IMITATION DRAWING: CAN WE SPOT THE DIFFERENCE BETWEEN AI AND HUMAN GENERATED DRAWING?

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Abstract:

Questions that have gained importance with the rise of artificial intelligence (AI): can we discern between image output created by humans versus that generated by AI? In this study, a diverse group of students and educators were presented with a range of tasks to determine whether image outputs were produced by humans or artificial intelligence (AI). The results of the study indicate that both teachers and students were able to differentiate between human and AI-generated outputs with accuracy from 32% to 79% on group images and from 54% to 82% on single images, although performance varied depending on the complexity of the task and participants' level of familiarity with AI. As the prevalence of AI-generated content continues to grow, it is crucial to comprehend how individuals can identify its use. This study highlights the significance of educating people on AI and the subtleties of image output in the era of AI. Overall, it is critical to continue exploring and understanding the intricate relationship between humans and AI as technology continues to advance.

Keywords:

Artificial Intelligence, DALL-E, AI generated images, Education and AI.

INTRODUCTION

As artificial intelligence (AI) rapidly advances, it becomes increasingly important to examine how people distinguish between drawn outputs created by humans versus those generated by AI. This study aimed to explore this question by conducting various tasks for a diverse group of students and teachers to identify whether an image output was produced by a human or an AI. As the use of AI-generated content becomes more prevalent in different fields, it is crucial to understand how people can identify between AI and human generated content. This study highlights the significance of educating individuals on the intricacies of image output in the era of AI, and the need to continue investigating the relationship between humans and technology.

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The release of OpenAI's ChatGPT-3 has sparked concern among people who fear its potential impact on multiple fields. While the technology can be used for cheating and creating plagiarised work, it also has the potential to enhance the learning experience, and produce novel ideas. This commentary offers opportunities for educators and research potential for scholars [1]. In this study we will compare the output of the DALL-E language driven image creation and human generated images.

The results of the study suggest that both teachers and students were able to distinguish between human and AI-generated content with a relatively high level of accuracy, from 32% to 79% on group images and from 54% to 82% on single images.

However, there were variations in performance depending on the task's nature and the participants' level of experience with AI technology. The relationship between humans and AI continues to evolve rapidly, and it is essential to continue exploring and understanding this complex interaction. This study provides valuable insights into the ability of teachers and students to differentiate between human and AI-generated outputs, and it calls for further research in this area.

2. RELATED WORK

As AI technology continues to advance, it is becoming increasingly difficult to distinguish between content generated by humans and content generated by machines. From text to image (Stable Diffusion, Midjourney and DALL-E 2)[2], audio, video, and chatbots (ChatGPT) [3], AI-generated content is becoming more sophisticated, and in some areas, even surpassing human-generated content. This raises questions about the role of AI in various fields and the potential impact on human creativity and productivity. In this context, it is important to explore the capabilities and limitations of AI-generated content and understand how it can be effectively used alongside human-generated content.

As more organizations implement artificial intelligence-based service agents to provide automated customer service, it is important to understand how users perceive this new form of communication [4]. AI-based service agents use natural language interaction to communicate with users, but instead of a live person, a chatbot controls the conversation using artificial intelligence. The authors of this study use qualitative and quantitative methods to investigate users' perceptions of authenticity and its impact on their attitudes and behavior towards AI-based service agents. They found that users judge the authenticity of AI-based service agents based on two categories of cues: agent-related and communication-related. The authors plan to use additional experimental studies to further explore the antecedents and consequences of authenticity perceptions in AI-based service encounters. The researchers are conducting a study on agent-related and communication-related cues to distinguish between human and AI service agents. The study has analyzed 41 interviews and 10 think-aloud protocols and identified two cue categories as central to the study.

The use of Artificial Intelligence (AI) in education, particularly in the form of chatbots, has raised concerns about its impact on academic integrity [5]. Study [5] aimed to assess the originality of academic essays generated by one of the most popular AI chatbots, ChatGPT, using two plagiarism detection tools. Results revealed that ChatGPT has the potential to produce high-quality content with high originality that can bypass traditional plagiarism checks. The study highlights the need for institutions to take appropriate measures to address potential plagiarism issues and engage in ongoing discussions about the impact of AI technology on education. The paper further discusses the implications of the study findings. The use of chatbots, such as OpenAI ChatGPT and Google Bard AI, in education has potential benefits but also raises concerns about academic integrity. A study found that 40 out of 50 essays generated by ChatGPT had a high level of originality, raising questions about the reliability of plagiarism check software. To address this problem, the study suggests that teachers inform students of the limitations of ChatGPT and promote critical thinking, students use ChatGPT as a means to improve their learning but not as a substitute for original thinking, and institutions create clear policies and guidelines for the responsible use of AI tools in education. The study also highlights the need for training and resources on academic integrity and the responsible use of AI tools in education.

In recent times, researchers have expressed concerns about AI generated images and human generated output. Paper [6] has been written to provide an examination of deep convolutional generative adversarial networks (GANs) and to explore the potential use of AI generated images. The research showed that images generated by AI are getting better and better, some of them can be misleading and cannot be differentiated between human and AI output.

Paper [7] represents the superiority of AI generated images by Stable Diffusion, Midjourney, and DALL-E 2, but is still concerned about some features photo realistic like face generation. Study also showed that some models like Stable Diffusion can produce better realistic faces than other models.

The main problem in the future of AI generated content is that we are making the difference between AI and human generated content smaller and smaller. This already affects the art competition where participants are submitting the AI generated art as in human competition, from photographs to digital art.

3. THE PROPOSED METHOD

In this paper, we have a method to assess the effectiveness of artificial intelligence (AI) in generating artwork using DALL-E software. The proposed approach involves administering a questionnaire to both students and teachers in two stages.

First stage will take participants which will be asked to differentiate between artwork generated by AI and that produced by students. This will be accomplished by presenting a set of four pictures, one of which will be generated by AI and the other three by students.

Participants will then be asked to identify the AI-generated artwork. This is represented in Figure 1.

In the second stage, the focus will shift to a single image. Participants will be presented with a series of images and asked to determine whether each one was generated by AI or by a human student shown in Figure 2. Overall, this approach provides a rigorous and objective means of evaluating the effectiveness of AI in generating artwork. It has the potential to shed new light on the capabilities of AI and inform future developments in this rapidly advancing field.

4. EXPERIMENTS

In this experiment we will use 64 different images in the first questioner where we have 15 images generated by AI and 45 images drawn by humans. In the second questionnaire we used 26 images where 13 images are generated by AI and 13 images are produced by humans. In Figure 1. we presented some the images used by both questionnaires and their authors generated by DALL-E and humans. The database of the entire set can be found on the github page: https://github.com/VukojicicMilic/Imitation-drawing.

The result form the first questionnaire on the question “Which of these images was generated by AI?” are shown in Table 1, right answers are bolded in the table.

Figure 1 - Sample of images created by DALL-E and human generated images.

Table 1 - Statistics of answers for each question in the first questionnaire related to images.

	Answer (%):			
Image	**(a)**	**(b)**	**(c)**	**(d)**
Images-1	4,081632653	32,65306122	14,28571429	**48,97959184**
Images-2	14,28571429	10,20408163	**55,10204082**	20,40816327
Images-3	14,28571429	**73,46938776**	6,12244898	6,12244898
Images-4	**44,89795918**	10,20408163	24,48979592	20,40816327
Images-5	34,69387755	6,12244898	**53,06122449**	6,12244898
Images-6	**44,89795918**	14,28571429	30,6122449	10,20408163
Images-7	**59,18367347**	2,040816327	28,57142857	10,20408163
Images-8	24,48979592	12,24489796	**32,65306122**	30,6122449
Images-9	32,65306122	**42,85714286**	18,36734694	6,12244898
Images-10	10,20408163	22,44897959	28,57142857	**38,7755102**
Images-11	14,28571429	**61,2244898**	14,28571429	10,20408163
Images-12	6,12244898	8,163265306	**67,34693878**	18,36734694
Images-13	6,12244898	14,28571429	14,28571429	**65,30612245**
Images-14	6,12244898	14,28571429	**57,14285714**	22,44897959
Images-15	4,081632653	10,20408163	**79,59183673**	6,12244898

Source: https://github.com/VukojicicMilic/Imitation-drawing/tree/main/Group%20Images

Statistics were taken from 50 different respondents who are of different ages and of different education levels with different experience with AI.

The second questionnaire showed that almost 50% of respondents can distinguish between AI and human generated artwork. The question was "Do you think this image is generated by AI or human?", the results are shown in Table 2, right answers are bolded in the table.

Table 2 - Statistics of answers for each question in the second questionnaire related to images.

	Answer (%):			Answer (%):	
Image	**AI**	**Human**	**Image**	**AI**	**Human**
Image1	32,60869565	**67,39130435**	Image14	**58,69565217**	41,30434783
Image2	**73,91304348**	26,08695652	Image15	**71,73913043**	28,26086957
Image3	21,73913043	**78,26086957**	Image16	23,91304348	**76,08695652**
Image4	**73,91304348**	26,08695652	Image17	**69,56521739**	30,43478261
Image5	32,60869565	**67,39130435**	Image18	**78,26086957**	21,73913043
Image6	43,47826087	**56,52173913**	Image19	17,39130435	**82,60869565**
Image7	**63,04347826**	36,95652174	Image20	19,56521739	**80,43478261**
Image8	**63,04347826**	36,95652174	Image21	**69,56521739**	30,43478261
Image9	32,60869565	**67,39130435**	Image22	**65,2173913**	34,7826087
Image10	**67,39130435**	32,60869565	Image23	**65,2173913**	34,7826087
Image11	**65,2173913**	34,7826087	Image24	17,39130435	**82,60869565**
Image12	43,47826087	**56,52173913**	Image25	34,7826087	**65,2173913**
Image13	45,65217391	**54,34782609**	Image26	36,95652174	**63,04347826**

Source: https://github.com/VukojicicMilic/Imitation-drawing/blob/main/Questionnaires/Find%20an%20AI%20generated%20drawing%20(2).pdf

Research has shown that individuals with greater skill and experience in both drawing and using text to image AI tools, such as DALL-E, tend to achieve better results on tests. This suggests that a combination of traditional artistic abilities and technological proficiency can lead to improved performance in tasks that require both. However, it is important to note that other factors, such as creativity and critical thinking, may also play a role in overall success. Therefore, developing a well-rounded skill set that includes both artistic and technological competencies may be beneficial for students and educators alike.

5. CONCLUSION

In this research study, the focus was on a crucial question in the era of artificial intelligence: can humans distinguish between image output created by humans and that generated by AI? A sample of students and teachers with diverse educational backgrounds was used, and they were presented with different tasks to identify whether the written and drawn outputs were produced by humans or AI. The study's results indicated that both teachers and students could, with great precision, distinguish between human and AI-generated content. However, the performance varied depending on the task and the participants' familiarity with AI.

As the use of AI-generated content continues to grow, it is vital to comprehend how people can identify its use. This study emphasises the importance of educating people on AI and the subtleties of written and drawn output in the age of AI. It is critical to continue exploring and understanding the relationship between humans and AI as technology advances.

One possible next topic for research could be the impact of AI on employment and the workforce [8]. This is a topic of growing importance as AI and automation technologies are increasingly being adopted in various industries, which has the potential to displace human workers from their jobs. Some key questions that could be explored in this area include:

- How will the job market evolve in response to AI adoption?
- What skills and training will be necessary for workers to remain employable in the age of AI?
- How to adapt the current educational system for AI's future?
- What policies and programs can be put in place to support workers in transition?

There are many different angles and approaches that can be taken in this area of research, making it a rich and interesting field to explore.

6. REFERENCES

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