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Robots over humans? The place of artificial intelligence in the pedagogy of art direction in film education

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Abstract: Discourses on artificial intelligence (AI) in the field of art direction have not gained enough attention, although its use is becoming more predominant in the rapidly evolving technologically driven filmmaking world. Largely, AI has taken over various aspects of the filmmaking process from pre-production, and production to postproduction. Apart from its major influence on the role of an art director, the incorporation of AI in filmmaking enhances the functions of producers, screenwriters, directors, cinematographers, editors, sound designers, and animators. This qualitative paper approach rides on a rapid review design based on the selection of scholarly articles drawn from databases such as Google Scholar, Elsevier, IEEEX Xplore, and ACM Digital Library, using artificial intelligence, art direction, and filmmaking as vocabulary for search. It aims to outline the benefits of integration of AI in art direction pedagogy in film education. Also, it highlights the challenges and potential solutions of the integration of AI in art direction pedagogy in film education. The findings of this review show that AI enhances set design and simulates lighting in the creation of film worlds. Also, AI has the ability to create three-dimensional (3D) and realistic complex props rapidly. In addition, AI has the ability to analyze and generate design renderings in costume design and make-up efficiently. Notwithstanding, it brings to the fore that the integration of AI in teaching art direction poses some challenges such as awareness and understanding of tools, as well as ethical implications to data privacy and algorithmic bias. The paper recommends that educational institutions offering film art direction curricula should embrace this technology and equip teachers with the necessary training and support to teach them effectively. Also, the institutions must take measures to control ethical issues and data-driven policies.

Keywords: Art direction, Artificial intelligence, Film education, Filmmaking, Pedagogy

1. Introduction

Artificial Intelligence (AI) has transformed all facets of human lives and keeps affecting most industries especially filmmaking (Chai, 2020; Chow, 2020; Mo & Zhao, 2020; Sun, 2020). According to Mutlu (2020), artificial intelligence software like *Cinelytic*, *Scriptbook*, and *LargoAI* plays major roles in data-driven filmmaking. For instance, *Scriptbook* enables movie producers or directors to upload a PDF (portable document format) version of their scripts and, within minutes, they receive a detailed report about the films from their character analysis to target an audience, and *LargoAI* enhances reports about potential audience. *Cinelytic* software's main feature also has the ability to provide predictions regarding casting, which presents information about actors' fame and appropriateness for a film project. Thus, the adoption and integration of AI into the training of every aspect of filmmaking has become a necessity. Among these filmmaking specialties

is the field of film and television art direction, where art directors work with other design personnel to create or recreate convincing or believable settings in order to tell stories visually on screen. The integration of AI tools in film art direction pedagogy in film education presents a new border for teachers and students in developing countries. Generally, this type of teaching pedagogy is new to teaching faculty and students in film institutions globally. AI technologies have the potential to enhance the learning experience of students and equip them with the skills necessary to navigate the ever-evolving landscape of the film and television industry. According to Berman et al. (2018), incorporating AI into the classroom can lead to improved student engagement and performance. AI can also provide students with personalized learning experiences tailored to their individual needs and learning styles (Chen & Zhan, 2019). With the advent of artificial intelligence (AI), there is an opportunity to improve the design process and enhance the learning experience of students in these fields. Art direction is a field of filmmaking that involves the design and creation of backgrounds in film and television (Fischer, 2015: Rizzo, 2015; Shorter, 2012; Whitlock, 2013). In addition, it involves the interpretation of a film or TV script into visuals through elements such as sets, props, costumes and make-up in communicating to an audience. Therefore, the aforementioned visual elements in the likes of set design, props, costume and make-up are relevant branches of film art direction that require creativity, technical skills, and attention to detail (Rizzo, 2015).

Artificial intelligence seems to be gaining attention and brings new dimensions in film art direction and its pedagogy. This calls for a pressing need for teachers and learners to take advantage of this technology. However, S. J. asserted, "Although I am not a stranger to AI tools or applications for film production design or art direction, I have not thoroughly explored them to apply them in teaching. Personally, I believe that students studying film art direction should be proficient in traditional methods of creating design concepts in addition to employing this technology" (personal communication, May 21, 2023). Also, G. B. expressed a fear that this new technology may kill the creativity of film art direction students and affect their imaginative abilities or skills in film design (personal communication, April 30, 2023). Therefore, this paper outlines the benefits of integration of AI in art direction pedagogy in film education. Also, it highlights the challenges and potential solutions of the integration of AI in art direction pedagogy in film education. Hence, the following research questions guided the review:

- RQ 1: What are the benefits of integration of AI in art direction pedagogy in film education?
- RQ 2: What are the challenges and potential solutions of the integration of AI in art direction pedagogy in film education?

2. Literature review

Conceptualizing Artificial intelligence

The emergence of AI has been there for some decades now and keeps evolving. Recently, due to technological innovations, AI has improved and changed human lives dramatically transforming various industries globally. Although this narrative may seem to affect the entire labour market in the future, the thoughts of robots taking over human activities must be embraced and accepted as a new genre (Park, 2017). The terminology *artificial intelligence* AI was first devised in 1956, by John McCarthy, a computer scientist, at the Dartmouth conference, in Dartmouth College, Hanover which began the investigation of AI as a field of study. Initially, it saw some hindrances until the 1990s, and later in the 2000s, when intelligence agents realised and showed much interest in exploring coupled effects of perceptions and actions (McCarthy, 2000). Later on, the availability of big data in the 2000s revived AI demand and has garnered success in various fields to date (LeCun, Bengio & Hinton 2015). Nunan and Di Domenico (2019) refer to big data as the explosive growth of data which is mainly due to technological advancements in data storage. As businesses grow all over the world, data increases and therefore a demand for bigger storage spaces. From that perspective, robbing in robotic mechanisms to execute human duties has become a requirement. The meaning of AI is shrouded with several ambiguities as to its core definition; however, a plethora of studies explains AI as the ability to train computers to do tasks that normally require human intelligence (Boden, 1996; Huan & Rust, 2018; Leg & Hunter, 2007; Wang, 2019).

Simply put it, artificial intelligence, or AI for short, is a collection of hardware and software systems capable of giving computing units skills that appear to mimic human cognitive abilities. This goes to affirm McCarthy's (2011) explanation of AI as the engineering and science of creating intelligent machines, particularly intelligent computer programmes (2011). In that perspective, artificial intelligence (AI) can also

be clarified as the practice of utilizing highly complex systems to handle enormous amounts of data in order to replicate human behaviour or thinking processes. Therefore, it must be noted as one of the important branches of computer science and a frontier area of technology that is highly supported and revered globally (Zhu & Zhang, 2022). In the opinion of the authors, the aforementioned submissions further foster that artificial intelligence is created out of computers which ceases to be natural but fake, that is robots are able to imitate human actions when they are fed with information. However, if these tools are able to make human tasks easy and deliver on time, they must be accepted and explored enough as far as technology is concerned. In addition, AI has the potential to transform the role of an art director in filmmaking. Currently, Open AI has developed some tools available to film art directors such as *Midjourney*, *DALL-E, Stable Diffusion* and *Ebsynth* that can enhance their work and enable them to deliver within a blink of an eye.

3. Methodology

Artificial intelligence is an evolving field and a grey area in film art direction scholarship which has limited access to literature. To stir up interest in AI from film institutions, stakeholders, and industry players in the Ghanaian film industry to embrace this technology with an immediate effect in practice and scholarship, using a systematic review, which demands a longer time for article search, did not suffice. Therefore, this qualitative paper approach was anchored on a rapid review design. The selection of scholarly articles was drawn from databases such as Google Scholar, Elsevier, IEEEX Xplore, and ACM Digital Library. Also, the authors relied on keywords such as artificial intelligence, art direction, and filmmaking vocabulary which established the search criteria. This enabled the use of components of the literature review process within a short period of time (Trico et al., 2015). In addition, the proposed review process by Cartaxo et al. (2018) was followed accordingly for article selection as seen in Figure 1. The screening was done and out of 100 published articles, 18 articles were finally selected for data extraction between the years 2020 and 2023. Assessment quality of selected articles was conducted for inclusion and exclusion. Data was then coded and extracted from included studies to synthesize the findings. Descriptive synthesis was used across studies to identify key concepts (Shaw et al., 2021). Therefore, words and text were used to analyze the findings.

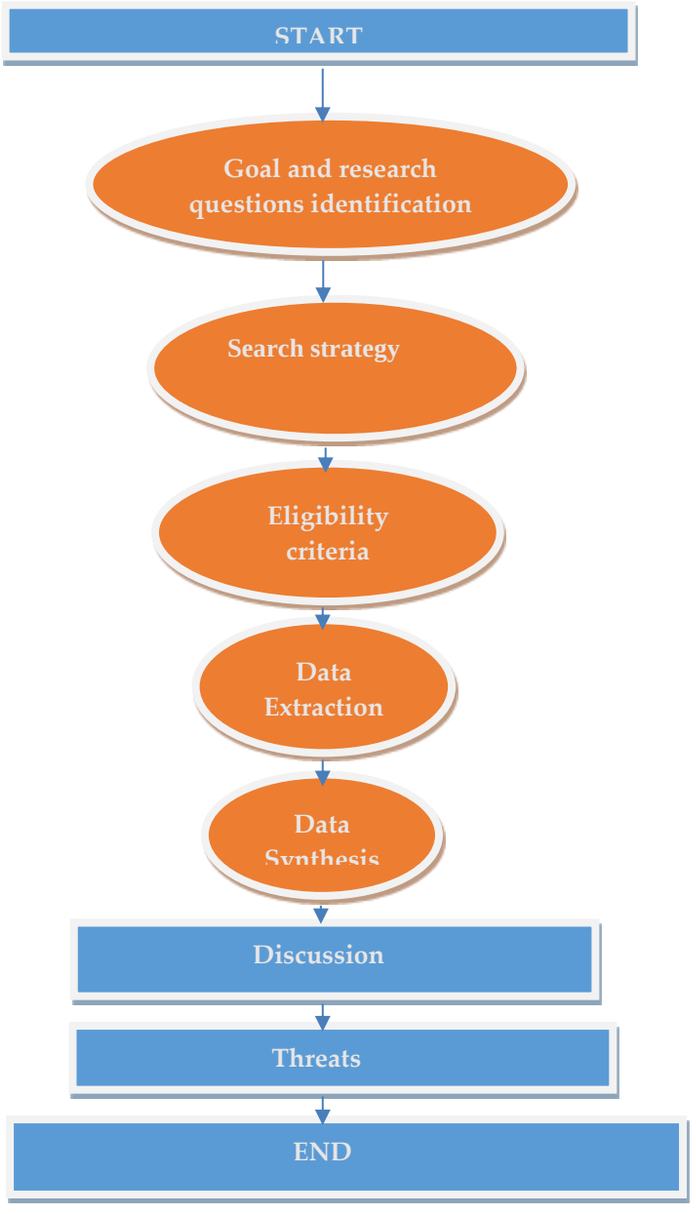

Figure 1: Research protocol used in rapid review

4. Results and discussions

Artificial Intelligence and Art Direction

Generally, the results of this rapid review explicate that Artificial intelligence (AI) has the potential to transform the field of film art direction by providing new and innovative ways to create designs from concept to realisation and enhance the learning experience of students (Zeng et al., 2019).

Set design

In set design, AI has the potential to revolutionise the traditional process by providing a more efficient and accurate method of designing and creating sets (Dai et al., 2019). One of the benefits of AI in set design is the ability to simulate lighting and other environmental elements. For example, AI algorithms can be used to analyse the lighting conditions in a specific location and generate a virtual representation of the set that takes into account the lighting and shadows that would be present in that environment (Li et al., 2020). Similarly, *NVIDIA's* Text to Video AI tool can create realistic animations from text, which can be a useful tool in set design, where the ability to simulate lighting and other environmental visual elements can provide a more realistic representation of the final product (Nvidia, n.d.). It does not only save time and resources but also allow designers to visualise the final product more accurately and make changes as needed before physical construction begins. Another advantage of AI in set design is the ability to create complex and detailed 3D models. AI algorithms can analyse data from various sources, such as photographs, sketches, and blueprints,

and generate highly detailed and accurate 3D models of a film and television set. This can help designers to better visualise a set design and make adjustments as needed before physical construction begins. Additionally, the use of AI can reduce the likelihood of errors and discrepancies in the final set design, as the 3D model can be thoroughly examined and tested before physical construction begins (Zhu et al., 2021).

Furthermore, AI can help to speed up the design of creating film sets. Typically, the traditional way of physical set construction can be a time-consuming process, with multiple rounds of revisions and adjustments needed before the final product is achieved. However, AI algorithms can analyse data and generate designs quickly, reducing the time required for the design phase of the set construction process. This can enable to increase efficiency and productivity, allowing designers to focus on other aspects of the production process (Cipresso et al., 2020).

According to Arush (2022), another design application by AI known as *DALL-E* enables an effective communication between art directors and film directors since filmmaking is a collaborative process. This programme enables art directors to create images and enhance them from textual descriptions. It can combine concepts, attributes and styles in creating spaces based on visual images. It can also make accurate edits to existing images from a natural language caption. It can also add and eliminate elements while taking shadows, reflections, and textures into account in creating scenic backdrops. Beyond this, it can create different duplicates of a particular image inspired by the original. However, you may still need human input to make it work. Overall, the benefits of AI in set design include the ability to simulate environmental elements, create complex and detailed 3D models, and speed up the design process. These advantages can help to improve the efficiency, accuracy, and quality of set design, ultimately leading to better productions and performances.

Props

The creation, improvisation and fabrication of complex props can sometimes be time-consuming task to filmmakers. AI is able to generate realistic 3D props through robot milling process. In this procedure, the actual design of a particular prop, dimensions and shape details are input into a computer programme that follows the instructions and completes the task without any human assistance (Kahn, 2021; Nassar, 2021).

Costume design and make-up

In the context of costume design and make-up, AI has the potential to revolutionise the entire working process by providing designers with access to vast amounts of data that can be analysed and used to generate new conceptual designs quickly and efficiently (Wang et al., 2018). For instance, AI algorithms can analyse images of historical costumes and generate new designs that incorporate elements from multiple periods (Jia et al., 2019). This can save designers a significant amount of time and effort and can also lead to the creation of new and innovative designs.

Furthermore, the integration of AI in costume design and make-up can reduce the time and cost associated with design processes. With the use of AI, costume designers can generate a range of quick designs and illustrations quickly and easily, reducing the amount of time and effort required for manual design processes. This can be especially beneficial in the fast-paced world of media production, where time is of the essence (Nakamura & Yamamoto, 2020).

In addition, AI can be used to analyse the facial features of actors and generate make-up designs that are tailored to their individual characteristics created in the film worlds (Wu et al., 2021). This can ensure that the make-up is applied correctly and that the actors' features are highlighted in the most flattering way possible. Furthermore, AI can be used to simulate the effects of different lighting conditions on the make-up, which can help designers to make more informed decisions about how to apply it (Wang et al., 2018).

According to a study by MidJourney, a company specialising in AI-driven creative tools, their Text to Image AI tool can generate high-quality images from text descriptions with a 90% accuracy rate (MidJourney, n.d.). This technology has the potential to significantly improve the design process in costume design and make-up, where AI can analyse data and generate designs with a high level of accuracy and efficiency.

Another advantage of AI in costume design and make-up is the ability to improve accuracy and reduce errors. AI algorithms can analyse vast amounts of data and identify patterns that may not be immediately apparent to human designers. This can help to ensure that the designs are accurate and aligned with the desired outcomes. In addition, AI can detect potential issues in a design and provide suggestions for improvement (Song et al., 2021).

Finally, AI in costume design and make-up can improve the learning experience for students. By incorporating AI into teaching pedagogy, students can learn about the latest tools and technologies used in the film industry. This can better prepare them for the professional world and enhance their employability (Shneiderman, 2021).

In summary, the integration of AI in costume design and make-up offers numerous benefits, including improved efficiency, accuracy, personalisation, reduced costs, and enhanced learning experiences for students. These benefits have the potential to revolutionise the way designers create and execute their designs and contribute to the growth and development of art direction in the film and television industry.

Artificial intelligence and art direction pedagogy in film education: The challenges

From all this, it is obvious that the integration of AI in film art direction is not new, as the potential of how it would enhance teaching and learning in film art direction has been highlighted. Therefore, film institutions in Ghana must never lag behind and find ways in adopting the technology and integrating it into art direction pedagogy. However, despite the potential benefits of AI in set design, props, costume design and make-up in filmmaking, there are also some challenges that must be addressed. A major challenge is the lack of awareness and understanding of AI among designers and educators in these fields (Nadkarni & Poon, 2020; Hassani & Huang, 2020). Many designers may be hesitant to adopt AI tools because they do not understand how the tools function or are unsure about their capabilities. This can lead to resistance to change and reluctance to incorporate AI into the curriculum. Film educators and art directors must be educated sensitised on the benefits of AI and how it can enhance the learning experience of students in art direction.

Also, there are ethical implications related to data privacy and algorithmic bias that must be considered (Crawford, 2016). For example, if AI algorithms are trained on data that is biased or incomplete, this could lead to the perpetuation of stereotypes or the exclusion of certain groups (Reiss, 2021). Moreover, the use of AI in art direction also presents a challenge in maintaining the creative aspect of the design process (Yin et al., 2019). While AI can generate designs quickly and efficiently, there is a risk that the designs may lack the creative spark and originality that is often a hallmark of successful art direction. As such, educators and art directors must strike a balance between incorporating AI into the design process and maintaining the artistic integrity of the work.

Technical challenges also exist in the integration of AI into teaching pedagogy in art direction. For example, students may require specialised training and access to specific software and hardware to effectively incorporate AI into their design work (Hassani & Huang, 2020). This can pose a challenge for educators who may not have the necessary resources or expertise to effectively teach AI in art direction.

Overall, while the integration of AI in art direction and teaching pedagogy presents several challenges, it also offers numerous benefits. It is important for educators and policymakers to work towards finding solutions to these challenges and ensure that the use of AI is optimized to enhance the learning experience of students and improve the quality of design in the art direction.

5. Contributions of the study

As artificial intelligence technology keeps evolving, this paper contributes to a body of knowledge in the area of AI and art direction in film scholarship and practice. It tickles the studies on AI applications and how it can enhance the art director's job in filmmaking. Although there seem to be some practical gaps realised in the use of AI in the *film art department* in these early stages, the technology keeps expanding at an unprecedented rate and thus an art director must accept AI as being part of his or her job.

6. Implications for future research

This study might serve as a catalyst for further research in AI and art direction in filmmaking that augur to fill some gaps in film scholarship. Therefore, future research can reflect on the use of AI tools from the perspective of art directors in executing their roles in the Ghanaian film and television industry. Aside from that, researchers can also consider studies on ways in which art directors would handle and control ethical pitfalls in relation to the integration of artificial intelligence in the execution of art direction in filmmaking locally. Moreover, discourses on the legal and societal implications of AI applications in film art direction, as well as on the contribution of the Ghana Film Authority, need to be advanced.

7. Conclusion

This rapid review paper identifies the benefits and brings to bare some challenges and potential solutions in the integration of AI in art direction pedagogy in film education. It showed that the incorporation of AI in teaching set design courses can enable create simulated worlds and enhance the lighting of spaces in visual storytelling on screen. Also, AI has the ability to help students create complex 3D props that saves time and done within budget. In addition, integration of AI in the teaching of costume design and make-up can generate ideas for the design and creation of costumes and make-up in scenes of a particular period and style. Finally, AI has become a necessary devil since most filmmakers across the world are already employing such tools in the filmmaking process. It is recommended that film institutions that offers film art direction curricula embrace the technology, adopt and integrate the use of AI in the teaching and learning. That said, measures must be put in place to check the ethical implications into data policy and algorithmic bias. In that manner, student art directors would be able to integrate AI in the execution of their roles as well as enhance their creativity, and save time and energy. Likewise, familiarising themselves with AI technology serves as means of professional development in preparing them for the job market.

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