

Employing artificial intelligence techniques in digital film production; case study of the “Rule of Your Swords” film

Eman Salah Elden Mohamed

Lecturer, Higher Institute of Applied Arts, 6th October City, Giza, Arab Republic of Egypt, eman.salah@appliedarts.edu.eg, eeman.salah@yahoo.com

Karim Sayed Metwally

CEO of Media Shades for Media Services, kareem_metwalee@yahoo.com

Abstract:

Artificial Intelligence (AI) technologies have witnessed tremendous development in recent years, greatly impacting digital filmmaking. This research explores the potential of artificial intelligence to improve the quality of digital films through a technical and artistic analysis of the production process, focusing on the case study of the film “Rule of Your Swords.” The research examines the role of artificial intelligence in different stages of production, from script writing through to visual and audio effects. The AI techniques used at each stage, such as deep learning, computer vision, and natural language processing, are analysed.

The applied study provides an analysis of the experience of producing the film “Rule of Your Swords” using the Stable Diffusion XL image production technology. The digital platforms used to edit images and improve their quality are analyzed, focusing on the technical and artistic aspects of the process. The research provides a dramatic analysis of digital video scenes, focusing on composition, visual elements, narrative, cinematography, colours, character design, camera angles and movement, lighting and story flow. The research aims to better understand how artificial intelligence techniques can be used in digital filmmaking and improve the quality of content. The research provides a valuable contribution to designers and filmmakers interested in employing artificial intelligence techniques in the production process. Research Problem: How can artificial intelligence (AI) technologies be utilized in various stages of digital film production to enhance the technical and aesthetic quality of the content?

Research Questions: How can AI technologies be employed in different stages of digital film production (scriptwriting, filming, editing, visual effects)? What is the impact of using AI technologies on the technical and aesthetic aspects of digital films? What are the technical and artistic challenges and opportunities associated with employing AI in digital film production?

Research Hypotheses: Utilizing AI technologies in different stages of digital film production contributes to the enhancement of the technical and aesthetic quality of the content.

Employing AI in the design and production process of digital films opens new horizons for creativity and improves workflow efficiency.

Research Objectives: Analyze the potential of using AI technologies in various stages of digital film production (scriptwriting, filming, editing, visual effects). Evaluate the impact of using AI technologies on the technical and aesthetic aspects of digital films. Explore the technical and artistic challenges and opportunities associated with employing AI in digital film production. Provide practical recommendations for filmmakers and designers on how to effectively use AI technologies to enhance the quality of digital films.

Significance of the Research: Advancement of Digital Film Industry: The research contributes to understanding how AI technologies can be used to improve the technical and aesthetic quality of digital films, thereby advancing the industry and increasing its competitiveness. Improvement of Production Efficiency: The research explores the potential of AI in streamlining creative workflows and increasing the efficiency of digital film production. Opening New Creative Horizons: The research highlights the role of AI in opening new creative and technical horizons in the digital film industry. Guiding Investments and Research: The research provides valuable insights for investors and researchers about the possibilities and challenges of using AI in digital film production.

Research Methodology: The research adopts a mixed-method approach combining descriptive-analytical and experimental methodologies, encompassing the following aspects: Theoretical Study: Reviewing literature and previous research on the use of AI technologies in the digital film industry. Applied Study: Analyzing the production experience of the film "Hokm Suyufak," focusing on technical and artistic aspects. Content Analysis: Examining the visual and auditory content of the film to assess the impact of AI technologies on the technical and aesthetic quality.

Research Limitations: The research focuses on analyzing the use of AI technologies in the production of the film "Hokm Suyufak - Rule of Your Swords " as a case study. The research is limited to analyzing the technical

and artistic aspects of the impact of AI on the visual and auditory quality of the film.

The research covers the time period from 2023 to 2024.

Results: The applied study of the production of "Hakm Suyufak - Rule of Your Swords " using AI technologies revealed significant potential for revolutionizing the digital film industry. Key findings include ^كImprovement of Production Efficiency: Accelerated Production Process: AI use in image generation, animation, and editing accelerated the production process, saving time and effort for the production team. Cost Reduction: AI reduced the need for real scene shooting and a large number of artists and technicians, leading to lower production costs, Enhancement of Artistic and Technical Creativity: Creation of Innovative Images and Scenes: AI technologies like Stable Diffusion XL enabled the creation of imaginative images and scenes that were not possible with traditional methods. Design of Realistic Characters: AI contributed to designing realistic 3D characters and animating them naturally, enhancing the film's realism and dramatic impact. Addition of Stunning Visual Effects: AI technologies enabled the creation of advanced visual effects, such as sandstorms, epic battles, and magical transformations, adding excitement and thrill to the film. Expansion of Visual Storytelling Horizons: Providing an Immersive Cinematic Experience: AI use created an immersive cinematic experience for viewers through realistic visual effects, animation, and appropriate soundtrack. Reviving Arab Heritage: The film successfully presented the story of Antarah ibn Shaddad in a new and innovative way, contributing to the revival of Arab heritage in a contemporary manner. Challenges and Future Opportunities: Despite the vast potential of AI in film production, several challenges remain: Need for Technical Skills: Using AI in film production requires advanced technical skills, which may pose a barrier for some filmmakers. Control Over Results: Controlling AI-generated images and animations is still limited and requires experimentation and adjustment of various parameters to achieve the desired results. Ethical Concerns: Concerns arise regarding the use of AI in creating fake content or for unethical purposes.

Keywords :

Artificial intelligence; digital films, film production; technical analysis; technical analysis; case study; Rule of your swords; Stable Diffusion XL.

References :

- 1- Ahmed, T. (2021, July 8). Digital transformation of Walt Disney. Medium. <https://tambirbau.medium.com/digital-transformation-of-walt-disney-50892cafb813>
- 2- Alto , V. (2023). Introduction to generative AI. In *Modern Generative AI with ChatGPT and OpenAI Models: Leverage the capabilities of OpenAI's LLM for productivity and innovation with GPT3 and GPT4* (p. 8). essay, Packt Publishing.
- 3- Alvarez, J., & Lane, S. (2023). Rising Against the Machine: Appeasing the Educators' Fears of Artificial Intelligence Taking Over Foreign Language Education. *UNC System Learning and Technology Journal*, 1(1). <https://journals.charlotte.edu/ljtj/article/view/1633>
- 4- Ansarullah , S. I., Kirmani , M. M., Alshmrany, S., & Firdous, A. (2024). Chapter 18 - Ethical issues around artificial intelligence. In *A Biologist's Guide to Artificial Intelligence* (pp. 301–314). essay, Academic Press. Retrieved April 27, 2024, from <https://doi.org/10.1016/B978-0-443-24001-0.00018-X>.
- 5- Baraheem, S. S., Le, T.-N., & Nguyen, T. V. (2023). Image synthesis: A review of methods, datasets, Evaluation Metrics, and future outlook. *Artificial Intelligence Review*, 56(10), 10813–10865. <https://doi.org/10.1007/s10462-023-10434-2>
- 6- Blocker, L. (2023). Achieving implementation: Putting creative ideas to work. *Handbook of Organizational Creativity*, 133–144. <https://doi.org/10.1016/b978-0-323-91841-1.00026-9>
- 7- Chen, Z., Mao, H., Li, H., Jin, W., Wen, H., Wei, X., Wang, S., Yin, D., Fan, W., Liu, H., & Tang, J. (2024). Exploring the potential of large language models (llms)in learning on graphs. *ACM SIGKDD Explorations Newsletter*, 25(2), 42–61. <https://doi.org/10.1145/3655103.3655110>
- 8- Dash, A., Ye, J., & Wang, G. (2024). A review of Generative Adversarial Networks (gans) and its applications in a wide variety of disciplines: From medical to Remote Sensing. *IEEE Access*, 12, 18330–18357. <https://doi.org/10.1109/access.2023.3346273>
- 9- Erdoğan , Z. (2023). Netflix'in Makine öğrenimi, Kişiselleştirme, Kültür çalışmaları ve Covid-19 Sürecindeki gelişmeleri. *Intermedia International E-Journal*, 10(18), 1–14. <https://doi.org/10.56133/intermedia.1066604>
- 10- Ghosh, A. (2023). Artificial Intelligence as an Innovation in the Film Industry. *Research Inspiration*, 3(3), 12–13.
- 11- Göring, S., Ramachandra Rao, R. R., Merten, R., & Raake, A. (2023). Analysis of appeal for realistic AI-generated photos. *IEEE Access*, 11, 38999–39012. <https://doi.org/10.1109/access.2023.3267968>

- 12- Hermann, I. (2021). Artificial Intelligence in fiction: Between narratives and metaphors. *AI & SOCIETY*, 38(1), 319–329. <https://doi.org/10.1007/s00146-021-01299-6>
- 13- Huang, Y., Lv, S., Tseng, K.-K., Tseng, P.-J., Xie, X., & Lin, R. F.-Y. (2023). Recent advances in Artificial Intelligence for Video Production System. *Enterprise Information Systems*, 17(11). <https://doi.org/10.1080/17517575.2023.2246188>
- 14- Jaakkola, M. (2023). *Academic AI Literacy: Artificial Intelligence in Scholarly Writing, Editing, and Publishing* (Ser. NordMedia Network Open Educational Resources). University of Gothenburg. April 28, 2024, <https://hdl.handle.net/2077/80946>
- 15- Johnsen, M. (2023). Chapter 1: Introduction. In *Screenwriting Made Easy: A Step-by-Step Guide to Writing Your First Screenplay* (pp. 7–10). essay, independently published. Retrieved April 27, 2024.
- 16- Manikandan, C., Kashyap, A., & Nahak, F. M. (2024). Discourse of ai-influence in visual aesthetics. 2024 IEEE International Conference on Computing, Power and Communication Technologies (IC2PCT), 1127–1130. <https://doi.org/10.1109/ic2pct60090.2024.10486754>
- 17- O’Riain, M. (2023, May 3). *The Well Trained Algorithm: An exploration of the use of AI as a tool for musical expression* (dissertation). www.diva-portal.org. Retrieved April 27, 2024, from <https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1768052&dsid=4392>.
- 18- Odu, A., Adedokun, D., & Steve, M. (2023). Harmonizing Minds and Machines: Exploring the Role of Artificial Intelligence in Enhancing Musical Performances. <https://doi.org/10.31219/osf.io/gmsbc>
- 19- Paulus, P. B., & Coskun, H. (2011). Group creativity. *Encyclopedia of Creativity*, 575–580. <https://doi.org/10.1016/b978-0-12-375038-9.00111-4>
- 20- Quintela, P. (2016). From the shadow to the centre: tensions, contradictions and ambitions in building graphic design as a profession. In *Redefining art worlds in the late modernity* (pp. 149–172). essay, Faculdade de Letras da Universidade do Porto. Retrieved May 2, 2024,.
- 21- Ramadan, R. A., & Yaseen, K. A. Y. (2024, March). Review of Can ai generate efficient and accepted speech? *worldscience*, 1–10. Retrieved from <https://www.worldscience.com/journals/index.php/wassn/article/view/42>.
- 22- Rane, N., Choudhary, S., & Rane, J. (2024). Gemini versus CHATGPT: Applications, performance, architecture, capabilities, and implementation. *Journal of Applied Artificial Intelligence*, 5(1), 69–93. <https://doi.org/10.48185/jaai.v5i1.1052>
- 23- Richards, R. L. (2011). Everyday creativity. *Encyclopedia of Creativity*, 468–475. <https://doi.org/10.1016/b978-0-12-375038-9.00092-3>
- 24- Sapkota, R., Ahmed, D., & Karkee, M. (2024). Creating Image Datasets in Agricultural Environments Using Dall.e: Generative AI-Powered Large Language Model. <https://doi.org/10.32388/a8dyj7>
- 25- Schumacher, D., & Labounty, F. (2023). Enhancing BARK Text-to-Speech Model: Addressing Limitations through Meta’s Encodec and Pretrained HuBert. <https://doi.org/http://dx.doi.org/10.13140/RG.2.2.16022.93760>
- 26- Simeoni, I. (2023). *Empathic Voice: Enabling Emotional Intelligence in Virtual* (thesis). <https://amslaurea.unibo.it/>.
- 27- Sun, P. (2024). A study of artificial intelligence in the production of film. *SHS Web of Conferences*, 183, 03004. <https://doi.org/10.1051/shsconf/202418303004>
- 28- Sun, P. (2024a). A study of artificial intelligence in the production of film. *SHS Web of Conferences*, 183, 03004. <https://doi.org/10.1051/shsconf/202418303004>
- 29- Szeliga, A. (2023, October 11). *A comparative Study of Deep Generative Models for Image Generation* (dissertation). serwiss.bib.hs-hannover.de. Hochschule Hannover. Retrieved April 28, 2024, from <https://serwiss.bib.hs-hannover.de/frontdoor/index/index/docId/2970>.
- 30- Wang, Y. (2023). Artificial creativity- ethical reflections on AI’s role in artistic endeavors. *Special Issue on Art and Artificial Intelligence*, 1–5. <https://doi.org/10.36227/techrxiv.23897169.v1>
- 31- Wells, B. (2011). Frame of reference: Toward a definition of animation. *Animation Practice, Process & Production*, 1(1), 11–32. https://doi.org/10.1386/ap3.1.1.11_1
- 32- Aayush. (2024, February 14). *Runway AI: Review, features, & guide* (2024). *Elegant Themes Blog*. <https://www.elegantthemes.com/blog/business/runway-ai-review>
- 33- Abellan, A. H. (2022b, November 10). Microsoft designer the new AI image generator. *Transcends*. <https://transcendsmarketing.com/microsoft-designer-the-new-ai-image-generator/>
- 34- AIContentfy team. (2023, July 5). *Breaking the boundaries: Using AI writing tools for fiction writing*. AIContentfy. <https://aicontentfy.com/en/blog/breaking-boundaries-using-ai-writing-tools-for-fiction->

writing

- 35- Arslan, A. (2023, September 13). The 12 best free AI art generators to create images from text. MUO. <https://www.makeuseof.com/ai-text-to-art-generators/>
- 36- Brown, S. (2021, April 21). Machine Learning, explained. MIT Sloan. <https://mitsloan.mit.edu/ideas-made-to-matter/machine-learning-explained>
- 37- Chen, J. (2024, February 7). What is a neural network?. Investopedia. <https://www.investopedia.com/terms/n/neuralnetwork.asp>
- 38- Copeland, B. J. (2024, April 29). Artificial Intelligence. Encyclopædia Britannica. <https://www.britannica.com/technology/artificial-intelligence>
- 39- Dattani, R. (2023, May 18). Microsoft Copilot- All You Need to Know. trndigital. <https://www.trndigital.com/microsoft-copilot-all-you-need-to-know/>
- 40- Davenport , T. H., & Mittal, N. (2022, November 14). How generative AI is changing creative work. Harvard Business Review. <https://hbr.org/2022/11/how-generative-ai-is-changing-creative-work>
- 41- DeGuzman, K. (2023, March 5). Digital Cinematography - The Pros & Cons of Shooting Digital. StudioBinder. <https://www.studiobinder.com/blog/what-is-digital-cinematography-definition/>
- 42- Edgar, T. (2018, March 9). Movie written by Ai interprets US. LinkedIn. <https://www.linkedin.com/pulse/movie-written-ai-interprets-us-taura-edgar>
- 43- Eliaçık, E. (2023, July 9). Meet Clipdrop AI, the Swiss Army Knife of visual editing. Dataconomy. <https://dataconomy.com/2023/07/09/what-is-clipdrop-ai-how-to-use-ai-tools/>
- 44- Flavin, B. (2023, October 17). What is graphic design? A beginner’s guide to this creative career. Rasmussen University. <https://www.rasmussen.edu/degrees/design/blog/what-is-graphic-design/>
- 45- Gillis, A. S., Burns, E., & Brush, K. (2023, July 27). What is deep learning and how does it work?: Definition from TechTarget. Enterprise AI. <https://www.techtarget.com/searchenterpriseai/definition/deep-learning-deep-neural-network>
- 46- Gonsalves, R. (2023, June 30). Artificial intelligence ai a key focus of Avid Innovation. avid. <https://www.avid.com/resource-center/avid-and-the-future-of-ai>
- 47- Ha, A. (2019, August 1). How the new “Lion King” came to life. TechCrunch. <https://techcrunch.com/2019/07/30/lion-king-behind-the-scenes/>
- 48- Hashemi-Pour, C. (2023, October 18). What is CGI (computer-generated imagery)?: Definition from TechTarget. WhatIs. <https://www.techtarget.com/whatis/definition/CGI-computer-generated-imagery>
- 49- Idelson, K. (2019, February 15). Machine learning saves “avengers” VFX artists time. Variety. <https://variety.com/2019/film/awards/machine-learning-saves-avengers-vfx-artists-time-1203140163/>
- 50- Jelicic, B. (2023, July 9). Mage Space: The Future of AI Image Generation. theaiconnoisseur.com. <https://theaiconnoisseur.com/mage-space-ai/>
- 51- Jose, B. (2024, March 8). What is Haiper, the text-to-video model created by Google DeepMind, TikTok alumni?. The Indian Express. <https://indianexpress.com/article/explained/explained-sci-tech/haiper-text-to-video-model-9200839/>
- 52- Kehr, D. (2024, February 24). Animation. Encyclopædia Britannica. <https://www.britannica.com/art/animation>
- 53- Kerner, S. M. (2024, April 5). What are large language models?: Definition from TechTarget. WhatIs. <https://www.techtarget.com/whatis/definition/large-language-model-LLM>
- 54- Laskowski, N., & Tucci, L. (2024, April 15). What is Artificial Intelligence (AI)? everything you need to know. Enterprise AI. <https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence>
- 55- Maio, A. (2023, September 7). Creating the impossible: Breaking down VFX Techniques. StudioBinder. <https://www.studiobinder.com/blog/what-is-vfx/>
- 56- Marr, B. (2024, April 26). Unleashing ai sounds: The best tools for music, voices, and Effects. Forbes. <https://www.forbes.com/sites/bernardmarr/2024/04/26/unleashing-ai-sounds-the-best-tools-for-music-voices-and-effects/?ss=ai&sh=3bc50c41167c>
- 57- Marshall , J. (2023, February 16). What is VFX? A guide to visual effects in film. backstage. <https://www.backstage.com/magazine/article/create-digital-effects-film-project-13748/>
- 58- McDonald, A. (2024, May 1). What is CGI (computer-generated imagery) & how does it work?. Discover. <https://discover.therookies.co/2020/04/05/what-is-cgi-computer-generated-imagery-how-does-it-work/>
- 59- Morrison, R. (2024, April 10). Meet udio - the most realistic AI music creation tool I’ve ever tried. Tom’s Guide. <https://www.tomsguide.com/ai/meet-udio-the-most-realistic-ai-music-creation-tool-ive-ever-tried>
- 60- Myers , M. (2020, February 8). “the Irishman”: An inside look at the de-aging visual effects. ABC7 New

- York. <https://abc7ny.com/the-irishman-de-aging-ilm-software-digital/5912777/>
- 61- Ortiz, S. (2024, April 15). Adobe Premiere Pro’s new AI tools blew my mind. watch them in Action for yourself. ZDNET. <https://www.zdnet.com/article/adobe-premiere-pros-two-new-ai-tools-blew-my-mind-watch-them-in-action-for-yourself/>
- 62- Patel, N. (2024). 5 AI Image Enhancer Tools & when to use them. neilpatel.com. <https://neilpatel.com/blog/ai-image-enhancers/>
- 63- Robles , S. (2024, March 5). Video editing terms & definitions explained: Beginner’s guide. Riverside. <https://riverside.fm/blog/video-editing-terms>
- 64- Rouse, M. (2017, May 1). What is video editing? - definition from Techopedia. techopedia. <https://www.techopedia.com/definition/2077/video-editing>
- 65- Rouse, M. (2022, April 30). What is Digital Film? - definition from Techopedia. techopedia. <https://www.techopedia.com/definition/15205/digital-film>
- 66- Santos, E. (2023, September 2). D-ID: Revolutionizing Video Creation with AI Technology. Pink Horn. <https://pinkhornmarketing.com/blog/d-id-revolutionizing-video-creation-with-ai-technology/>
- 67- Stefansky, E. (2022, December 21). Inside the visual effects of avatar: The way of water: "water is both a blessing and a curse". Vanity Fair. <https://www.vanityfair.com/hollywood/2022/12/awards-insider-avatar-the-way-of-water-visual-effects>
- 68- Tucci, L., & Burns, E. (2023, September 15). What is machine learning and how does it work? in-depth guide. Enterprise AI. <https://www.techtarget.com/searchenterpriseai/definition/machine-learning-ML>
- 69- Wahl, J. (2018, September 19). What is graphic design? Beginner’s Guide to. Learn Hub. <https://learn.g2.com/what-is-graphic-design>
- 70- Yasar, K. (2023, August 21). What is a neural network? definition, types and how it works. Enterprise AI. <https://www.techtarget.com/searchenterpriseai/definition/neural-network>

Paper History :

Paper received May 19, 2024, Accepted July 11, 2024, Published on line September 1, 2024.