Navigating the Future Landscape: Probing the Mechanism and Feeding Model of AI within Theatrical Arts

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Abstract: This scholarly article explores the application and impact of artificial intelligence (AI) in the realm of theatrical art creation, providing an analysis of the current state, challenges, and future development of the integration of AI and theatre. Through comprehensive case studies of various theatrical works both domestically and abroad, the article delineates four major "feeding" models of AI in theatre creation, discussing the specific applications and effects of these modes within the sphere of artistic creation. The symbiotic relationship between human creators and AI during the creative process is emphasized, envisioning the potential of AI as an innovative collaborator advancing theatrical artsalongside human creators. Despite present challenges confronting AI in theatrical creation, such as emotional depth and data dependency, the potential demonstrated in enhancing creative efficiency and expanding the scope of artistic expression is noteworthy.
***Keywords*:** artificial intelligence (AI), theatrical arts, AI application

1. Introduction

Artificial Intelligence (AI) has traditionally been perceived as a domain confined to computer science, with marginal applicability to the social sciences. Yet, as the practical implications of AI technologies have expanded, significance of AI is progressively being recognized as central to discussions within the information social sciences (Mondal, 2020) [1-2]. This impact, in recent years, has extended to the field of theatrical and stage arts, causing even the once conservative, and even proud theatre practitioners to align with the adoption of AI and even consider transitioning into AI professionals.

Judged by the works in recent years, the influence of AI on theatrical creation has evolved beyond the theoretical, affecting not just a region, but offering a globally encompassing impact. Some believe that AI has made its mark in the field of theatre creation and is even demonstrating some degree of autonomy, despite being in an initial stage of artistic achievement. Nevertheless, with the continuous technological iterations and further expansion of depth, it is reasonable to anticipate potential groundbreaking progression of this technology in artistic creation (Rosa et al., 2006) [3].

2. Artificial Intelligence in Stage Arts: Teasing out and Exploring of Data Feeding Model

The "creativity" demonstrated by artificial intelligence doesn't stem from its subjective consciousness but is derived from the "feeding" of vast amounts of data and the efficient processing by deep learning technologies. This data-driven creative process or mode has become a necessary condition for artistic innovation and a crucial assurance of human subjectivity in innovation.

Researchers have selected 48 different works from varying time periods and countries as sample for analysis, such as *Hello Hi There* (2010), *The Metamorphosis* (2014), *Yesterday Tomorrow* (2015), *Discrete Figure* (2018), *RUR* (2021), *When A Robot Writes A Play* (2021), *Shakespeare's Coriolanus* (2.0)(2022), *ALIA: ZU TÀI* (2023), *AI Kun Opera. The Romance of the Lute: A Portrait of Beauty* (2023), and *PROMETHEUS FIREBRINGER* (2023), and based on the basic models of artificial intelligence , they have identified four ways in which drama utilizes data collection with artificial intelligence.

The first model is the Scenic-Data Feed Model. This data feeding approach calculates based on real-time data on stage and the information source is not fixed, but flexible (Figure 1). When AI-related devices collect variable data from the stage, they calculate it and ultimately generate corresponding results. The generated result is not final, and simultaneously, it will be redirected back to the stage. At this point, certain changes will occur on the stage due to the received variable results. The stage performance will transform according to the newly provided information. In this process, the AI and the stage performance adapt to each other, learn from each other, and form the final stage presentation. The process often involves the utilization of AI models related to Pose Estimation.

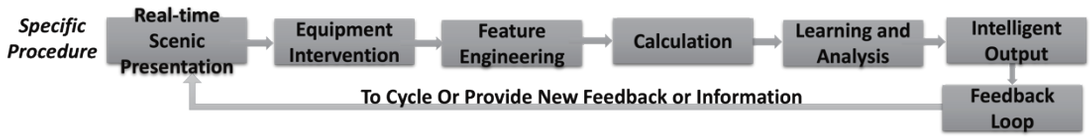

Figure 1. Scenic-Data Feed Model

The performance of *Discrete Figure* epitomizes this data feed model. The action, or information source, is initiated by the performer, and then the collection of data begins promptly once the devices start implementing. After the data collection is completed, AI begins to calculate, deep-learn and output results. The results are presented through third-party media imagery with which the performer interacts. Subsequently, AI conducts deep learning and analysis through interaction with the physical actor, forming new body movements. The actor feedback on the newly developed body movements, thereby forming a dynamic stage performance. This performance transcends the traditional stage paradigms and even surpasses the expressiveness of traditional dance. This high-energy improvised interaction between "human-machine" transcends the traditional constraints of human subjectivity and emotional expression.

Similar productions include the 2011 work *Yesterday Tomorrow*. In contrast to *Discrete Figure* which focuses on physical movements, *Yesterday Tomorrow* is more concerned with instant feedback of language and text. The 2002-piece *Mai Hi Ten Yu*, a collaboration between Kaiji Moriyama and Yamaha Corporation, also displays this characteristic. The performers wear some current-inducing contacts on their bodies. As the performers move, these currents form information, which, after deep learning and computation by AI, is used to play the piano. Then, the performer again forms new body movements based on these music outputs.

The second model is the Pre-data Feeding Model. The information source for this feeding method does not come from the performance site but is completed before the performance, forming a relatively stable database (Figure 2). This model must start and lead with the operator's approach and creative points. According to the creative ideas and presentation content, the initiator needs to specifically control the data feed to the AI and, after many corrections, can directly apply it to the stage presentation.

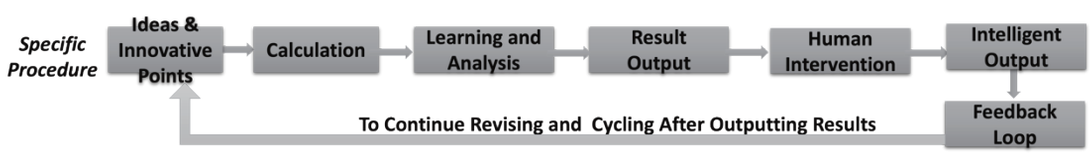

Figure 2. Pre-data Feeding Model

Compared to the Scenic-Data Feed Model, the Pre-data Feeding Model has ample time to "feed" the AI. Through numerous corrections and refinements, the AI is able to perform more stably during the stage presentation and often reaches the desired stage effect of creation. In this model, the function and work of the AI are situated outside of the performance, so the audience often can't directly perceive the presence of AI. This model inherently boasts high controllability, hence its broader range of application. This model is also widely used in the teaching of various disciplines (Zhang, 2020)[4-5]. In dance teaching, with the assistance of motion analysis technology in AI, dance learning content suitable for the learner's actual situation can be intelligently integrated based on the learner's dance movement training and corresponding data feedback, providing scientific assistance for the learner's imminent dance movement practice and technique extension (Ibid.). This viewpoint has strong implications for teaching in drama and related specialties.

Prague Mechanical Cabaret is another notable case. The performance script was formed under the team's creation, and the actors adjusted and intervened with the AI's generated content based on creative demands, ultimately shaping the final performance script. Subsequently, AI, following the AI-generated script, generated the visual effects of the stage and all the music in return. *Discrete Figure* utilized the Openpose software of AI to analyze poses in movie scenes, collect pose data, and arrange the work based on these poses.

The Scenic-Data Feed Model emphasizes the "presence" of "human-machine" interaction, demonstrating strong aspects of "immediacy", "spontaneity", "liveness", "authenticity", "contingency", and "intimacy" (Power, 2008)[6]. However, this concept has also evolved. Traditional presence emphasized the actors within the stage space, but in this performance, the emphasis is on the presence formed in the relationship between AI and actors. The Pre-data Feeding Model places more

emphasis on the input of the operator's creativity and ideas, so it presents the concept of "human-machine" interaction and does not handle the stage presentation specifically.

The third model is the Existing-data Feeding Model. Unlike autonomous data, the data here are not specially made for the performance but use existing datasets. This method maintains a certain "dramatic independence" with stage performance, as the source of information handled by AI comes from a pre-existing database (Figure 3).

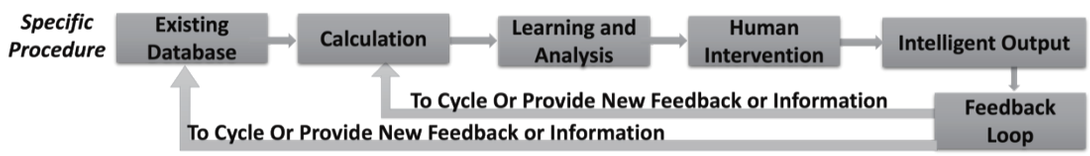

Figure 3. Existing-data Feeding Model

Unlike data designed specifically for a single performance, this model utilizes a broad collection of available data sets. This approach sustains a degree of independence from stage presentations because the AI processes data sourced from a pre-existing database, rather than generated in real-time. In this model, AI's intervention introduces new possibilities and interpretations to existing stage presentations, allowing audiences to understand the art portrayed on stage through predetermined content. Here, AI is not an improvisational performer but, instead, is a meticulously programmed tool capable of offering predefined interpretations and enhancing experiences. For example, in the 2023 Beijing performance of *AI Offending the Audience*, this model was employed to feed the AI a substantial data set on Peter Handke's works before the performance. Peter Handke's works serve as the existing data. Completing *AI Offending the Audience* was only possible through AI's deep learning of Peter Handke's writing style and logic. Before the *PROMETHEUS FIREBRINGER* performance, Dorsen also allowed AI to learn a significant amount of work by Aeschylus, which shaped the creation of lost works in Aeschylus' tone. Compared to the first two learning styles, existing data tends to be richer and more logically robust, providing AI with more stable, deep learning opportunities. Furthermore, this approach is more likely to generate novel ideas and expressions — capturing classic works' (from the database) elements through a digital logic blend to create unique pieces. Additionally, this model contains some educational value, conservation, and inheritance value, experimental and diversity value, efficiency, and accessibility value.

The fourth model is the Contextual Sensing Interactive Model. This model emphasizes AI's role in drama isn't merely as data processor and feedback generator, but as an intelligent entity capable of profoundly understanding and sensing the current performance scenario, environmental factors (such as lighting, sound, even air quality, and more), and audience emotions, thus adjusting the performance's direction, atmosphere, and content in real-time (Figure 4).

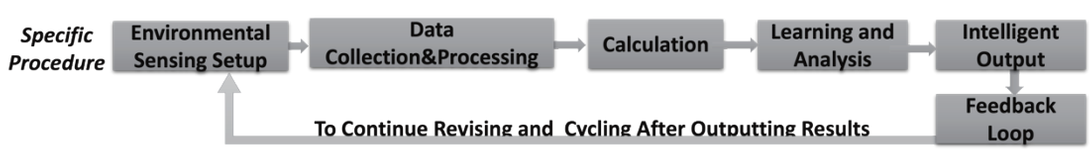

Figure 4. Contextual Sensing Interactive Mode

This model relies on advanced AI sensing technology allowing the performance to respond in real time to various environmental and situational changes, as well as the audience's emotions and reactions, creating a completely immersive and interactive performance experience. In contrast to the Scenic-Data Feed Model, the Contextual Sensing Interactive Model takes the entire performance as a source of information collection, not limited to stage-only information. This model is currently under construction. Numerous companies and developers are exploring this realm, with the MIT Media Lab undertaking multiple projects to investigate the application of AI and machine learning in art and interactive media. These projects demonstrate how to use AI to perceive audience reactions and environmental changes and create interactive and responsive artworks. Google's Magenta project is dedicated to creating art and music with machine learning. Their experimental work explores how to engage audience emotions and interaction through AI, primarily focusing on music, but these techniques can also be applied to theatre performances in the Contextual Sensing Interactive model. The aforementioned examples are based on the process of a model loop, but if the model is only driven and not cycled, this model realizes another function of AI — Monitor.

The Massachusetts Institute of Technology has developed a physiological emotion recognition (PER) model that ana-

lyzes the psychological state of the audience by examining the correlation between emotions described through facial expressions, speech, and physiological signals (Gloor, 2002)[7].The group is examining how actors' vocal and physiological indicators of emotion are mirrored in the audience's facial expressions, exploring both the cross-modal dynamics of emotion and the emotional exchange between different people. They're utilizing a newly created PER model to achieve this. The end goal is to determine which emotions create the most fulfilling experiences for both the actors and their spectators. Sharing these insights with the performers can help them better grasp the influence of their emotions on the viewers, leading to an improvement in their artistic expression and technique. This model can be extended to various angles and aspects of stage art and is currently yielding promising results.

As evident from the analysis, the development of artificial intelligence has evolved from simple data processing to profound learning. It is not only "feed" massive data but can also interact and respond to enhance theatrical art. From the real-time collection of stage data to pre-set creative guidance, down to in-depth mining of existing data sets, the application of AI in drama is becoming increasingly diverse. The latest trend is the Contextual Sensing Interactive Model, which allows AI to capture and respond to real-time changes and audience emotions during a performance, leading to immersive interactive experiences. This model even integrates the advantages of the previous models. Clarifying these data feed models and understanding their integration with human creativity is crucial for maintaining and strengthening the human subjectivity in art creation. Human artists remain the source of creativity and the guardians of emotional depth in their works. The role of AI, at least in this current phase, is to act as a powerful tool and partner, helping human artists expand the boundaries of creation, rather than replacing them. These advancements are not endpoints; as technology continuously evolves, our comprehension and control over AI will also consistently improve. Importantly, we need to summarize these functions and develop systematic methodologies to "tame" AI, ensuring it can better serve human creativity and artistic expression.

3. Conclusion

Four different "feeding" models have portrayed the versatility and adaptability of AI technology in theatrical art, while also underscoring the necessity for artists to maintain subjectivity during the creation process. The intuition, emotion, and creativity of human creators, combined with the data processing and pattern recognition abilities of AI, collectively constitute a new creative paradigm for modern treatre. Moving forward, we anticipate this collaborative relationship to continuously develop, enabling AI not merely to serve as a creative tool but also to evolve into an innovation-inspiring partner, elevating theatrical art to new heights. Through such collaborations, the union of artists and AI is expected to produce technologically cutting-edge and emotionally rich theatrical works, offering unprecedented art experiences for audiences worldwide.

Acknowledgments

(1) 2023 Jiangsu Academy of Educational Sciences Researching Project: Research on innovative teaching methods of integrating artificial intelligence and performance courses (B/2023/01/147).

(2) 2023 Jiangsu Higher Education Researching Project: Artificial intelligence model construction and practice exploration of acting course under the background of number intelligence (2023JSJG135).

(3) 2023 Communication University of China, Nanjing, Researching Project: ChatGPT teaching Application: Theoretical and practical research on the model of "Two-dimensional Interactive and Complementary Acting Education" (2023KY08).

(4) 2023 Communication University of China, Nanjing, Teaching Reforms Researching Project: Construction and practical exploration of AI mode in drama and film performance courses under the background of digital and intelligent transformation (JG202303).

References

[1] Mondal, B., 2020. Artificial intelligence: state of the art. *Recent Trends and Advances in. Artificial Intelligence and Internet of Things*, pp.389-425.

[2] Pizzo, A., Lombardo, V. and Damiano, R., 2019. Algorithms and interoperability between. drama and artificial intelligence. *TDR/The Drama Review*, 63(4), pp.14-32.

[3] Rosa, R., Dušek, O., Kocmi, T., Mareček, D., Musil, T., Schmidtová, P., Jurko, D., Bojar, O., Hrbek, D., Košťák, D. and Kinská, M., 2020. *THEaiTRE: Artificial intelligence to write a theatre play. arXiv preprint arXiv*:2006.14668

[4] Zhang, Y., 2023. Analysis of Transformation of Dance Teaching Model Equipped with AI. Technology. *Frontiers in Educational Research*, 6(31).

[5] Zylinska, J., 2020. *AI art: machine visions and warped dreams* (p. 181). Open Humanities. Press.
[6] Power, C., 2008. *Presence in play: A critique of theories of presence in the theatre* (Vol. 12). Brill.
[7] Gloor, P.A., Araño, K.A. and Guerrazzi, E., 2020. Measuring audience and actor emotions at a theater play through automatic emotion recognition from face, speech, and body sensors. *In Digital Transformation of Collaboration: Proceedings of the 9th International COINs Conference* (pp. 33-50). Springer International Publishing.