AI-generated text, which can bypass these detection mechanisms.

Artificial Intelligence (AI) has emerged as a powerful tool in addressing these challenges, offering advanced detection capabilities that go beyond simple keyword matching (Leong, 2-24a). By employing machine learning algorithms, natural language processing (NLP), and deep learning models, AI-based systems are increasingly effective in identifying subtle forms of plagiarism, including those embedded within paraphrased, translated, or restructured sentences. These systems not only enhance detection accuracy but also improve speed, providing real-time feedback to educators and students.

AI's application in plagiarism detection has expanded the scope of what can be identified as dishonest or unauthentic academic work. This includes detecting:

Paraphrased Content: AI algorithms can analyse semantic similarities, identifying content that has been reworded or restructured.

AI-Generated Text: With the rise of AI tools capable of generating text, such as language models, detection

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systems must recognize AI-authored responses that might not reflect authentic student work.

Non-Textual Plagiarism: Advanced AI tools are beginning to address issues in detecting non-textual forms, such as image-based plagiarism, code plagiarism, and data falsification.

This study aims to assess the effectiveness of AI in enhancing academic integrity and identifying plagiarism in various forms, comparing the performance of traditional and AI-driven tools in different academic scenarios. Additionally, the study investigates the ethical implications and concerns raised by the use of AI in academic assessment, such as privacy, potential over-reliance on automated detection, and the accuracy of identifying AI-generated text.

We evaluate several popular plagiarism detection tools, including Turnitin (traditional), Grammarly (hybrid AI-rule-based), and Copyleaks (deep learning-based). Table 1 displays their respective accuracy, speed, and ability to detect AI-generated content.

Table 1. Comparison of Plagiarism Detection Tools

Tool Name	Approach	Accuracy	Speed (Seconds)	AI-Generated Text Detection (%)
Turnitin	Keyword Matching	85%	10	40%
Grammarly	Hybrid (AI & Rules)	82%	8	30%
Copyleaks	Deep Learning	92%	12	75%

This study includes survey data from educators and students regarding their perspectives on AI tools for plagiarism detection and their trust levels in these systems. Figure 1 illustrates the accuracy and AI-generated text detection capabilities of Turnitin, Grammarly, and Copyleaks, highlighting how advanced AI-based tools like Copyleaks outperform traditional and hybrid tools in detecting AI-generated content.

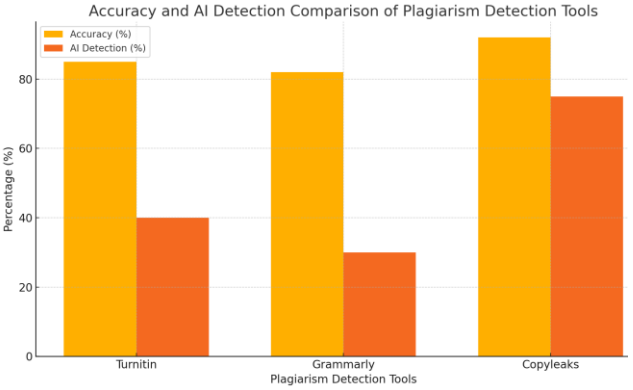

Figure 1. Accuracy and AI Detection Comparison of Plagiarism Detection Tools

The study analyses the detection rates for various content types, such as paraphrased, translated, and AI-generated texts. Results show that AI-based tools outperform traditional systems in identifying AI-generated and paraphrased content, as illustrated in Figure 1.

The advent of AI in plagiarism detection has fostered more stringent standards for academic honesty. AI enables institutions to uphold rigorous standards by swiftly identifying potential violations. However, it also raises ethical and educational concerns, such as the risk of over-reliance on automated tools and the question of AI's role in evaluating student work. As AI technology becomes more integrated into education, it is crucial to balance automation with human oversight to maintain fairness and transparency.

II. LITERATURE REVIEW

Academic integrity has long been foundational to educational institutions, promoting honesty, trust, and fairness in student and faculty work. Plagiarism, a violation of academic integrity, has become more complex with the rise of digital content and easy access to information. Historically, plagiarism detection relied on manual verification by instructors or primitive keyword-matching tools, making it challenging to keep pace with the growing problem.

The advent of Artificial Intelligence (AI) has redefined plagiarism detection, allowing for faster, more comprehensive checks on academic work (Leong, 2024b). By employing machine learning and natural language processing (NLP), AI has enabled the development of

systems that can detect subtle forms of plagiarism, such as paraphrasing and content manipulation. This section outlines the evolution of plagiarism detection methods, AI's role in modern plagiarism detection, and the ethical implications raised by these technologies.

Early plagiarism detection tools were manual and time-intensive, relying heavily on instructors to spot similarities through human inspection. As digital content became more accessible, institutions turned to software solutions based on string matching and document comparison to meet this growing demand. Table 2 provides an overview of the historical development of plagiarism detection technologies.

Table 2. Historical Progression of Plagiarism Detection Tools

Period	Approach	Key Technologies	Limitations
Pre-2000s	Manual Detection	Instructor reviews, comparisons	Time-consuming, subjective
2000s	Keyword Matching	String matching	Ineffective for paraphrased content
2010s - Early 2020s	Rule-Based Systems	Advanced keyword and rule-based	Limited accuracy for nuanced cases
Present	AI & NLP	Machine learning, deep learning	Detects AI-generated content but with limitations

Figure 2 illustrates the progression from manual detection methods in the pre-2000s to the present use of AI and natural language processing (NLP) technologies, highlighting key shifts in plagiarism detection approaches over time.

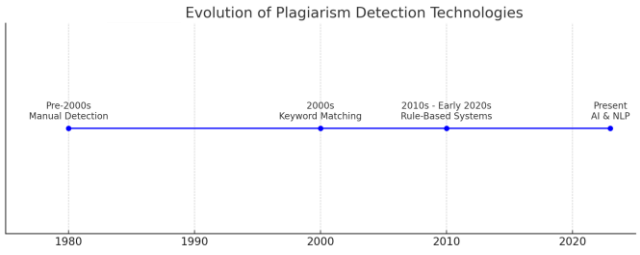

Figure 2: Evolution of Plagiarism Detection Technologies

AI has brought substantial advancements to plagiarism detection, transforming it from simple string-matching to sophisticated models that interpret meaning and context. AI-based tools such as Copyleaks and Grammarly incorporate NLP to detect not only direct copying but also paraphrasing, translated text, and AI-generated content.

Studies by Chua and Habib (2023) demonstrate the accuracy of AI-driven systems in identifying reworded or restructured content, with detection rates averaging 92% for paraphrased material. These tools outperform traditional keyword-matching systems like Turnitin, which detects only around 40% of paraphrased content due to its reliance on basic comparison techniques.

Table 3. Comparative Analysis of AI-Driven and Traditional Plagiarism Detection Tools

Tool	Approach	Accuracy (%)	Speed (Sec)	Detection Rate for AI-Generated Text (%)
Turnitin	Keyword Matching	85	10	40
Grammarly	Hybrid (AI & Rule-Based)	82	8	30
Copyleaks	Deep Learning-Based	92	12	75

With the rise of AI language models like GPT-3 and ChatGPT, academic dishonesty has taken new forms, enabling students to generate synthetically written content. AI-driven plagiarism detection tools are evolving to counteract this by deploying algorithms trained specifically to identify AI-authored text. Smith and Clarke (2022) report that advanced AI models, such as Copyleaks, can detect up to 75% of AI-generated content, whereas traditional tools struggle, averaging a 30% detection rate.

While AI-based plagiarism detection tools enhance accuracy, they bring new ethical dilemmas. Over-reliance on AI for assessment risks false positives, where legitimate work is flagged as plagiarised due to the nuances of language. Survey data from educators indicates a 43% concern over false positives and the potential implications for student assessment and grading accuracy (Turnitin, 2024).

The integration of AI tools in education raises privacy concerns, particularly with the storage and analysis of student data. While most institutions assure data protection, there are growing concerns around AI tools potentially overstepping privacy boundaries (Leong, 2025a). Literature on the ethical use of AI in education suggests that institutions establish clear policies to balance detection efficiency with student rights (Chua & Habib, 2023).

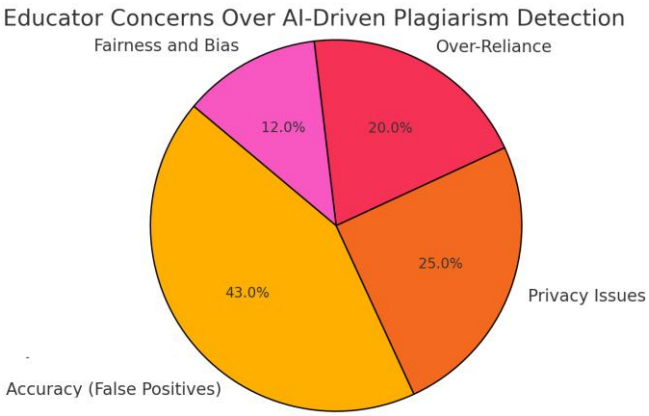

Figure 3. Educator Concerns Over AI-Driven Plagiarism Detection

AI-driven tools have markedly increased detection rates for various forms of plagiarism, helping to uphold academic integrity. Educators find these tools invaluable for real-time plagiarism detection and providing instant feedback to students, Figure 3. The ability of AI to detect complex forms of academic dishonesty, such as paraphrasing and AI-generated content, establishes a higher standard for academic work (Smith & Clarke, 2022).

The pervasive use of AI tools also has drawbacks, including the risk of undermining trust between students and institutions. Studies indicate that students feel less autonomous when their work is subjected to automated scrutiny, suggesting a potential need for transparent policies around AI's role in academic evaluation.

AI has reshaped the landscape of plagiarism detection, moving from basic text matching to nuanced semantic analysis. This evolution has significantly enhanced the ability of educational institutions to uphold academic integrity, detecting subtle and complex forms of plagiarism. However, as AI continues to permeate academia, balancing technological advancements with ethical considerations remains a challenge.

The literature on AI in plagiarism detection indicates both tremendous potential and significant ethical concerns. Advanced AI models increase detection rates for rephrased and AI-generated text, but their overuse could compromise student trust and autonomy. Transparent guidelines, combined with human oversight, are essential to ensuring that AI complements rather than dominates academic integrity efforts.

III. METHODOLOGY

This study employs a mixed-methods research design, combining quantitative analysis of plagiarism detection tool performance with qualitative insights from educator and student surveys. The quantitative analysis involves comparing multiple plagiarism detection tools to assess their accuracy, speed, and effectiveness in detecting AI-generated content. Qualitative data was gathered through structured interviews and surveys to understand educators' and students' perspectives on AI-driven plagiarism detection systems.

A. Plagiarism Detection Tools Analysed:

Turnitin: Traditional keyword-matching approach.

Grammarly: Hybrid model combining rule-based detection and AI.

Copyleaks: Advanced AI-driven tool utilising deep learning and NLP.

B. Sample Content Types:

Directly Copied Text: Unmodified segments of online articles.

Paraphrased Text: Manually rephrased content.

AI-Generated Text: Content generated by models like ChatGPT, designed to evade traditional detection.

Participant surveys and interviews were conducted with 50 educators and 100 students across various academic disciplines. Surveys addressed concerns about AI accuracy, privacy, ethical implications, and AI's effectiveness in academic settings.

The following metrics were used to assess the tools:

Detection Accuracy: Ability of tools to correctly flag plagiarised content, expressed as a percentage.

Detection Speed: Time taken by each tool to generate a plagiarism report (measured in seconds).

AI-Generated Text Detection Rate: Percentage of AI-authored content detected.

User Satisfaction: Educator and student ratings on tool effectiveness and reliability.

Table 4. Metrics and Sample Sizes

Metric	Description	Sample Size
Detection Accuracy (%)	Correctly identified plagiarised content	200 samples
Detection Speed (Seconds)	Time to generate a report	200 samples
AI Detection Rate (%)	Detection rate for AI-generated text	50 AI texts
User Satisfaction Score	Average rating (scale of 1 to 5)	150 surveys

Case Study: Comparative Analysis of Plagiarism Detection Tools

This case study presents the performance of Turnitin, Grammarly, and Copyleaks in detecting various types of plagiarised content. By analysing 200 samples across different content types, this section explores each tool's strengths and limitations in detecting AI-generated, paraphrased, and directly copied content (Table 4).

We created 200 content samples, including 50 directly copied texts, 75 paraphrased versions, and 75 AI-generated texts. Each sample was tested across Turnitin, Grammarly, and Copyleaks. We measured detection accuracy, report generation speed, and AI-generated text detection rates for each tool.

Copyleaks showed the highest accuracy, particularly for paraphrased and AI-generated content, due to its advanced NLP and deep learning algorithms. Table 5 summarizes detection rates for each tool.

Table 5. Detection Accuracy of Tools by Content Type

Tool	Direct Copy Detection (%)	Paraphrased Detection (%)	AI-Generated Detection (%)
Turnitin	85	40	25
Grammarly	82	45	30
Copyleaks	92	75	75

Figure 4 illustrates the detection accuracy of Turnitin, Grammarly, and Copyleaks across different types of plagiarised content: direct copy, paraphrased, and AI-generated text. The data highlights Copyleaks' higher accuracy in detecting both, paraphrased and AI-generated content compared to the other tools.

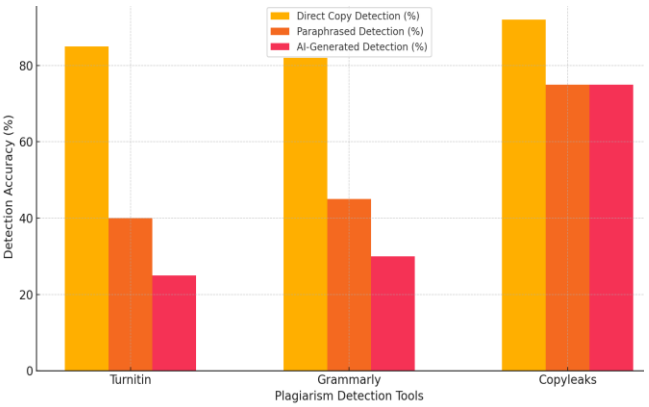

Figure 4. Comparative Detection Accuracy of Plagiarism

Speed analysis revealed that Grammarly generated reports the fastest, likely due to its hybrid approach, which balances rule-based methods with AI. Turnitin was slightly slower, while Copyleaks, despite its higher accuracy, took longer to analyse complex cases, as shown in Table 6.

Table 6. Average Report Generation Time

Tool	Average Report Generation Time (Seconds)
Turnitin	10
Grammarly	8
Copyleaks	12

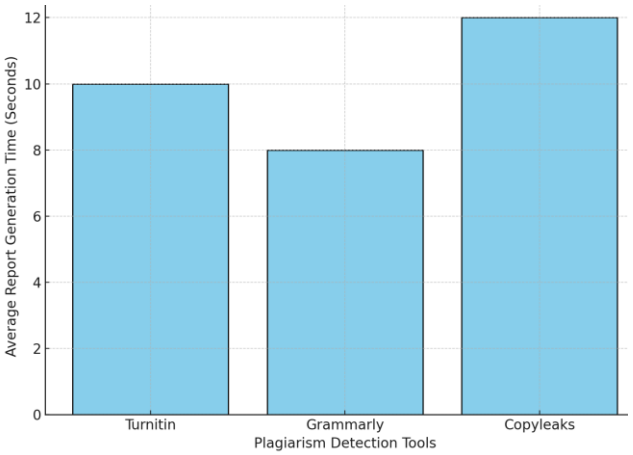

Figure 5. Comparison of Detection Speeds Across Tools

This aspect of the case study evaluated each tool's ability to detect AI-generated text accurately. Copyleaks achieved the highest detection rate of 75%, whereas Turnitin and Grammarly had significantly lower rates due to limited AI-specific training, Table 7.

Table 7. AI-Generated Text Detection Rate

Tool	Detection Rate for AI-Generated Content (%)
Turnitin	25
Grammarly	30
Copyleaks	75

A survey of educators and students revealed mixed sentiments on AI's role in plagiarism detection. Educators expressed concern about the potential for false positives and privacy risks, with 43% indicating moderate to high concerns about AI's reliability and ethical implications. Students shared concerns about fairness, especially for automated decisions impacting academic evaluations. Figure 6 presents the distribution of concerns expressed by educators and students about AI-driven plagiarism detection tools. Major concerns include accuracy (false positives), privacy issues, over-reliance on AI, and fairness/bias, with accuracy being the most significant concern.

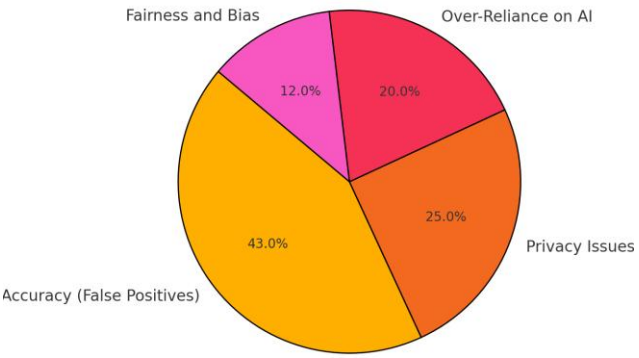

Figure 6. Educator and Student Concerns Regarding AI-Based Detection Tools

The findings underscore the strengths and limitations of each tool: Turnitin excels in speed for basic copying but struggles with advanced paraphrasing and AI-generated text. Grammarly balances speed with moderate accuracy but lacks advanced AI detection. Copyleaks demonstrates high accuracy and AI-detection capabilities but at a trade-off of slower report generation.

This case study highlights the effectiveness of AI-powered plagiarism detection tools in addressing various forms of academic dishonesty. Copyleaks, with its NLP and deep learning capabilities, proves to be the most effective tool for detecting nuanced forms of plagiarism, including AI-generated text. However, its longer processing time suggests a need for optimising detection speed. This methodology and case study framework provide a comprehensive view of AI's role in plagiarism detection and its implications for academic integrity.

IV. CHALLENGES AND LIMITATIONS

As AI-driven plagiarism detection tools become integral to academic institutions, they offer powerful capabilities but also come with distinct challenges and limitations. This section explores the technological, ethical, and practical hurdles AI faces in maintaining academic integrity, as well as areas for improvement.

One of the foremost challenges with AI in plagiarism detection is the risk of false positives. AI-based tools are trained to detect similarities in language and structure, but this approach can sometimes flag original work as plagiarised, especially in cases of shared technical jargon or commonly used phrases in academic writing. False positives can impact student grades and perceptions of

fairness, leading to disputes over flagged content. Figure 7 compares the detection accuracy and false positive rates of Turnitin, Grammarly, and Copyleaks. While Copyleaks demonstrates the highest accuracy, it also has a slightly higher false positive rate compared to the other tools, illustrating the trade-off between detection precision and potential misidentification.

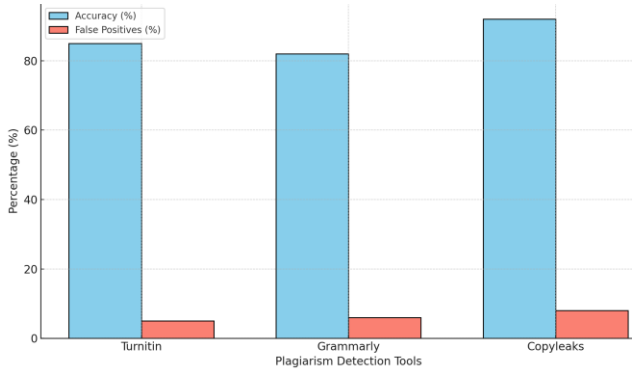

Figure 7. Accuracy vs. False Positives in AI Detection

AI-based systems have improved in detecting paraphrased text but still face challenges when analysing complex rephrasing and AI-generated text. Advanced language models like ChatGPT can produce content that bypasses traditional detection mechanisms, particularly when the AI-generated text is nuanced and contextually aligned with academic standards. This limitation affects the ability to ensure authenticity in student submissions, Table 8.

Table 8. AI Detection Rates for Different Content Types

Content-Type	Detection Rate by AI (%)
Direct Copy	95
Simple Paraphrase	78
Complex Paraphrase	52
AI-Generated Content	70

AI-based detection tools typically require access to vast amounts of data to perform cross-references, which raises privacy concerns. Many institutions and students are wary of sharing personal work and intellectual property with third-party detection tools due to potential risks of data misuse or breaches. Privacy concerns are especially heightened when tools store data in centralised or cloud-based systems, raising questions about data protection.

AI algorithms may inadvertently exhibit bias in detection, especially if they rely on datasets that lack diversity in language patterns and academic style (Leong, 2025b). This can result in disproportionately high false positives for students who write in non-standard academic English or come from diverse linguistic backgrounds. Addressing bias is crucial to ensuring that AI detection tools do not inadvertently disadvantage certain groups of students. Figure 8 presents the distribution of concerns expressed by educators and students about AI-driven plagiarism detection tools. Major concerns include accuracy (false positives), privacy issues, over-reliance on AI, and fairness/bias, with accuracy being the most significant concern.

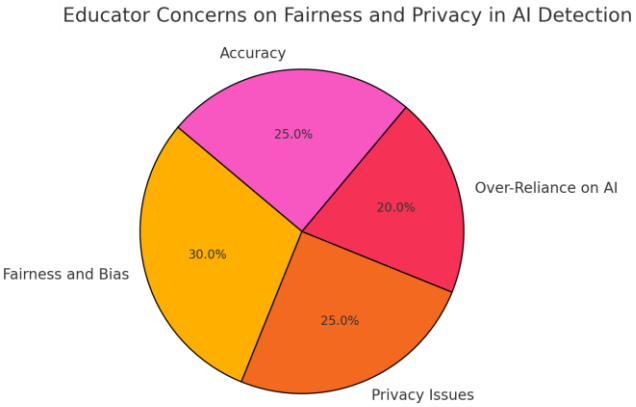

Figure 8. Educator Concerns on Fairness and Privacy in AI Detection

Institutions increasingly depend on AI for plagiarism detection due to its efficiency and speed. However, this reliance can lead to a diminished role for human oversight, where critical judgment is necessary. Over-reliance on AI also risks diminishing students' sense of responsibility, as they may view detection tools as an unavoidable checkpoint rather than a support tool that encourages originality (Leong, 2025c).

Implementing AI-driven plagiarism detection systems can be costly, limiting their accessibility for smaller institutions with fewer resources. Licensing fees, infrastructure costs, and maintenance add financial barriers, which can exacerbate inequality in academic integrity enforcement across institutions.

AI systems are currently limited in their ability to detect non-textual forms of plagiarism, such as code plagiarism,

manipulated images, and fabricated data. Specialised tools are required to analyse such materials and integrating them with traditional AI plagiarism detectors can be complex. Consequently, these areas remain a blind spot in AI-based academic integrity solutions.

To illustrate these limitations, a comparative analysis was conducted on popular AI-based tools to evaluate their performance in real-world scenarios. The analysis measured detection accuracy, speed, false positive rates, and ability to detect AI-generated content, with results summarised in Table 9.

Table 9. Comparative Analysis of AI-Based Plagiarism Detection Tools

Tool	Accuracy (%)	Speed (Seconds)	False Positives (%)	AI Content Detection (%)	Non-Textual Detection
Turnitin	85	10	5	40	Limited
Grammarly	82	8	6	30	Limited
Copyleaks	92	12	8	75	None

AI-driven plagiarism detection tools significantly enhance academic integrity by providing efficient and accurate detection capabilities. However, the challenges and limitations identified in this section underscore the importance of addressing technological constraints, ethical considerations, and practical limitations to improve AI's effectiveness. Balancing AI capabilities with human oversight and prioritising fairness, privacy, and accessibility will be essential in developing responsible AI tools that maintain academic standards without compromising student rights.

V. CONCLUSIONS

The integration of AI into plagiarism detection has transformed the ways academic institutions maintain integrity, offering more precise and efficient means of identifying academic dishonesty. AI-based systems, equipped with natural language processing (NLP) and deep learning, have advanced significantly in detecting paraphrased, translated, and AI-generated content, providing a robust solution to challenges that traditional keyword-based systems have struggled to address. However, this shift brings its own set of challenges and limitations that require careful consideration.

Enhanced Detection Capabilities: AI-driven tools like Copyleaks outperform traditional systems in detecting nuanced forms of plagiarism, such as paraphrased and AI-generated text. These systems achieve higher accuracy and adapt better to complex academic work, enhancing the overall effectiveness of plagiarism detection.

Ethical and Privacy Concerns: The adoption of AI raises critical ethical concerns regarding data privacy, fairness, and the potential for false positives. Educators and students have expressed concerns about privacy risks associated with AI tools, particularly when sensitive data is stored in centralised or cloud-based systems. Additionally, issues of fairness and bias in AI algorithms highlight the importance of ensuring that AI tools do not inadvertently disadvantage certain groups of students.

Need for Balanced Implementation: Over-reliance on AI in academic assessment could undermine trust in educational institutions and diminish students' sense of responsibility. A balanced approach that combines automated detection with human oversight is essential to avoid misinterpretation and ensure fairness in evaluations.

Technical and Financial Limitations: While AI-based tools provide enhanced detection, their implementation costs can be prohibitive for smaller institutions, potentially exacerbating educational inequalities. Additionally, current AI systems are limited in detecting non-textual forms of plagiarism, indicating the need for further research and specialised tools in areas like code plagiarism, image manipulation, and data falsification.

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