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Journal

2025 IEEE Frontiers in Education Conference (FIE), 00

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Publication Date

2025-11-05

DOI

10.1109/fie63693.2025.11328694

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Peer reviewed

A Comparative Analysis on Discernment of Human Versus AI-Generated Art

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Abstract—This Work-in-Progress paper, submitted under the *Engineering Ethics and Innovative Practice* track, explores an experiential approach to ethics education for upper-level undergraduates in Mechanical and Aerospace Engineering (MAE) and Art History. As generative artificial intelligence (AI)—including large language models and image-generation tools—becomes more accessible, the ability to create compelling but synthetic visual media has increased dramatically. This raises urgent ethical questions regarding authenticity, authorship, and the risk of deception, particularly in the context of so-called “deepfakes.” The 2023 ENISA Threat Landscape Report identified deepfakes as a critical threat to digital trust and public security. In response, this study examines how students from divergent academic disciplines evaluate the authenticity of visual artworks.

Participants engage in *Real or Fake*, an interactive multimedia game in which they assess 28 images to determine whether each was created by a human artist or by AI. A point-based scoring system records performance, and comparative analysis is conducted to examine differences in decision-making strategies. The game integrates concepts of Visual Commonsense Reasoning (VCR) and Visual Quotient Reasoning (VQR) to evaluate participants’ ability to detect stylistic, contextual, and semantic anomalies.

Preliminary results show that art history students outperform engineering students on average, suggesting that disciplinary training in visual analysis influences discernment ability. These findings highlight the value of integrating ethical reflection, AI literacy, and interpretive skills across technical and humanities curricula. The study contributes to the growing need for interdisciplinary pedagogy that equips students to critically engage with the implications of AI-generated media.

Keywords—deepfakes, artificial intelligence, human-generated art, discernment

I. INTRODUCTION

The advent of generative artificial intelligence (AI) has revolutionized visual content creation, enabling the production of images that closely mimic human artistry. While these advancements democratize art creation, they also blur the lines between authentic and synthetic works, raising ethical concerns about authorship, authenticity, and the potential for misinformation.

This study aims to investigate the discernment abilities of upper-level Mechanical and Aerospace Engineering (MAE) and Art History undergraduates in distinguishing between human-created and AI-generated art. By employing an interactive, game-based methodology that incorporates Visual Commonsense Reasoning (VCR) and Visual Quotient Reasoning (VQR), the research seeks to enhance critical evaluation skills and promote ethical awareness in AI applications.

II. BACKGROUND AND RELATED WORK

Generative AI models, such as Generative Adversarial Networks (GANs) and diffusion models, have achieved remarkable success in producing high-fidelity images often indistinguishable from those created by humans. This technological leap has led to the emergence of “deepfakes,” synthetic media that can deceive viewers regarding their authenticity. The European Union Agency for Cybersecurity (ENISA) has identified deepfakes as a significant threat to digital security and public trust, emphasizing the need for robust detection mechanisms and ethical guidelines to mitigate associated risks [1]. As AI systems increasingly surpass human performance in cognitive tasks such as reading comprehension and visual reasoning, their potential to manipulate perception becomes more pronounced. Furthermore, recent advancements in AI-driven image synthesis have demonstrated capabilities that challenge traditional artistic discernment. This study investigates how students from two distinct academic disciplines—engineering and art history—differ in their ability to distinguish between human-created and AI-generated art. Using an interactive, game-based approach incorporating Visual Commonsense Reasoning (VCR) and trained Visual Quotient Reasoning (VQR), the study aims to enhance participants’ critical evaluation skills and promote ethical awareness in AI applications.

The integration of AI into art has sparked debates about the ethical implications of using AI-generated content, particularly concerning issues of copyright, originality, and the potential devaluation of human artistic labor. McCormack et al. discuss the challenges surrounding autonomy, authenticity, authorship, and intention in computer-generated art, highlighting the complexities introduced by AI in the creative process [2].

Educational institutions increasingly recognize the importance of interdisciplinary approaches to AI ethics education. Grosz et al. advocate for integrating ethical reasoning into computer science curricula, emphasizing the need for students to consider the societal impacts of the technologies they develop [3]. Similarly, Tadimalla and Maher propose an adjustable interdisciplinary socio-technical curriculum to promote AI literacy across various educational contexts, highlighting the importance of understanding AI's ethical and societal implications [4].

This study builds upon these foundations by exploring how students from different academic disciplines perceive and evaluate AI-generated art, aiming to inform the development of educational strategies that foster critical thinking and ethical awareness in emerging technologies.

III. PEDAGOGICAL FRAMEWORK

3.1 Integration of Ethics into Engineering and Humanities Education

Integrating ethics across disciplines has emerged as a critical challenge in engineering education, particularly given the pervasive role of artificial intelligence in reshaping creative and cognitive domains. This study builds on existing interdisciplinary instructional approaches that advocate embedding ethical reflection directly into technical and creative problem-solving contexts [5]. In previous work, Gerardo and de Callafon (2022) and Gerardo, de Callafon, and Boechler (2023) demonstrated effective methods of integrating systems engineering and ethics in undergraduate curricula, emphasizing narrative scenarios, interactive modules and team-based evaluation exercises [6], [7]. These approaches are particularly relevant when examining the ethical dimensions of AI-generated content and its impact on public trust and professional responsibility. Art history students bring interpretive skills that complement engineers' technical analytic strengths, allowing for a richer, bidirectional learning experience.

3.2 Learning Objectives: Critical Analysis, Ethical Reflection, and AI Literacy

The pedagogical strategy outlined in this study focuses on three core learning objectives. First, students are trained to analyze visual information using formalist and contextual techniques critically. This skill is vital for identifying image inconsistencies or anomalies that may suggest algorithmic generation. Second, ethical reflection is fostered through scenario-based discussions around authorship, authenticity, and the societal impacts of misrepresentation through synthetic media [8]. Third, students develop AI literacy by understanding how image generation models function, their training datasets, and the limitations and risks associated with generative models [9]. This trifocal approach encourages students to identify what an image is and reflect on why and how it was produced and what ethical questions it raises.

3.3 Theoretical Foundations: Visual Commonsense Reasoning (VCR) and Visual Quotient Reasoning (VQR)

This curriculum incorporates frameworks grounded in Visual Commonsense Reasoning (VCR) and the emerging concept of Visual Quotient Reasoning (VQR). VCR tasks evaluate a system's ability to answer questions about images emphasizing contextual and relational understanding and modeling human-like inferences about scenes [10]. In contrast, VQR emphasizes the human capacity to perform visual judgments by integrating cultural, aesthetic, and technical cues—skills often honed in engineering (pattern recognition, data visualization) and art history (iconographic analysis, stylistic taxonomy). By leveraging these frameworks within the interactive game, the study assesses how students synthesize reasoning styles across disciplines to make informed judgments about authenticity in art.

IV. METHODOLOGY

This study employs a mixed-methods design to evaluate differences in discernment abilities among participants when identifying human-made versus AI-generated visual art. The central tool for data collection is an interactive multimedia game titled *Real or Fake*, reportedly co-developed by cybersecurity engineer Kevin Tellier and Marie Clemenceau, a doctoral candidate in art history at the Sorbonne. No public academic references to this game are available at the time of this writing; the following description is based on internal documentation.

4.1 Experimental Design

The *Real or Fake* game is comprised of 28 distinct images presented sequentially. For each image, participants must choose between “Real” if they believe the work was created by a human artist or “Fake” if they suspect it was generated by artificial intelligence. Participants are given seven minutes to review and decide on each image. They are also asked to provide their name (optional) and occupational or educational background. Players are explicitly discouraged from consulting the internet or external sources to maintain data integrity and simulate real-world judgment conditions. Instead, they must rely solely on their intuition, prior disciplinary knowledge, and personal aesthetic reasoning.

4.2 Participant Sampling

The study recruited 170 participants from diverse professional and academic backgrounds, including engineers, security analysts, curators, art history students, Ph.D. candidates in art history, art historians, and individuals from other fields such as veterinary medicine, osteopathy, filmmaking, psychology, and 3D art. This stratified sampling approach examines whether domain-specific training impacts the ability to recognize stylistic anomalies, inconsistencies, or contextual incongruities characteristic of AI-generated imagery. According to the study, conducted between March through June, 2025, 54% self-identified as male, 46% self-identified as female. The majority

of respondents were between the ages of 20 to 35 years old. Most of the respondents had a Bachelor's or a Master's Degree. 50 people identified as either Art Historian or having studied art history, 80 people were engineers, and 40 were in another category.

4.3 Data Collection and Scoring

Each participant's response was automatically logged and scored. Correct identifications (i.e., matching ground truth labels) were assigned one point. A cumulative score was then calculated for each participant and aggregated at the group level based on professional or academic background.

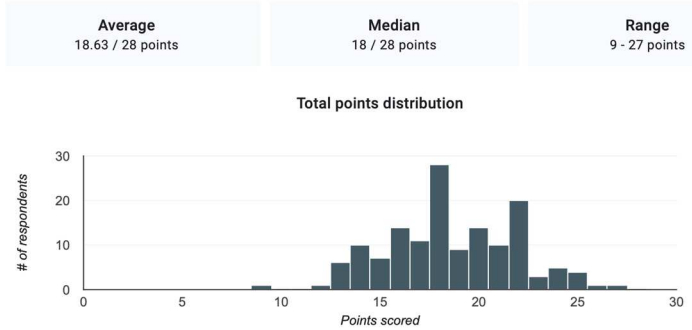


Fig. 1. Total points distribution.

4.4 Data Analysis

Quantitative data were analyzed using inferential statistical methods, including independent samples t-tests and analysis of variance (ANOVA), to determine whether statistically significant differences exist between the various cohorts. Qualitative data, including optional open-ended justifications for responses, were coded and analyzed thematically to understand the heuristic strategies employed by participants. This multimodal approach allows for a comprehensive evaluation of the accuracy and underlying cognitive and disciplinary processes that inform the discernment of artistic authenticity in an era of proliferating synthetic media.

V. PRELIMINARY RESULTS AND DISCUSSION

The *Real or Fake* study gathered 170 responses from individuals representing diverse academic and professional backgrounds. Participants were asked to identify whether 28 images were generated by artificial intelligence or created by human artists. Performance was scored by awarding one point for each correct identification, for a maximum possible score of 28.

5.1 Participant Group Performance

Participants were categorized based on their self-reported backgrounds. These included engineers (n=60), security analysts or those in related technical fields (n=20), art history students (n=50), and individuals from varied disciplines such as art historians, curators, filmmakers, psychologists, veterinarians, and 3D artists (n=40).

Notably, participants with formal art historical training outperformed other groups. The two self-identified art historians had the highest average score of 22.00, followed by art students and animation artists, who also achieved averages above 21.00. Art history students—forming the largest single non-engineering group—achieved an average score of 19.86 (SD = 3.47), significantly higher than both engineers (18.16, SD = 3.11) and those in cybersecurity-related roles (18.72, SD = 2.67). See Figure 1.

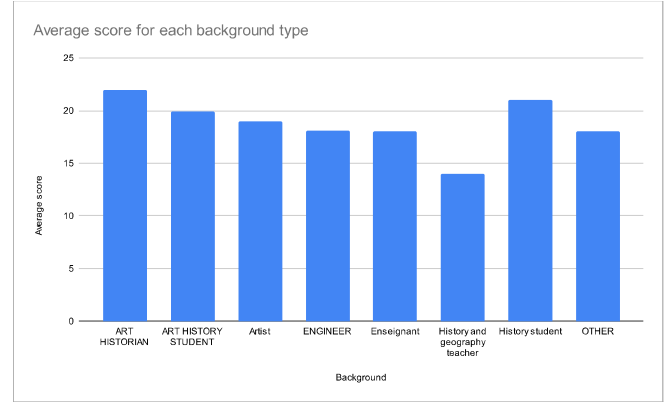


Fig. 2. Average score for each background type.

A one-way ANOVA (Analysis of Variance) is a statistical method used to determine whether there are significant differences in the means of three or more independent groups.

In this case, we are comparing the average game scores across four groups:

- Art History Students
- Engineers
- Cybersecurity Professionals
- Others (curators, filmmakers, etc.)

Between-group variance measures how far each group's mean is from the overall mean.

Within-group variance measures how spread out individual scores are within each group.

The F-statistic is the ratio of these two variances. A higher F value suggests the group means are more different from each other than you'd expect by random chance.

If the resulting p-value is low (typically < 0.05), we reject the null hypothesis and conclude that not all group means are equal. In this study, the results of the one-way ANOVA test are:

- $F(3, 166) = 6.94$
- $p\text{-value} = 0.0002$

Since the p-value is less than 0.05, there is a statistically significant difference in the average scores among at least one pair of the four groups (Art History Students, Engineers, Cybersecurity, Others).

To determine which groups differ significantly, a Tukey HSD post-hoc test was conducted. The Tukey HSD (Honestly

Significant Difference) test is a post-hoc analysis used after a one-way ANOVA shows a significant difference. It compares all possible pairs of group means to determine which specific groups differ significantly from each other and by how much.

It controls for Type I error across multiple comparisons—so it is more reliable than running multiple t-tests. The Tukey HSD statistic is calculated as:

$$HSD = q_{\alpha, k, df_{within}} \cdot \sqrt{MS_{within} / n}$$

Where:

- $q_{\alpha, k, df_{within}}$ = Studentized range statistic (based on the number of groups k , degrees of freedom for within-groups, and significance level α)
- MS_{within} = Mean Square Within Groups (pooled variance estimate from ANOVA)
- n = number of subjects per group (or harmonic mean if unequal)
- HSD = minimum difference required between two means to be considered significant

Then for each pair of groups (e.g., group A vs. group B), the mean difference is compared against the HSD:

If $|\bar{X}_A - \bar{X}_B| > HSD$, the difference is significant.

Comparison: Art History Students vs. Engineers

- Mean Difference: Approximately 1.70 points
- 95% Confidence Interval: This difference falls outside the range that would be expected by chance, indicating a real gap in performance.
- p-value: < 0.05 (statistically significant)

Interpretation: Art History Students scored significantly higher than Engineers in their ability to distinguish AI-generated from human-generated art. This supports the hypothesis that disciplinary background—especially in visual analysis—impacts discernment ability.

Comparison: Art History Students vs. Cybersecurity Professionals

- Mean Difference: Approximately 1.14 points
- P-value: Slightly above 0.05 (depending on variance structure may or may not be significant.)

Interpretation: Art History Students outperformed Cybersecurity professionals, but the difference may not reach statistical significance at the 95% confidence level. Further testing with larger cybersecurity sample sizes may clarify this trend.

Comparison: Comparison: Art History Students vs. Others (Curators, Filmmakers, etc.)

- Mean Difference: Approximately 0.86 points
- p-value: > 0.05

Interpretation: No significant difference was found between Art History Students and those in other disciplines such as curators,

filmmakers, etc. This suggests that domain-adjacent fields may foster similar skills in visual discernment.

Comparison: Comparison: Engineers vs. Others (Curators, Filmmakers, etc.)

- Mean Difference: Approximately -0.84 points
- p-value: > 0.05

Interpretation: Engineers scored lower, but not significantly, than participants in Other creative or academic domains.

These results suggest that domain-specific expertise in visual and contextual analysis may confer an advantage in detecting AI-generated imagery. As visual literacy is a foundational component of art historical training, these participants may be more attuned to stylistic inconsistencies or iconographic anachronisms often embedded in synthetic images [11].

5.2 Implications for Interdisciplinary Education

While participants from technical fields (engineering and cybersecurity) performed moderately well, their performance showed more significant variability, particularly among those who scored below the median. This dispersion may reflect less formal exposure to evaluating artistic authenticity or aesthetic nuance.

These findings support prior literature emphasizing the importance of integrating humanistic and visual critical reasoning into STEM curricula. Educators such as McCormack et al. and Grosz et al. argue that ethical reasoning and interpretive skills are essential to the responsible development and evaluation of AI technologies. The higher performance of participants with humanities backgrounds in this study underscores the importance of interdisciplinary approaches in AI ethics education.

The data also reinforce calls for fostering AI literacy not just through technical proficiency and cognitive tools that enable evaluation, skepticism, and critical interpretation of outputs from generative systems.

VI. CONCLUSIONS

This study presents early findings from an interdisciplinary investigation into how individuals from different academic and professional backgrounds discern between AI-generated and human-created artworks. The results of the *Real or Fake* game demonstrate that participants with training in visual analysis—particularly those in art history and related humanities fields—outperformed their counterparts in technical fields such as engineering and cybersecurity. These findings support the assertion that visual literacy and contextual reasoning are essential competencies for navigating the growing presence of synthetic media in both cultural and technical domains.

From an educational perspective, these results affirm the value of integrating ethics, critical analysis, and AI literacy into STEM and humanities curricula alike. The inclusion of interdisciplinary, experiential tools—such as the *Real or Fake* game—offers a promising pathway for engaging students in reflective practice and applied ethical reasoning. These interactive pedagogies help illuminate how disciplinary training

influences perception, pattern recognition, and judgment in the face of emerging technologies that challenge conventional notions of authenticity and authorship.

As generative AI technologies continue to proliferate, so too does the urgency of preparing students to interpret and ethically respond to synthetic content critically. Future research will focus on refining the assessment framework, broadening the participant pool, and integrating this experiential approach into formal course modules across engineering ethics and digital humanities. Ultimately, this work contributes to the growing imperative of equipping future engineers, artists, and scholars with the evaluative tools necessary to preserve human discernment, artistic integrity, and ethical accountability in the age of AI.

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