DOI 10.20504/opus2026.32.52
Special Issue: Music and Artificial Intelligence: Innovations, Challenges, and Perspectives

Artificial Intelligence and Music Composition: A Narrative Overview from 1980 to 2024

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Abstract: The intersection of artificial intelligence (AI) and music composition has introduced both creative and technological challenges, reshaping practices in music production. This study examines the evolution of AI-powered tools in music composition, focusing on key papers published from 1980 to 2024. We explore how AI algorithms, objectives, and methodologies have transformed compositional processes, bridging the gap between human creativity and machine learning capabilities. Using a multi-analytical approach, we applied statistical techniques such as Correlation Analysis, Principal Component Analysis, Random Forest, and Support Vector Machines to identify trends and relationships among study features—algorithm types, study objectives, tested hypotheses, findings, discussions, limitations, and future research directions. Results indicate that the algorithms used and the research hypotheses were the most influential factors in shaping AI composition studies. Our preliminary analysis also revealed clustering of research across distinct periods, suggesting significant advancements in AI research paradigms over time. Consequently, AI in music composition has shown considerable evolution in terms of research framing, algorithmic techniques, hypothesis formulation, and the presentation of findings. While AI demonstrates great potential to enhance and automate compositional processes, further exploration into human-AI collaboration is essential. This study provides valuable insights into the chronological development of AI applications in music composition.

Keywords: music composition, artificial intelligence, music technology, machine learning, narrative paper

Inteligência artificial e composição musical: Uma Visão Geral Narrativa de 1980 a 2024

Resumo: A interseção da inteligência artificial (IA) e da composição musical introduziu desafios criativos e tecnológicos, remodelando as práticas de produção musical. Este estudo examina a evolução das ferramentas de IA na composição musical, concentrando-se nos principais artigos publicados de 1980 a 2024. Exploramos como os algoritmos, objetivos e metodologias de IA transformaram os processos de composição, preenchendo a lacuna entre a criatividade humana e os recursos de aprendizado de máquina. Usando uma abordagem multianalítica, aplicamos técnicas estatísticas como análise de correlação, análise de componentes principais, floresta aleatória e máquinas de vetores de suporte para identificar tendências e relações entre os recursos do estudo - tipos de algoritmos, objetivos do estudo, hipóteses testadas, descobertas, discussões, limitações e direções de pesquisas futuras. Os resultados indicam que os algoritmos usados e as hipóteses de pesquisa foram os fatores mais influentes na formação dos estudos de composição de IA. Nossa análise preliminar também revelou o agrupamento de pesquisas em períodos distintos, sugerindo avanços significativos nos paradigmas de pesquisa de IA ao longo do tempo. Consequentemente, a IA na composição musical apresentou uma evolução considerável em termos de estrutura de pesquisa, técnicas algorítmicas, formulação de hipóteses e apresentação de resultados. Embora a IA demonstre um grande potencial para aprimorar e automatizar os processos de composição, é essencial explorar mais a colaboração entre humanos e IA. Este estudo fornece informações valiosas sobre o desenvolvimento cronológico dos aplicativos de IA na composição musical.

Palavras-chave: composição musical, inteligência artificial, tecnologia musical, aprendizado de máquina, artigo narrativo.

SIMURRA, Ivan Eiji; RIBEIRO, Felipe de Almeida. Artificial Intelligence and Music Composition: A Narrative Overview from 1980 to 2024. Opus (Assoc. Nac. Pesqui. Pós-Grad. Música), João Pessoa v. 32, e263253, p. 1-46, 2026. http://dx.doi.org/10.20504/opus2026.32.53
Recebido: 30/11/2024; aprovado: 27/03/2026; publicado: 06/11/2026.
Editor responsável: Dr. Vinícius Eufrásio

Technological advances in Artificial Intelligence (AI) have introduced new challenges and possibilities in music composition, redefining the relationship between computational systems and creative practice. Recently, from a Music History perspective, improvements in computing have advanced the boundaries of interaction with symbolic and audio material generation for music composition, especially when considering the exploration of AI applications in this context (Nierhaus, 2009; Dean & Mclean, 2018).

The role of AI in music composition has its roots in early experiments with computer-generated music tasks (Essl, 2007). Since the achievements of computing in the 20th century, the intersection of AI and music composition has represented a key frontier of creative and technological innovation, regardless of chronological period or technical constraints (Fernandez & Vico, 2013). AI's capabilities suggest tools that can assist or even automate the compositional process (Malt, 2000; Murail, 2005; Gilmore & Hirs, 2009). This is reflected in digital processing techniques, vast online datasets, and complex algorithms designed to identify patterns. These technologies have demonstrated their ability to generate music, analyze compositional structures, and even mimic stylistic features from the canonical repertoire (Miranda, 2021).

As AI continues to evolve and permeate various domains, its application in music creation has sparked lively debates within academic and artistic communities. In this context, AI is increasingly seen not only as a tool for automating or aiding music composition but also as a 'collaborative partner' in the creative process. However, it also raises complex questions about creativity, authorship, and the role of the human composer.

This study aims to analyze published works focused on the role of Artificial Intelligence in the field of music composition, with particular attention to trends in methodology, algorithms, and the impacts of AI on this creative domain. We employ a range of analytical tools, including Correlation Analysis, Principal Component Analysis (PCA), Random Forest (RF), Support Vector Machines (SVM), and feature importance assessments, to examine how AI has influenced research on computer-aided music composition (Baniya & Lee, 2014; Müller, 2015; Bahuleyan, 2018; Ansari et al, 2021).

For our current study, we adopted a narrative review approach. As Sukhera (2022) notes, narrative reviews allow researchers to synthesize multiple perspectives and leverage the unique viewpoints of their team, which is crucial in a field where technological advancements, creative practices, and theoretical frameworks intersect. This approach enables us to provide a general overview of our topic of interest while identifying relevant research to date (Rumrill & Fitzgerald, 2001). Unlike systematic reviews, which focus on narrow questions in specific contexts, a narrative review can include a wide range of studies, offering a comprehensive summary with interpretation and critique (Greenhalgh et al., 2018). This flexibility is particularly valuable in AI music composition research, where studies range from technical algorithm development to creative applications.

Despite the growing body of research on artificial intelligence in music composition, much of the literature remains focused on technical developments and algorithmic performance. Less attention has been devoted to understanding how these technologies reshape compositional thinking, musical material, and creative agency. In this sense, the present study not only maps the evolution of AI applications but also seeks to critically interpret their implications for compositional practice, addressing shifts in authorship, aesthetics, and the relationship between human and machine creativity.

In the following sections, we outline the steps taken to structure our analysis, beginning with the criteria used to select the published papers. We then provide a chronological overview of the selected works, examining their relevance to the current study. Next, we define our research topics of interest—categorical variables—used to conduct the analysis. After that, we present our analysis design and the results, exploring the proposed topics in detail. Finally, we discuss the outcomes, highlighting both the individual techniques and the overall relationships among them. At the conclusion of this study, we offer our reflections and suggest directions for future research.

1. Method

Our proposed method adopts a systematic approach to retrieve, analyze, and interpret selected works within the domain of AI and music composition. This section details the steps undertaken for data collection, selection criteria, feature design, and the analytical techniques used to investigate trends and correlations within the research corpus. Additionally, we outline the process for defining the scope of the study, including the filtering criteria applied to the selected papers and the chronological considerations incorporated into the analysis.

1.1. Selection and Inclusion Criteria

The dataset used in our study was compiled through an extensive review of academic literature on AI-driven music composition. We conducted searches across major online research platforms, including Google Scholar, Consensus AI, and ResearchGate. On all platforms, we maintained the default filter criterion of 'relevance' to ensure consistency. To identify works relevant to our analysis, we used targeted keywords such as 'Artificial Intelligence', 'Music Composition', and 'Creative Practices in Music Composition'. Additionally, we limited our selection to papers published up to the first half of 2024. This approach resulted in a curated dataset of 75 works that met our inclusion criteria.

Citation count was one of the key features considered in our analysis. It serves as a reliable metric for evaluating the impact and recognition of a research work. Generally, higher citation counts indicate that a study has been influential and frequently referenced in subsequent research. Therefore, works with higher citation counts were prioritized in our study.

It was fundamental to include works that reflected the diversity of research topics, methodologies, and applications. We evaluated theoretical and technical foundations, algorithm developments, practical implementations, and case studies. Additional factors such as title, abstract, and citation counts were also considered. Using this approach and applying our selection criteria and filters, we classified a dataset of 75 works. The following tables and histogram present descriptive statistics and the proportional frequency of selected works by year of publication. Finally, we show the frequency distribution of these works over time.

Results	
Descriptive	Year
N	75
Median	2019
Mode	2023

Table 1. Frequency distribution of the papers selected for study by year and the table of the summary statistics for their amount.

Source: Prepared by the authors.

Year	Number of works	Cumulative %
1980	1	1.3
1985	1	2.7
1987	1	4.0
1989	2	6.7
1990	1	8.0
1992	1	9.3
1993	1	10.7
1996	1	12.0
1999	1	13.3
2000	2	16.0
2001	1	17.3
2002	1	18.7
2003	1	20.0
2007	1	21.3
2011	2	24.0
2013	2	26.7
2014	3	30.7
2016	5	37.3
2017	3	41.3
2018	6	49.3
2019	4	54.7
2020	9	66.7
2021	5	73.3
2022	3	77.3
2023	16	98.7
2024	1	100

Table 2. Summary of the Selected Works by year

Source: Prepared by the authors.

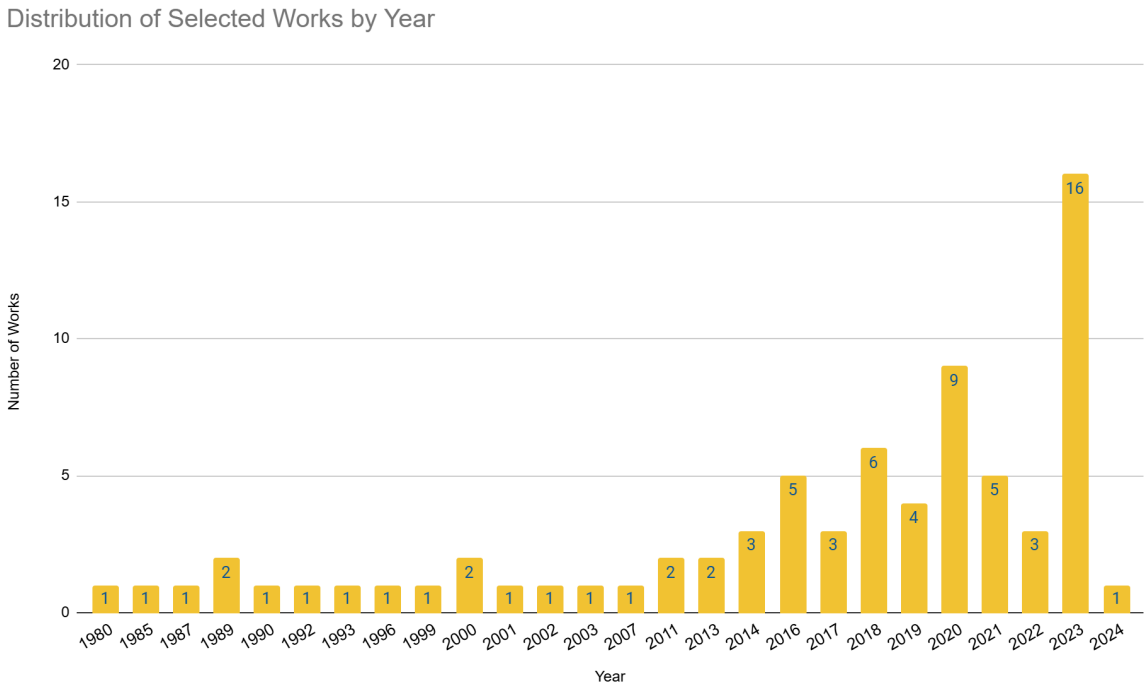


Figure 1. The histogram of the selected paper by year of publication
Source: Prepared by the authors.

1.1.1. Citation Counts in Early Works (1980s-1990s):

Early works in AI and music composition from the 1980s and 1990s often have significant citation counts, reflecting their seminal contributions to the field. These foundational studies introduced key theories and methodologies that have shaped the trajectory of subsequent research. The high citation counts underscore the enduring impact of these early frameworks, highlighting their importance in establishing the theoretical and methodological groundwork for modern advancements in AI-driven music composition.

1.1.2. Moderate Citation Counts in the Transitional Period (2000-2010):

Between 2000 and 2010, the transitional period in AI-based music composition saw diverse methodological explorations, resulting in a moderate but varied range of citation impacts. While some works from this era gained significant influence, others remained niche, reflecting the experimental and evolving nature of the field during this time. This decade marked a pivotal shift from the dominance of rule-based systems to the emergence of more adaptive machine learning techniques, paving the way for a broader range of applications and laying the groundwork for subsequent advancements.

1.1.3. Increasing Citation Counts in Recent Years (2010-2022):

From 2010 to 2022, the adoption of deep learning and advanced neural network models significantly boosted the impact of research in AI-based music composition. These techniques have enhanced the capabilities of AI, leading to innovative applications that have drawn considerable academic and practical interest, as evidenced by the increasing citation counts. Additionally, works centered on novel neural network architectures, such as GANs and Transformers, have become particularly influential. Their cutting-edge contributions and practical utility underscore the growing prominence of these methodologies in shaping the future of AI-driven music composition.

1.1.4. Recent Publication (2023-2024):

Publications from 2023 to 2024 naturally exhibit lower citation counts due to their recency. However, these recent works are characterized by novel methodologies and significant potential for influence. As they are cited and built upon in future studies, they are likely to shape the next wave of research, representing an emerging impact in the field of AI-driven music composition.

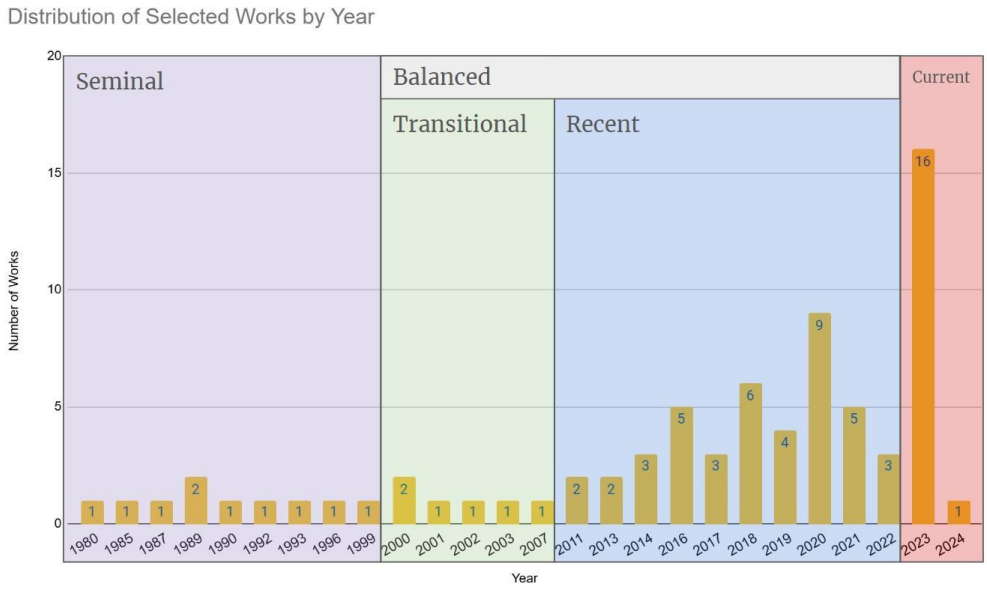


Figure 2. The histogram of the frequency distribution of the selected papers by citation counts.
Source: Prepared by the authors.

1.2. Discussion on the selected paper dataset

The dataset was designed to provide a comprehensive and balanced representation of significant works in AI-based music composition, incorporating foundational, progressive, and cutting-edge research:

2. Seminal Works: Influential studies published before 2000.
3. Mid-Range Coverage: Research spanning 2000 to 2022.

4. Recent Advances: Works from 2023 and the first half of 2024.

By including works from different periods, the dataset captures the evolution of AI techniques and their growing sophistication in music composition. It highlights key contributions across various approaches, including rule-based systems, expert systems, machine learning, deep learning, and recent innovations. That way, we ensure both historical depth and coverage of recent advancements. As a result, works published before 2000 were included to capture the historical context and foundational developments in the field. These seminal studies offer critical insights into the pioneering efforts and breakthroughs that laid the groundwork for modern advancements. For the period between 2000 and 2022, a balanced selection was made to represent the evolution and progress of the field. By ensuring no particular year or period is overrepresented, this approach highlights the gradual advancements and shifts in AI techniques, methodologies, and applications in music composition over two decades. Finally, works from 2023 and the first half of 2024 were examined to capture the latest developments and cutting-edge research. These recent studies reveal emerging trends, innovations, and potential future directions in the field.

Building on this selection, we next classify the selected works into categories for further analysis. This categorization allows us to identify and discuss specific outputs, enabling a detailed evaluation of observed trends and patterns across the dataset.

2. Classification and Analysis of Selected Categories

In this section, we identify and discuss the main categories observed in the selected works. They are chosen due to their relevance in the selected papers' sections and/or subsections. These categories are analyzed based on their feature distributions, encompassing elements such as:

1. Algorithm Distribution
2. Study Objectives Distribution
3. Hypothesis Tested Distribution
4. Findings
5. Discussions
6. Limitations
7. Future Research Directions

Through this analysis, we highlight common topics and trends that capture the multifaceted nature of the selected works. These topics and trends are suggestions derived from the literature survey; therefore, the terminology may be adjusted while preserving the content. To enhance readability, we provide a summary of the categorized labels at the end of this section, offering a comprehensive and streamlined overview of our findings.

2.1. Algorithm Distribution

In the exploration of AI-based music composition, several algorithms have emerged as central to advancing the field. Among the foundational approaches are **knowledge-based systems**, which leverage encoded expert knowledge to make informed decisions. These systems rely on predefined rules and heuristics to simulate decision-making processes akin to those of human experts, ensuring results adhere to specific criteria or constraints, such as harmonic rules or stylistic guidelines.

Another notable approach identified in our analysis is **Genetic Algorithms**, rooted in evolutionary techniques. These algorithms iteratively refine musical compositions by mimicking the process of natural selection, using cycles of selection, mutation, and recombination to evolve musical ideas over time.

Machine learning techniques have also become pivotal, with **Neural Networks** and **Deep Learning** models playing a prominent role. Recurrent Neural Networks (RNNs) excel in sequence generation tasks, making them particularly well-suited for music composition. **Generative Adversarial Networks (GANs)** have gained traction with their dual-network architecture, where a generator creates data and a discriminator evaluates it. Similarly, **Variational Autoencoders (VAEs)** stand out for their ability to learn latent representations, enabling innovative approaches to musical problem-solving.

The following histogram summarizes the trends identified through our analysis, focusing on the primary topics and algorithms shaping the selected works.

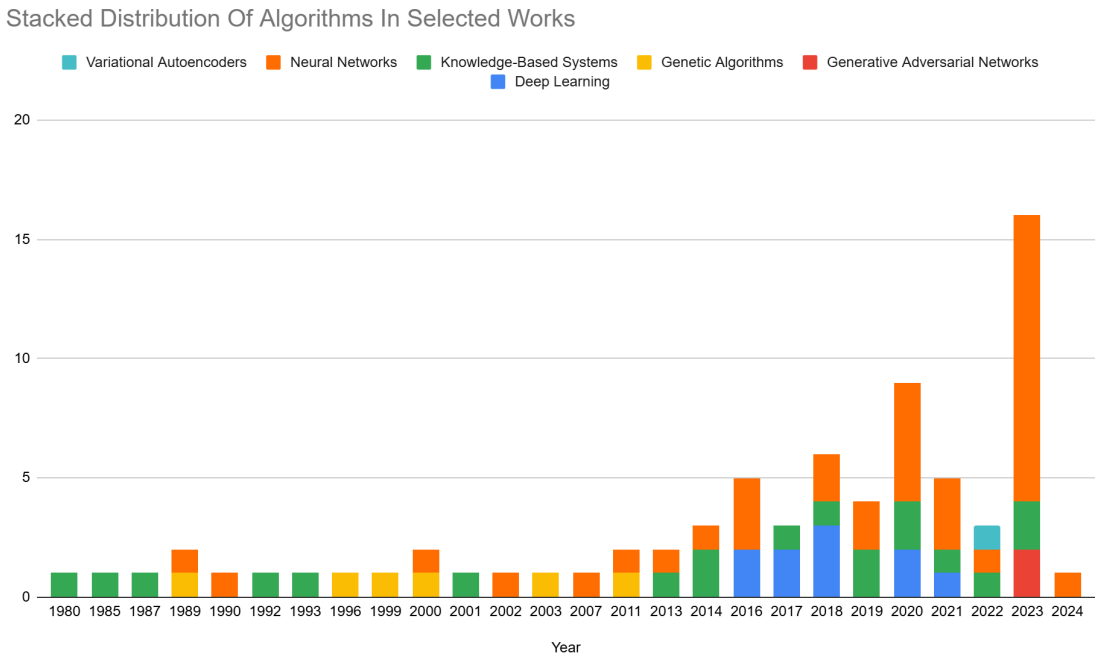


Figure 3. The histogram of the frequency distribution from the algorithm technique found in the selected paper.
Source: Prepared by the authors.

2.1.1. Observed Trends in Algorithm

In the evolution of AI-based music composition, observed trends in algorithm use highlight the shifting focus of research over time. Rule-based systems dominated the early landscape of the 1980s and 1990s, as they represented initial attempts to formalize musical rules and processes using AI. These systems relied on predefined logic to replicate decision-making processes, laying the groundwork for later, more adaptive approaches.

Genetic algorithms and other evolutionary methods gained traction in the 1990s due to their ability to simulate natural selection and evolution in musical creativity. These techniques persisted into the early 2000s but gradually declined in prominence as the field shifted toward more sophisticated neural network-based models. While still occasionally employed, their impact in music composition research has been overshadowed by the rapid rise of deep learning.

Since the 2010s, neural networks and deep learning models have become the dominant paradigm in AI-based music composition. Their ability to generate and infer music through learned representations has revolutionized the field. Recent works, particularly those published in 2023 and 2024, continue to focus on advanced architectures such as Generative Adversarial Networks (GANs) and Transformers, which have expanded the creative potential of AI.

In addition to these primary trends, other algorithms such as Markov Models and Reinforcement Learning have been explored for more specialized or niche applications. While less prevalent, these methods offer unique solutions to specific challenges in music composition and are occasionally revisited in research.

2.2 Study Objectives Distribution

Identifying latent topics to summarize the study objectives of the selected works is a challenging task. However, we believe it is essential to adopt a broad perspective on the potential activities and actions required to achieve meaningful outcomes. A recurring theme is the direct application of AI in music, which explores how AI techniques can be leveraged across various aspects of music composition. This includes the potential of AI to transform traditional music processes into computational paradigms, revolutionizing how music is conceptualized and created.

Another critical objective is the **development of tools and systems**. Increasingly, studies focus on creating interactive systems and AI-powered tools that support composers in their creative process. These tools often incorporate machine learning algorithms capable of generating melodies, harmonizing music, or suggesting compositional structures, thereby augmenting the composer's creative toolkit and streamlining the composition process.

A third objective centers on **understanding musical style**, where research investigates how AI can be trained to emulate and comprehend different musical styles. By analyzing vast datasets of musical works, AI models can capture the nuances of various genres and styles, enabling them to produce compositions that align with specific stylistic conventions. This objective underscores the role of AI in preserving and innovating within traditional musical frameworks.

Another key focus is **enhancing creativity**, which examines how AI can inspire and encourage innovation in music composition. By presenting musical elements or suggesting novel combinations of sounds and structures, AI tools act as collaborative partners, offering composers fresh perspectives and possibilities during the creative process.

Finally, "Technological Integration" explores how AI can be seamlessly incorporated into traditional music composition methods, extending beyond experimental or sound- and textural-based outputs. This includes addressing the challenges of combining AI with established compositional techniques and evaluating the impact of such integration on both the creative process and the resulting musical works.

The following sections provide a comprehensive summary of the trends identified through an analysis of the primary themes emerging from the "Study Objectives" in the selected works.

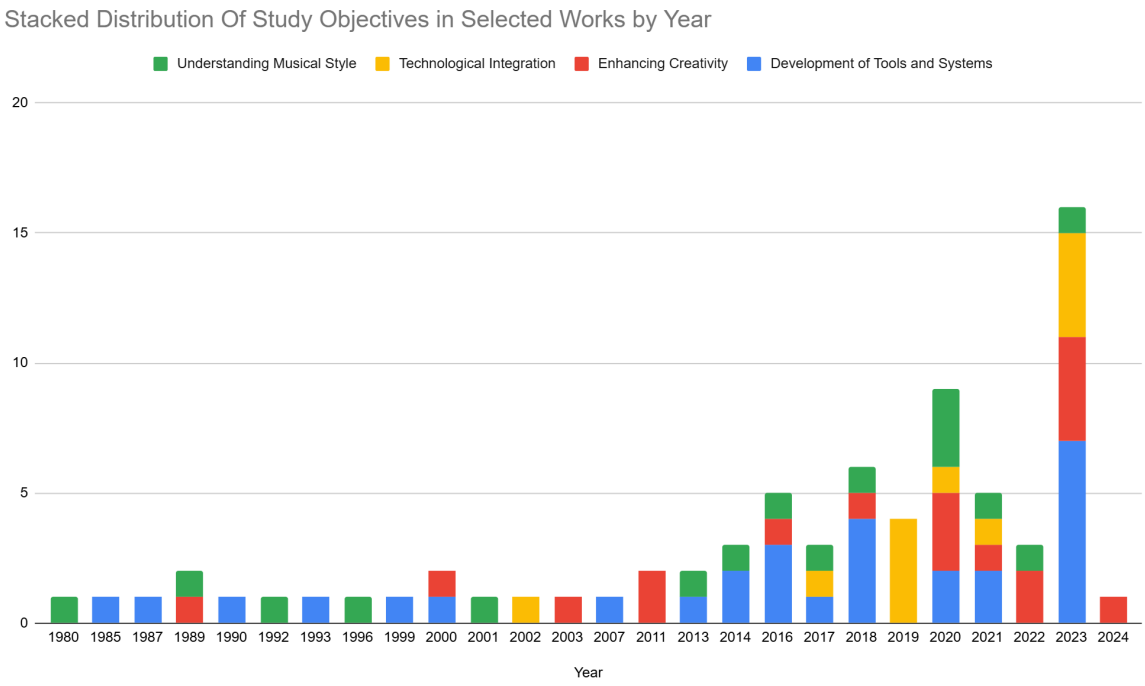


Figure 4. The histogram of the frequency distribution from the study objectives found in the selected paper
Source: Prepared by the authors.

2.2.1. Observed Trends in Study Objectives

In the early stages of AI-based music composition, research primarily focused on **understanding and replicating musical styles through computational applications**. These studies aimed to mimic human composers by using AI techniques to analyze and recreate stylistic elements. Alongside this, significant effort was directed toward the **development of tools and systems** for AI-assisted music composition. These initial tools established the frameworks that would support future advancements in the field.

By the mid-1990s to early 2000s, the focus began to shift. Researchers increasingly evaluated how effectively AI could compose music, emphasizing empirical studies that explored the creative potential and computational capabilities of AI-generated compositions. This period also saw the **exploration of alternative AI techniques**, including neural networks and genetic algorithms, as researchers sought to expand the methodological approaches available for music composition.

Recent developments reveal a consolidation of **interdisciplinary** approaches, integrating computational, musicological, and cognitive perspectives. Study objectives broadened to include the development of more **sophisticated AI applications** that could foster creativity and facilitate collaboration between human composers and AI systems. A notable trend emerged in the use of **data-driven approaches**, leveraging large datasets to train AI systems. This shift reflected advancements in machine learning and deep learning, as well as the growing availability of diverse musical data, enabling AI to achieve greater nuance and complexity in its outputs.

2.3 Hypothesis Tested Distribution

In analyzing the selected works on the application of AI in music composition, several key hypotheses emerge. A central focus is the **AI's ability to mimic human creativity**, where researchers examine whether AI systems can replicate the nuanced and idiosyncratic processes underlying human musical composition. This inquiry often intersects with studies on **challenges and limitations**, critically evaluating the constraints of AI in producing culturally and aesthetically valued music on par with human-created works.

Another prominent area of investigation is the **impact of AI tools on human composers**, exploring how AI integration influences the creative workflow and redefines the role of the composer. These studies assess whether AI acts as a supportive collaborator, a disruptive force, or something entirely new within the compositional process.

Finally, a recurring hypothesis tests the **efficacy of AI in music composition**, evaluating the utility and effectiveness of AI systems in generating complete musical pieces or supporting tasks like melody generation or harmonic structuring. These studies frequently benchmark AI-generated outputs against traditional human compositions to measure quality, innovation, and audience reception. Together, these themes frame the current discourse on AI in music composition, highlighting both its transformative potential and the challenges it presents as this field continues to evolve.

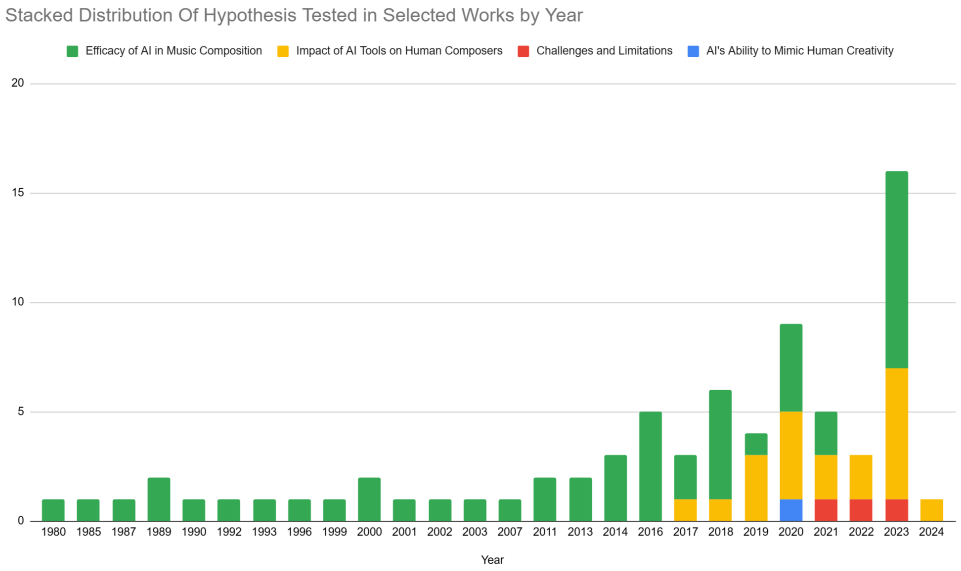


Figure 5. The histogram of the frequency distribution from the hypothesis proposed in the selected paper
Source: Prepared by the authors.

2.3.1. Observed Trends in Hypothesis Tested

In the early stages of AI in music composition, spanning the 1980s to the early 1990s, hypotheses focused on the **potential of AI to compose music** comparable to human-created works. These studies sought to validate the fundamental premise of AI's capabilities in music, laying the groundwork for further exploration. Central to this period was the investigation into **AI's ability to mimic human creativity**, testing whether AI systems could replicate the nuanced and idiosyncratic processes characteristic of human composers. These foundational hypotheses were crucial in establishing AI's potential within creative domains.

From the mid-1990s to the early 2000s, the focus shifted toward addressing **technical feasibility and constraints**. Researchers critically evaluated the limitations and performance of techniques such as genetic algorithms, neural networks, and other emerging methods in music composition. Concurrently, efforts were directed toward **improving AI systems**, with hypotheses centered on refining algorithms and integrating innovative techniques to enhance their capability to support music composition more effectively.

In more recent years, from the late 2000s to the present, hypotheses have increasingly reflected the **interdisciplinary nature of the field**. Studies have tested how integrating insights from areas like cognitive science, musicology, and computer science impacts the creativity and effectiveness of AI-generated music. The focus has also expanded to examine **human-AI collaboration**, exploring how AI can augment human creativity and serve as a collaborative partner in the compositional process. Additionally, as **algorithmic models have grown in complexity**, hypotheses now often involve testing the effectiveness of advanced approaches like deep learning and reinforcement learning in producing high-quality and innovative music compositions.

2.4. Findings Distribution

In the evolving field of AI and its application in music composition, several key themes have emerged from recent studies, particularly in the areas of **interactive systems**, **methodological approaches**, and **technological advancements**. Based on our interpretation of the selected papers, interactive systems have become central to research, emphasizing the dynamic interplay between human creativity and AI-driven processes. These systems facilitate collaborative and immersive experiences, enabling composers to work with AI as co-creators rather than merely as tools. This shift redefines the boundaries of artistic collaboration and highlights the potential of AI to enhance the creative process.

The methodological approaches employed in AI-based music composition are equally diverse, ranging from traditional machine learning techniques to advanced deep learning frameworks such as Generative Adversarial Networks (GANs), Recurrent Neural Networks (RNNs), and Variational Autoencoders (VAEs), as discussed in earlier sections. These methodologies not only enhance the technical capabilities of AI systems but also open new creative possibilities, providing innovative ways to generate, manipulate, and evaluate musical content.

Technological advancements have played a crucial role in driving these innovations. The development of sophisticated algorithms and models now allows AI to autonomously compose music, analyze intricate musical structures, and simulate human-like creativity. These advancements underline the transformative potential of AI in the music industry and reinforce the need for continued research in interactive, methodological, and technological domains to fully harness AI's capabilities in artistic and creative fields.

Additionally, in the “Hypothesis Tested” category, each selected study was analyzed across two findings topics to avoid constraining the scope of the research to a single theme. This broader approach ensures a more comprehensive understanding of the diverse contributions and potential of AI in music composition.

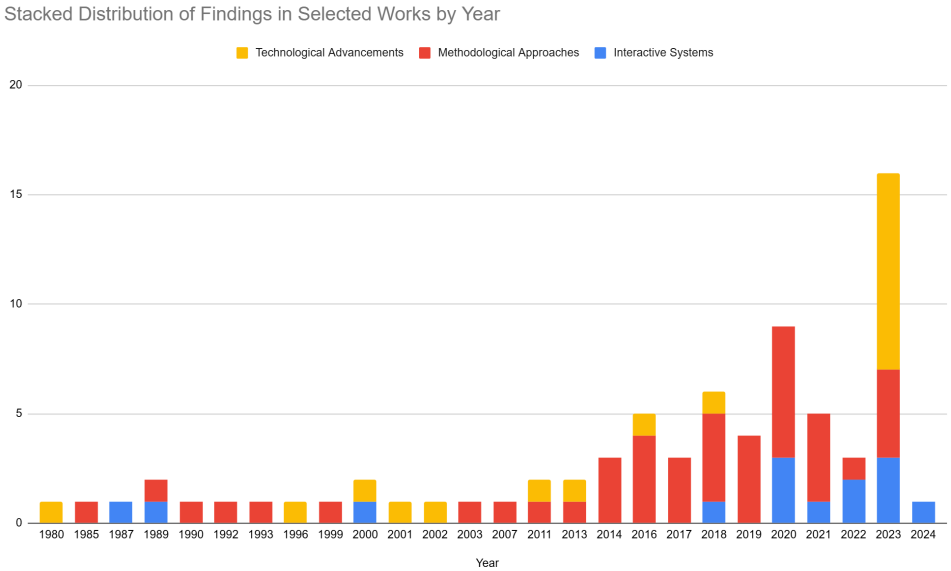


Figure 6. The histogram of the frequency distribution from the findings in the selected paper
Source: Prepared by the authors.

2.4.1. Observed Trends in Findings Distribution

From the 1980s to the early 1990s, findings in AI-based music composition focused on validating the feasibility of using AI in this domain. These early studies demonstrated the potential of AI to compose music, corroborating initial hypotheses about its capabilities. However, they also highlighted significant technical constraints, including limited computational power and the rigidity of rule-based systems, which restricted creativity and adaptability.

By the mid-1990s to the early 2000s, advancements in AI techniques led to notable improvements in the quality and diversity of AI-composed music. Empirical studies during this period assessed the effectiveness of AI systems in generating creative and stylistically specific compositions, marking a shift toward more refined and versatile applications.

From the late 2000s to the present, findings have increasingly reflected interdisciplinary approaches, drawing insights from fields such as musicology, cognitive science, and computer science. These studies emphasize the role of AI in enhancing human creativity and fostering collaboration between AI systems and human composers. Additionally, researchers have explored the scalability of AI systems, with a growing focus on leveraging large datasets to train more effective and sophisticated models for music composition.

2.5. Discussion Distribution

The evolution of artificial intelligence has profoundly impacted the field of music, transforming traditional practices while opening new avenues for creative expression. **AI's influence** spans composition, performance, and even the listening experience, making its impact both diverse and far-reaching. Technologies such as Generative Adversarial Networks (GANs), Recurrent Neural Networks (RNNs), and deep learning models, as discussed earlier, have enabled the creation of music that not only mimics human composition but also challenges traditional norms by introducing alternative forms and structures.

This widespread adoption of AI in music has also sparked critical discussions about creativity, authorship, and originality, prompting a re-evaluation of established **theoretical frameworks**. In addressing these challenges, researchers have turned to interdisciplinary approaches, integrating insights from cognitive science, music theory, and computational creativity to better contextualize AI's role in music. These frameworks aim to define the boundaries between human creativity and machine capabilities, shedding light on their interplay in the artistic process.

Looking ahead, several key areas of exploration emerge in the field of AI and music composition. A significant focus lies in enhancing the interpretability of AI models to better understand the decision-making processes behind AI-generated compositions. This includes the development of hybrid models that combine AI's computational strengths with human creativity, fostering collaborative and nuanced approaches to composition. Another critical avenue for research involves examining the ethical

and societal implications of AI in music, ensuring equitable access to these technologies while mitigating potential biases and cultural homogenization.

Throughout this analysis, we ensured that at least two primary discussion topics were addressed for each selected work, providing a comprehensive understanding of the diverse themes shaping the discourse on AI in music.

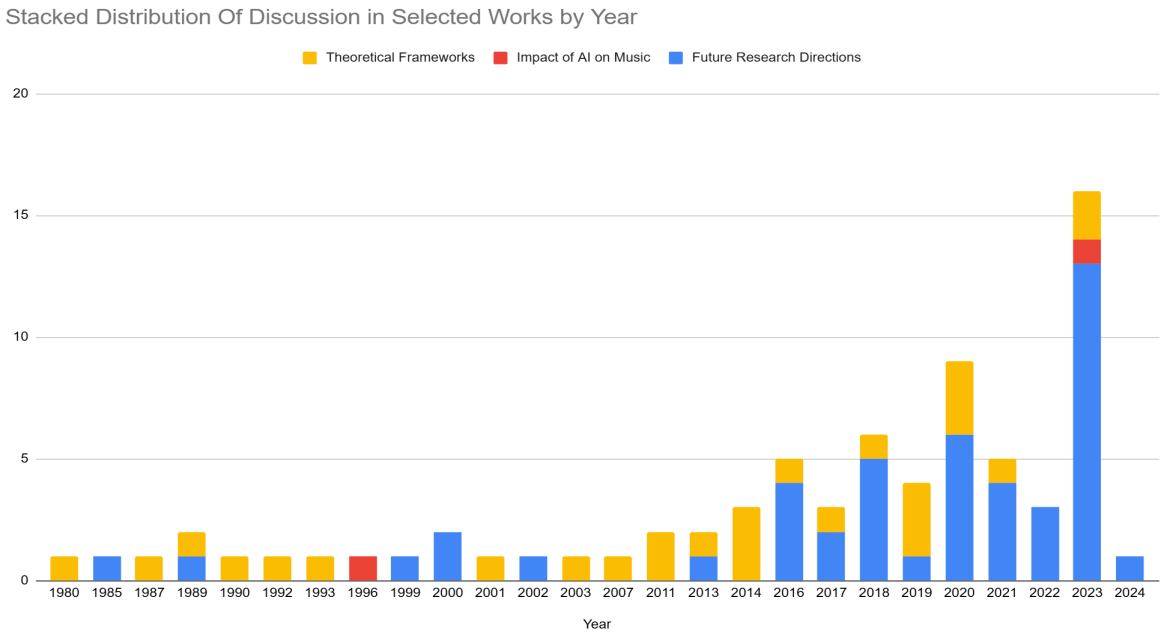


Figure 7. The histogram of the frequency distribution from the discussion in the selected paper
Source: Prepared by the authors.

2.5.1. Observed Trends in Discussion Distribution

In the early years of AI in music composition, spanning the 1980s to the early 1990s, discussions primarily centered on the **potential of AI techniques** and their implications for the field. Researchers debated the capabilities of AI in composing music and its broader impact on musical practices. These discussions also often delved into **philosophical considerations**, exploring the nature of creativity and the role machines could play in artistic processes.

By the mid-1990s to early 2000s, the focus shifted towards **practical applications**. As AI techniques advanced, researchers discussed the effectiveness of various systems in music composition and their real-world applicability. Alongside this, significant attention was given to the technical **challenges** of implementing AI systems, with many proposing strategies to enhance their performance and usability.

From the late 2000s to the present, discussions have increasingly addressed the **limitations of available data and the complexity of algorithms** required for advanced AI composition. There has also been a notable emphasis on **interdisciplinary approaches**, integrating insights from music theory, computer science, cognitive science, and related fields to improve AI-driven music composition. Furthermore, recent conversations highlight the **collaborative potential** between AI and human composers, positioning AI not just as a tool but as a creative partner in the compositional process.

2.6. Limitations Distribution

The literature from the selected works reveals several common limitations that pose significant challenges to advancing AI in creative music tasks. One major concern is **algorithmic and methodological issues**, which highlight the difficulty of developing algorithms capable of producing consistent and cohesive music compositions. These challenges often arise from the inherent complexity of music, encompassing intricate features such as rhythm, harmony, timbre, and melody. Closely tied to these issues are **technical constraints**, which underline the current limitations of AI systems. These constraints are further exacerbated by the computational resources required to process and generate musical material or complete compositions. The substantial computational power needed often reduces the accessibility and scalability of these technologies.

Another critical limitation is the **availability of data**, as the diverse and extensive datasets required to train AI models remain insufficient despite advancements in data collection. The lack of robust datasets hinders the ability of AI systems to generate compositions that reflect the richness and diversity of human-created music. Finally, one of the most pressing challenges lies in achieving **musicality and human-like creativity**. AI-generated music frequently lacks the affective and emotional depth, intentionality, and expressive qualities characteristic of human compositions. Despite advances in machine learning and neural networks, replicating the creative intuition and cultural context embedded in human music remains a significant hurdle for AI-driven music production.

To address these limitations comprehensively, our analysis delineated two distinct discussion topics within the limitations category for each selected work, offering a deeper exploration of these challenges and their implications.

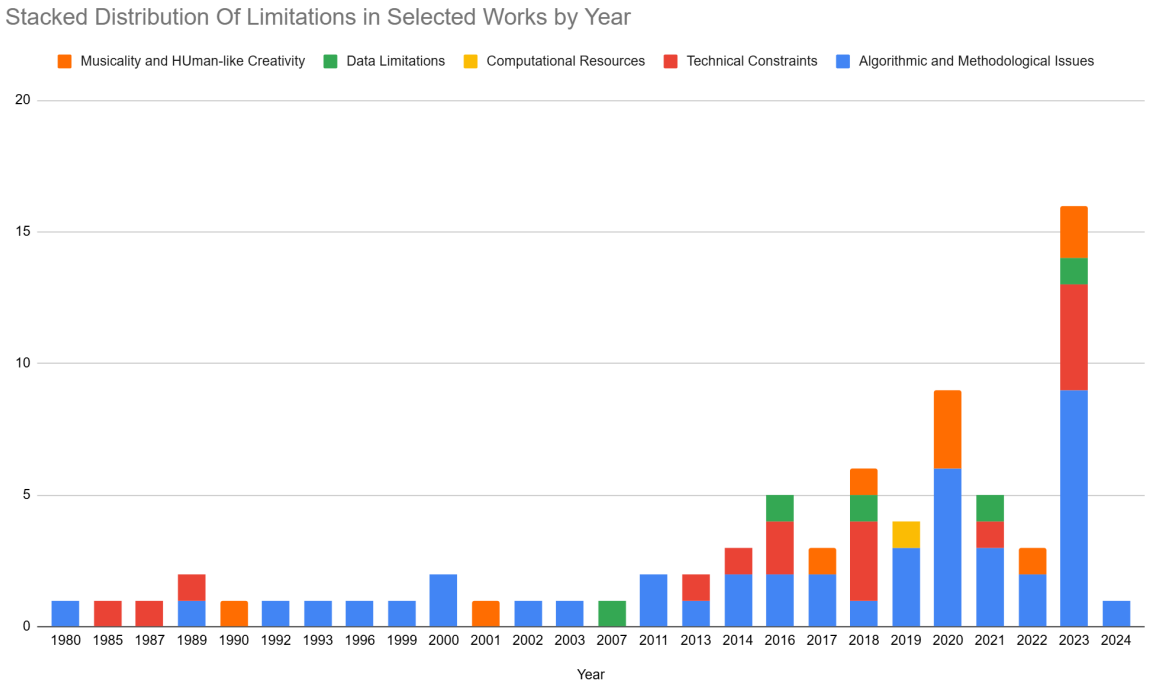


Figure 8. The histogram of the frequency distribution from the limitations in the selected paper
Source: Prepared by the authors.

2.6.1. Observed Trends in Limitations Distribution

From the 1980s to the early 1990s, early studies on AI in music composition highlighted significant **technical constraints**, such as limited computational power and the rigidity of rule-based systems. Researchers also recognized the challenges in **mimicking human creativity**, as early AI models struggled to produce works that captured the depth and nuance of human artistic expression.

By the mid-1990s to early 2000s, the scope of limitations expanded to include **issues related to data availability and the methodological constraints** of existing AI techniques. There was also growing recognition of the need for algorithmic improvements to overcome these challenges and enhance the functionality and versatility of AI systems in music composition.

From the late 2000s to the present, discussions have increasingly focused on the **scalability** of AI systems and the escalating **complexity** of algorithms required for effective and nuanced music composition. Researchers have also identified **interdisciplinary constraints**, noting the difficulties in integrating insights from fields like music theory, cognitive science, and computer science to create cohesive and innovative AI composition systems. Additionally, limitations in **human-AI interaction** have become a key area of concern, with studies emphasizing the need for more advanced mechanisms to foster effective collaboration between AI systems and human composers.

2.7. Future Research Distribution

An important focus of this study lies in the future research directions for AI-generated music, as identified in the selected works. These perspectives aim to overcome existing limitations and advance the field strategically. A key priority is **improving algorithmic complexity**, which involves developing more sophisticated algorithms capable of capturing and addressing the nuances of musical composition. Notable advancements include the application of hybrid algorithms to creative musical tasks, as highlighted in the algorithms section. Achieving these improvements will likely require **interdisciplinary approaches**, with collaborations among experts in music theory, computer science, cognitive science, and other related fields. Such collaborations can yield more comprehensive outcomes that integrate the technical, artistic, and cultural dimensions of music creation.

Equally vital is the focus on **enhanced human-AI collaboration**, aimed at developing tools and frameworks that facilitate seamless interaction between human composers and AI systems. This approach ensures that AI acts as a creative partner rather than a replacement in the artistic process. Additionally, **ethical and philosophical considerations** must remain at the forefront of future research, addressing societal impacts, intellectual property rights, and the cultural implications of AI in music. These considerations are essential to ensure that technological advancements align with broader human values and rights.

To support these advancements, there is a pressing need for **expanding datasets and improving training methods**. Developing diverse and robust datasets—including a wide range of musical

excerpts, sound recordings, and symbolic music features—is critical for training AI models capable of producing innovative and culturally sensitive music. Finally, future research should explore **applications beyond composition**, expanding AI's role into areas such as performance, education, music therapy, and interactive media. These expansions would complement the primary focus of this study on music composition.

To ensure a comprehensive exploration of these topics, we analyzed two distinct future research themes for each selected work in the dataset.

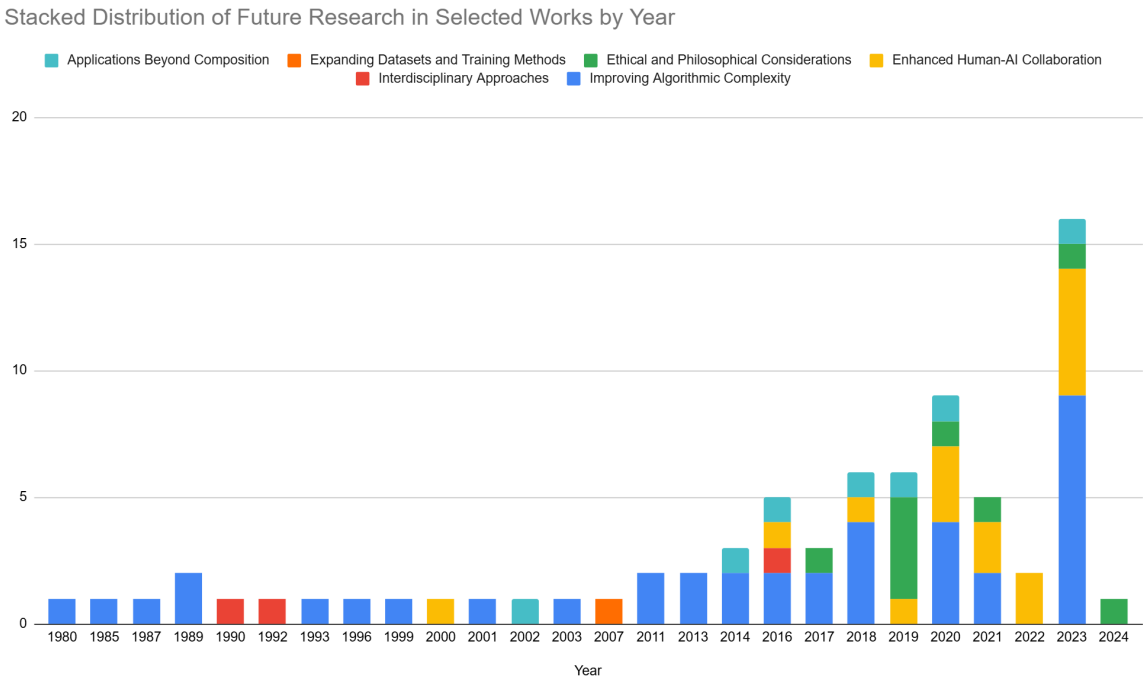


Figure 9. The histogram of the frequency distribution from the future research found in the selected paper
Source: Prepared by the authors.

2.7.1. Observed Trends in Future Research Distribution

In the early years of AI in music composition, spanning the 1980s to the early 1990s, future research directions focused on **improving basic AI algorithms**, including refining rule-based systems and exploring emerging AI techniques. Researchers also sought to deepen their **understanding of 'musical intelligence'**, investigating how it could be modeled using AI to replicate or enhance human compositional processes.

By the mid-1990s to early 2000s, the emphasis shifted toward the **development of advanced AI techniques**, such as genetic algorithms and neural networks, aimed at improving the capabilities of AI composers. Future research also began prioritizing the creation of **practical tools and systems** for composers, with a focus on usability, effectiveness, and real-world applications.

From the late 2000s to the present, future research has increasingly embraced **interdisciplinary approaches**, combining insights from fields like music theory, cognitive science, and computer science to develop more sophisticated AI systems. A significant area of focus has been **human-AI collaboration**, exploring how AI can work alongside human composers to enhance interaction and cooperation, fostering a more collaborative creative process. Researchers have also placed growing importance on **data-driven techniques**, leveraging large datasets and advanced machine learning models to improve the quality and diversity of AI-generated compositions.

Recent research directions also emphasize **creativity and novelty**, aiming to push the boundaries of what AI can achieve by not only replicating existing musical styles but also creating innovative compositions that challenge traditional norms. As AI becomes more integrated into the creative process, there has been a parallel rise in the exploration of **ethical and philosophical considerations**, addressing questions about the role of AI in art, the implications of AI-generated music, and its impact on cultural and societal values.

2.8. Summary chart for selected works main categories

Work / Reference / Citations	**Algorithm / Objective / Hypothesis**	**Findings / Discussion / Limitation / Future research**
Artificial Intelligence and Music Roads 1980 | citations: 165	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Research in Music and Artificial Intelligence Roads 1985 | citations: 24	Algorithm: Knowledge-Based Systems Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
An Expert System for Computer-Assisted Composition Cope 1987 | citations: 150	Algorithm: Knowledge-Based Systems Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Interactive Systems Discussion: Theoretical Frameworks Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Experiments in musical intelligence (EMI): Non-linear linguistic-based composition Cope 1989 | citations: 177	Algorithm: Genetic Algorithms Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
The use of Artificial Intelligence to encourage and facilitate music composition by novices Holland 1989 | citations: 150	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
On the Role of Artificial Intelligence in Music Research Camurri 1990 | citations: 24	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Musicality and Human-Like Creativity Future research: Interdisciplinary Approaches
Artificial Intelligence and Music - A Cornerstone of Cognitive Musicology Laske 1992 | citations: 31	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Interdisciplinary Approaches
machine models of music Introduction Levitt and Schwanauer 1993 | citations: 84	Algorithm: Knowledge-Based Systems Objective: Development of Tools and Systems Hypothesis:	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Experiments in Musical Intelligence Cope 1996 | citations: 455	Algorithm: Genetic Algorithms Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Impact of AI on Music Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
AI Methods for Algorithmic Composition: A Survey, a Critical View and Future Prospects Papadopoulos and Wiggins 1999 | citations: 331	Algorithm: Genetic Algorithms Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Vox Populi - An Interactive Evolutionary System for Algorithmic Music Composition Moroni et al 2000 | citations: 197	Algorithm: Genetic Algorithms Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Artificial Intelligence in music education: a critical review Holland 2000 | citations: 67	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
Virtual-Music-Computer-Synthesis-of-Musical-Style Cope 2001 | citations: 436	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Theoretical Frameworks Limitation: Musicality and Human-Like Creativity Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
AI and Music From Composition to Expressive Performance Mantaras and Arcos 2002 | citations: 259	Algorithm: Neural Networks Objective: Technological Integration Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Applications Beyond Composition
Generative Model for the Creation of Musical Emotion, Meaning, and Form Birchfield 2003 | citations: 38	Algorithm: Genetic Algorithms Objective: Enhancing Creativity Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
A Corpus-Based Hybrid Approach to Music Analysis and Composition Manaris et al 2007 | citations: 111	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Data Limitations Future research: Expanding Datasets and Training Methods
Algorithmic Composition: Computational Thinking in Music key insights Edwards 2011 | citations: 185	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Composing with Melomics - Delving into the Computational World for Musical Inspiration Diaz-Jerez 2011 | citations: 49	Algorithm: Genetic Algorithms Objective: Enhancing Creativity Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
AI Methods in Algorithmic Composition: A Comprehensive Survey Fernandes and Vico 2013 | citations: 475	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
David Cope and Experiments in Musical Intelligence Silva 2013 | citations: 455	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Theoretical Frameworks Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Automatic melody composition based on a probabilistic model of music style and harmonic rules Roig et al 2014 | citations: 61	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Applications Beyond Composition
BACH IN 2014: MUSIC COMPOSITION WITH RECUR-RENT NEURAL NETWORK Liu and Ramakrishnan 2015 | citations: 52	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Technical Constraints Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
Kulitta: a Framework for Automated Music Composition Quick 2014 | citations: 43	Algorithm: Knowledge-Based Systems Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Music transcription modelling and composition using deep learning Sturm et al 2016 | citations: 222	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Applications Beyond Composition
SONG FROM PI: A MUSICALLY PLAUSIBLE NETWORK FOR POP MUSIC GENERATION Chu et al 2017 | citations: 175	Algorithm: Neural Networks Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Text-based LSTM networks for Automatic Music Composition Choi et al 2016 | citations: 151	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Computational Intelligence in Music Composition - A Survey Liu and Ting 2016 | citations: 76	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Data Limitations Future research: Enhanced Human-AI Collaboration
Artificial intelligence and the arts - Toward computational creativity Mantaras 2016 | citations: 33	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Interdisciplinary Approaches
Do Androids Dream of Electric Copyright? Comparative analysis of originality in artificial intelligence generated works Guadamuz 2020 | citations: 158	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations
AUTOMATIC STYLISTIC COMPOSITION OF BACH CHORALES WITH DEEP LSTM Liang 2017 | citations: 115	Algorithm: Deep Learning Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
DeepArtificialComposer: A Creative Neural Network Model for Automated Melody Generation Colombo et al 2017 | citations: 51	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Musicality and Human-Like Creativity Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
Automatic Music Transcription - An Overview Benetos et al 2019 | citations: 325	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
I Lead, You Help But Only with Enough Details: Understanding the User Experience of Co-Creation with Artificial Intelligence Oh et al 2018 | citations: 281	Algorithm: Knowledge-Based Systems Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Theoretical Frameworks Limitation: Musicality and Human-Like Creativity Future research: Enhanced Human-AI Collaboration
DeepJ: Style-Specific Music Generation Mao et al 2018 | citations: 154	Algorithm: Deep Learning Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Machine Learning Research that Matters for Music Creation: A Case Study Sturm et al 2021 | citations: 115	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Data Limitations Future research: Applications Beyond Composition
Music Generation by Deep Learning - Challenges and Directions Briot and Pachet 2018 | citations: 68	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Algorithmic Music Composition Based on Artificial Intelligence: A Survey Lopez-Rincon et al 2018 | citations: 65	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
A Self-Consistent Sonification Method to Translate Amino Acid Sequences into Musical Compositions and Application in Protein Design Using Artificial Intelligence Yu et al 2019 | citations: 114	Algorithm: Neural Networks Objective: Technological Integration Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Computational Resources Future research: Enhanced Human-AI Collaboration
Artificial Intelligence and Music: Open Questions of Copyright Law and Engineering Praxis Sturm et al 2019 | citations: 108	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations
How AI can Change/Improve/Influence Music Composition, Performance and Education: Three Case Studies Zulic 2019 | citations: 53	Algorithm: Neural Networks Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Applications Beyond Composition

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
The concept of authorship and inventorship under pressure - Does artificial intelligence shift paradigms Lauber-Roensberg and Sven 2019 | citations: 49	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations
Novice-AI Music Co-Creation via AI-Steering Tools for Deep Generative Models Louie et al 2020 | citations: 230	Algorithm: Deep Learning Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
THE JAZZ TRANSFORMER ON THE FRONT LINE: EXPLORING THE SHORTCOMINGS OF AI-COMPOSED MUSIC THROUGH QUANTITATIVE Wu and Yang 2020 | citations: 95	Algorithm: Deep Learning Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Musicality and Human-Like Creativity Future research: Improving Algorithmic Complexity
AI SONG CONTEST: HUMAN-AI CO-CREATION IN SONGWRITING Huang et al 2020 | citations: 94	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Musicality and Human-Like Creativity Future research: Enhanced Human-AI Collaboration
Are you ready for artificial Mozart and Skrillex? An experiment testing expectancy violation theory and AI music Hong et al 2020 | citations: 69	Algorithm: Neural Networks Objective: Understanding Musical Style Hypothesis: AI's Ability to Mimic Human Creativity	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
Music Creation by Example Frid et al 2020 | citations: 58	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Design Considerations for Real-Time Collaboration with Creative Artificial Intelligence McCormack et al 2020 | citations: 57	Algorithm: Knowledge-Based Systems Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Theoretical Frameworks Limitation: Musicality and Human-Like Creativity Future research: Applications Beyond Composition
A Style-Specific Music Composition Neural Network Jin et al 2020 | citations: 48	Algorithm: Neural Networks Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
Artificial intelligence as producer and consumer of copyright works: evaluating the consequences of algorithmic creativity Bonadio and Luke 2020 | citations: 47	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations
Artificial intelligence methods for music generation: a review and future perspectives Kaliakatsos-Papakostas et al 2020 | citations: 33	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
MUSIC COMPOSITION WITH DEEP LEARNING: A REVIEW Hernandez-Olivan and Beltran 2021 | citations: 86	Algorithm: Deep Learning Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Where Does the Buck Stop? Ethical and Political Issues with AI in Music Creation Morreale 2021 | citations: 61	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Challenges and Limitations	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations
Piano Performance and Music Automatic Notation Algorithm Teaching System Based on Artificial Intelligence Mobile Information Systems[1] Yang 2021 | citations: 38	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Artificial intelligence became Beethoven: how do listeners and music professionals perceive artificially composed music? Tigre-Moura and Charlotte 2021 | citations: 35	Algorithm: Neural Networks Objective: Understanding Musical Style Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Data Limitations Future research: Enhanced Human-AI Collaboration
I Keep Counting: An Experiment in Human/AI Co-creative Songwriting Micchi et al 2021 | citations: 34	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration

[1]Yang (2021) was formally retracted in August 2023 following a publisher investigation into indicators of systematic manipulation of the publication process. The study was retained in the present review exclusively for historical and bibliographic purposes, without endorsing the reliability of its findings. See the official retraction notice: https://doi.org/10.1155/2023/9802192.

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
Personalizing AI for Co-Creative Music Composition from Melody to Structure Deguernel et al 2022 | citations: 371	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
ReStyle-MusicVAE: Enhancing User Control of Deep Generative Music Models with Expert Labeled Anchors Prvulovic et al 2022 | citations: 99	Algorithm: Variational Autoencoders Objective: Enhancing Creativity Hypothesis: Impact of AI on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
An Empirical Study on How People Perceive AI-generated Music Chu et al 2022 | citations: 52	Algorithm: Knowledge-Based Systems Objective: Understanding Musical Style Hypothesis: Challenges and Limitations	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Musicality and Human-Like Creativity Future research: Improving Algorithmic Complexity
Artificial Intelligence Capabilities in Music Production: A Multiple Case Study and Application in Mini-album Bachelor final diploma Pilka 2023 | citations: 60	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
Logos & Techne -About New Possibilities of Creating Art with Artificial Intelligence Marcinkowski 2022 | citations: 47	Algorithm: Knowledge-Based Systems Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Adoption of AI Technology in the Music Mixing Workflow: An Investigation Vanka et al. 2023 | citations: 19	Algorithm: Neural Networks Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Developments and Applications of Artificial Intelligence in Music Education Yu et al 2023 | citations: 17	Algorithm: Neural Networks Objective: Technological Integration Hypothesis: Impact of AI Tools on Human Composers	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Technical Constraints Future research: Applications Beyond Composition
A Survey of AI Music Generation Tools and Models Zhu et al 2023 | citations: 14	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Data Limitations Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
HUMAN-AI MUSIC CREATION: UNDERSTANDING THE PERCEPTIONS AND EXPERIENCES OF MUSIC CREATORS FOR ETHICAL AND PRODUCTIVE COLLABORATION Newman et al 2023 | citations: 12	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Musicality and Human-Like Creativity Future research: Enhanced Human-AI Collaboration
Advancements in Generative AI: A Comprehensive Review of GANs, GPT, Autoencoders, Diffusion Model, and Transformers Bengesi et al 2023 | citations: 12	Algorithm: Generative Adversarial Networks Objective: Technological Integration Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Impact of AI on Music Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
AI-Based Affective Music Generation Systems: A Review of Methods, and Challenges Adyasha and Agres 2023 | citations: 10	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Methodological Approaches Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Development of a Music Generator Application Based on Artificial Intelligence Tamas and Aravai 2023 | citations: 9	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Technical Constraints Future research: Improving Algorithmic Complexity
Arguments for the Rise of Artificial Intelligence Art Liu 2023 | citations: 7	Algorithm: Knowledge-Based Systems Objective: Technological Integration Hypothesis: Challenges and Limitations	Findings: Methodological Approaches Discussion: Theoretical Frameworks Limitation: Musicality and Human-Like Creativity Future research: Ethical and Philosophical Considerations
Harmonizing minds and machines: survey on transformative power of machine learning in music Liang 2023 | citations: 7	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Virtual Computer Systems in AI-Powered Music Analysis: A Comparative Study for Genre Classification and Musicological Investigations Liu and Dai 2023 | citations: 7	Algorithm: Neural Networks Objective: Understanding Musical Style Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
INTELLIGENT MUSIC APPLICATIONS: INNOVATIVE SOLUTIONS FOR MUSICIANS AND LISTENERS Tabak 2023 | citations: 7	Algorithm: Neural Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity

Work / Reference / Citations	Algorithm / Objective / Hypothesis	Findings / Discussion / Limitation / Future research
Research on multi-system interactive pop music composition based on artificial intelligence technology Chen and Tan 2023 | citations: 6	Algorithm: Generative Adversarial Networks Objective: Development of Tools and Systems Hypothesis: Efficacy of AI in Music Composition	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Improving Algorithmic Complexity
Creative Computing and Harnessing the Power of Generative Artificial Intelligence Shah and Shukla 2023 | citations: 5	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Technological Advancements Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Enhanced Human-AI Collaboration
MoMusic: A Motion-Driven Human-AI Collaborative Music Composition and Performing System Bian et al 2023 | citations: 4	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Technical Constraints Future research: Enhanced Human-AI Collaboration
On the Human-AI Metaphorical Interplay for Culturally Sensitive Generative AI Design in Music Co-Creation Correia 2024 | citations: 7	Algorithm: Neural Networks Objective: Enhancing Creativity Hypothesis: Impact of AI Tools on Human Composers	Findings: Interactive Systems Discussion: Future Research Directions Limitation: Algorithmic and Methodological Issues Future research: Ethical and Philosophical Considerations

Table 3. Summary table for all the selected works categories and main topics
Source: Prepared by the authors.

Although this study is grounded in a narrative review approach, quantitative analytical techniques are employed as complementary tools rather than as primary inferential methods. Techniques such as correlation analysis, PCA, Random Forest, and SVM are used heuristically to identify structural patterns across the dataset. This hybrid approach allows for the integration of qualitative interpretation with data-driven insights, acknowledging that statistical outputs do not replace critical analysis but instead support the identification of trends subsequently interpreted within a broader musicological and theoretical context.

3. Preliminary Analysis

It is important to begin with some consideration of the categorical distributions observed in the earlier section. First, we present our study's analysis proposal. We start by examining the strength and direction of pairwise relationships between variables using the Pearson correlation method.

Next, we aim to identify latent dimensionality reductions within the variables observed in the selected works. To achieve this, we use Principal Component Analysis (PCA) to transform the variables into a new set of uncorrelated components. PCA allows us to capture the greatest variance among data variables

while retaining the most relevant information. In certain contexts, the variable space expands exponentially, leading to data sparsity, which complicates the identification of meaningful patterns. In our study, we address this issue through the use of topic categories, including Algorithm, Hypothesis Tested, Study Objectives, Discussion, Limitation, Findings, and Future Research. PCA also serves as a valuable tool for visualizing data, revealing clusters, patterns, or trends that may not otherwise be apparent.

Finally, we applied machine learning techniques to analyze our data. Specifically, we propose using both the Random Forest (RF) and Support Vector Machine (SVM) techniques. RF is particularly useful for handling both categorical and continuous outcomes, performing well with large, high-dimensional datasets, and showing a lower sensitivity to overfitting. For our study, RF is especially effective in identifying the most influential variables for predicting outcomes of interest, such as the year of publication or citation impact.

In parallel, SVM is employed for classification tasks, particularly when identifying boundaries or hyperplanes that separate different classes in a high-dimensional space. This supervised learning model supports both binary and multi-class classification, categorizing data points into distinct groups. For our study, SVM classifies works based on categorical features and predicts outcomes such as the year of publication or citation impact. Using RF and SVM concurrently does not result in conflicting outputs. RF provides insights into feature importance and produces robust predictions, while SVM highlights representative boundaries within the data. In the following table, we summarize our rationale for employing these techniques in our study.

Proposed Technique	Rationale for Use in the Study
Correlation	● Quantifying the degree of relationship between different variables in pairs. ● Detecting multicollinearity
PCA	● Reducing the number of variables ● Identifying potential patterns and clusters
RF	1. Applying regression tasks for predicting latent outcomes 2. Dealing with considerable datasets (the number of selected works) and complex interactions between variables
SVM	● Distinguishing borderlines for classes for classification ● Handling complex and non-linear variable relationships

Table 4. Summary of the proposed techniques to analyze the paper selected
Source: Prepared by the authors.

The combined use of statistical techniques—correlation, PCA, RF, and SVM—enabled a comprehensive analysis of our dataset of selected works. Each method contributed uniquely: correlation provided an initial understanding of variable relationships, PCA reduced data complexity, RF delivered reliable predictions and valuable insights into feature importance, and SVM offered robust classification.

Using these methods together allowed us to extract meaningful preliminary insights from the data. Next, we will present the results from each statistical method individually before shifting our focus to their combined contributions in an overall discussion.

3.1. Correlation Approach

In our study, we used the correlation approach to measure the strength of the relationships between pairs of variables, which represent the observation categories in the selected works. High correlation values, closer to 1, indicate strong positive relationships between features. However, since the variables are categorical, we encoded the data into numerical values using a one-hot encoding process. This method ensures that labels in our categories are represented as binary indices, either zero or one. For the calculations, we applied the Pearson coefficient.

The figure below illustrates the correlation matrix for all labels in each observed category. Colors indicate the direction of the relationships: red shades represent positive correlations, while blue shades indicate negative ones.

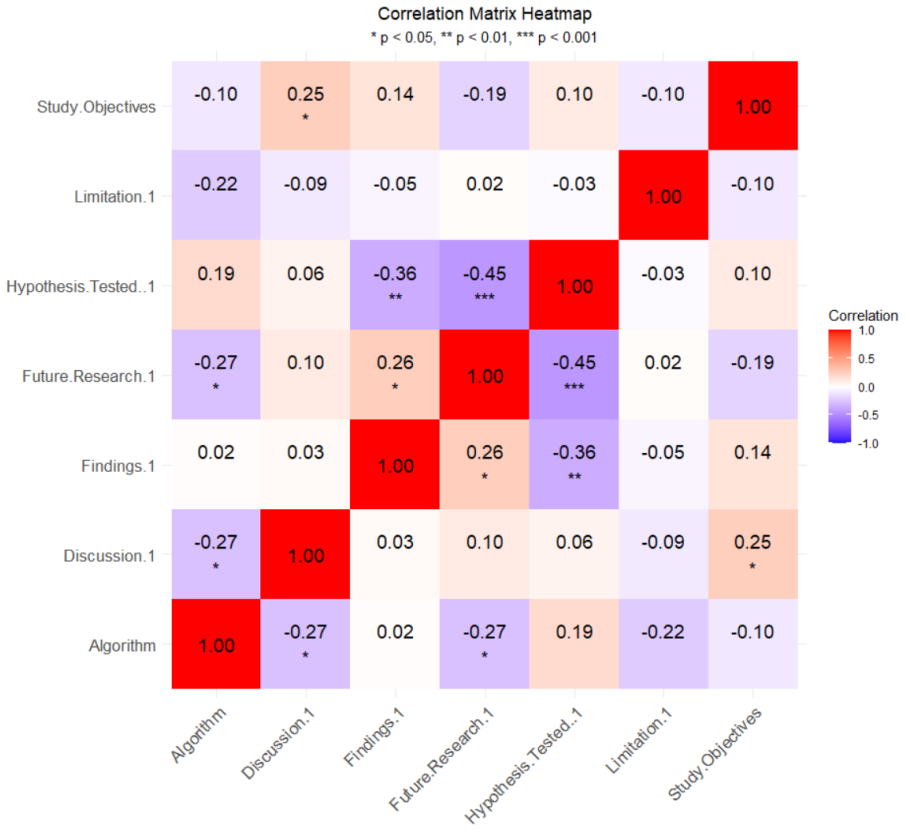


Figure 10. Correlation Matrix from the selected paper categories
Source: Prepared by the authors.

These outputs allow us to draw several considerations based on the most significant p-values and observed relationships. The Algorithm category shows a moderate negative correlation with Discussion (-0.27*), suggesting that more advanced algorithms might enable or encourage more intricate and diverse

discussions. Additionally, a similar negative correlation between Algorithm and Future Research (-0.27*) implies that certain algorithms steer discussions in different directions or lead to the formulation of unconventional research questions.

The Study Objectives category reveals one moderate positive correlation with Discussion (0.25*), indicating that research goals are closely linked to how results are discussed and interpreted. This suggests that varying objectives drive different types of discussions and interpretations.

For the Hypothesis Tested category, we observe negative correlations with both Findings (-0.36**) and Future Research (-0.45***). These results may indicate that hypotheses guide the exploration of advancing research areas, often leading to unexpected directions or new challenges for future investigation.

Finally, Findings display a weak positive correlation with Future Research (0.26*), indicating that while findings and future research are connected, they often address different aspects of the study's scope. This relationship suggests that findings and future directions, although related, may not always align directly but tend to complement each other as the research evolves.

3.2. Principal Component Analysis (PCA)

In summary, for our study analysis, Principal Component Analysis (PCA) was employed as a dimensionality reduction technique to transform a large set of correlated variables into a smaller set of uncorrelated components. Given the high dimensionality of our dataset, which includes a diverse range of variables representing different aspects of the selected works, PCA was applied to simplify the data. By doing so, PCA allows us to focus on the most critical factors that explain the variance within the dataset.

The PCA analysis was conducted on all 75 selected works, described by 7 variables. Some important assumption checks are worth noting. Bartlett's Test of Sphericity yielded a significant result ($p = 0.002$), indicating that the variables are correlated and suitable for factor analysis. However, the overall Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.502, below the commonly accepted threshold of 0.6, suggesting potential concerns with sampling adequacy.

In the following table, we present the leading dimensions that account for the variance in the data. Our results show that the first four dimensions explain more than 74% of the total variance (74.5%), highlighting the effectiveness of PCA in capturing the most relevant patterns within the dataset.

Component	SS Loadings	% of Variance	Cumulative %
1	1.65	23.6	23.6
2	1.35	19.3	43.0
3	1.27	18.1	61.1
4	0.95	13.5	74.5

Table 5. Summary statistics from the PCA results
Source: Prepared by the authors.

In the following table, we identify the most representative categories for each principal component. This analysis highlights that Hypothesis Tested, Future Research, Limitation, Algorithm, Study Objectives, and Discussions emerge as the leading categories across the first three components.

Category	Component 1	Component 2	Component 3	Uniqueness
Hypothesis.Tested..1	-0.781			0.384
Future.Research.1	0.715			0.406
Findings.1	0.699			0.423
Algorithm		0.804		0.306
Limitation.1		-0.759		0.404
Study.Objectives			0.802	0.348
Discussion.1			0.736	0.454

Table 6. Summary Statistic loadings for each category by the principal found components
Source: Prepared by the authors.

Finally, we generated a phylogenetic dendrogram visualization to cluster the selected works based on their similarities. The plot reveals a mix of papers from different years clustered together, suggesting that similarities in research approaches can transcend publication dates. This observation is particularly noteworthy, as it highlights how seminal studies continue to influence recent research, despite the significant advances in algorithms and techniques over the years of technological development.

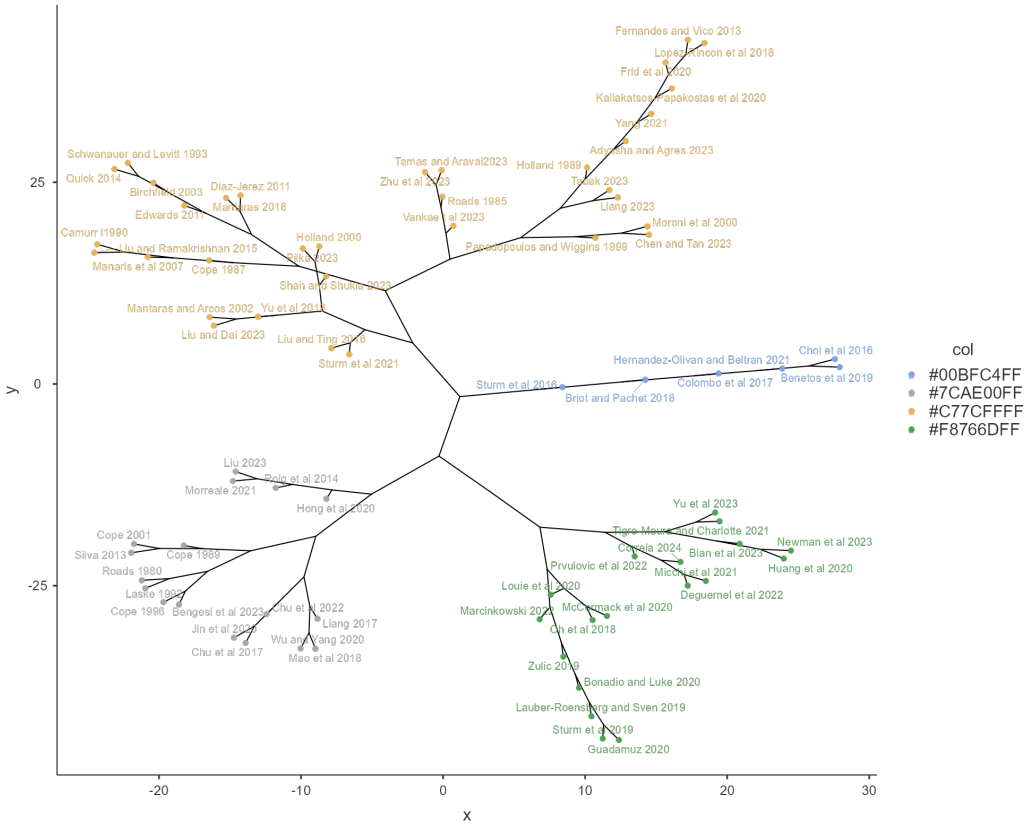


Figure 11. The cluster dendrogram approach for the selected papers.
Source: Prepared by the authors.

3.3. Random Forest (RF)

In summary, the Random Forest (RF) technique is an ensemble learning method suitable for both regression and classification tasks. In our case study, RF was chosen for its ability to handle datasets with multiple variables and potentially complex relationships, such as the categories derived from the selected works, while effectively reducing overfitting. The RF algorithm creates distinct subsets, referred to as "trees", by randomly sampling data and categories. This increases model diversity and reduces variance. For our analysis, we arbitrarily set the number of trees to 500, ensuring that no single feature biases the model. During the training process, the reported mean squared error - MSE (around 140) but quickly decreased, stabilizing at approximately 100 trees. This suggests that 100 trees might be an optimal number for the model.

In the regression task, the RF algorithm averages all outputs to produce an overall result. This approach also ranks variables based on their importance, providing insights into which features contribute most strongly to the model's predictions. For this study, we used the variable Year as the target variable in our preliminary analysis. The results indicate that variables with higher importance scores have a stronger impact on the model's predictions over time, reflecting temporal trends in the dataset.

The results are presented in the following table and figure, which include two key metrics: the Percentage Increase in Mean Squared Error (%IncMSE) and the Increase in Node Purity (IncNodePurity). The %IncMSE metric measures how influential a particular variable is within the model, indicating the variable's impact on the regression task. IncNodePurity measures the cumulative reduction in residual sum of squares associated with splits involving each predictor across the regression trees, indicating how much each variable contributes to reducing prediction variability within the trees nodes. , enhancing the accuracy of target variable predictions. Our findings show that Algorithm and Hypothesis Tested are the most significant variables in the model.

A notable aspect of the RF analysis arises from the perspective of Limitations. A negative index for this variable suggests that it has minimal influence on predicting the year and also reflects constraints in the development of these studies. This result implies that the field of AI in music composition has evolved more through the questions being asked and the methods employed, rather than through how findings are presented or how limitations are addressed.

	%IncMSE	**IncNodePurity**
Algorithm	49.366973	2210.0340
Study.Objectives	12.888165	890.4498

	%IncMSE	IncNodePurity
Hypothesis.Tested..1	42.006921	1082.8017
Findings.1	2.656884	781.0170
Discussion.1	15.635560	852.1179
Limitation.1	-2.881951	446.6310
Future.Research.1	6.052107	917.6408

Table 7. Variable importance estimates from the Random Forest regression model predicting publication year, expressed as percentage increase in mean squared error (%IncMSE) and increase in node purity (IncNodePurity).
Source: Prepared by the authors.

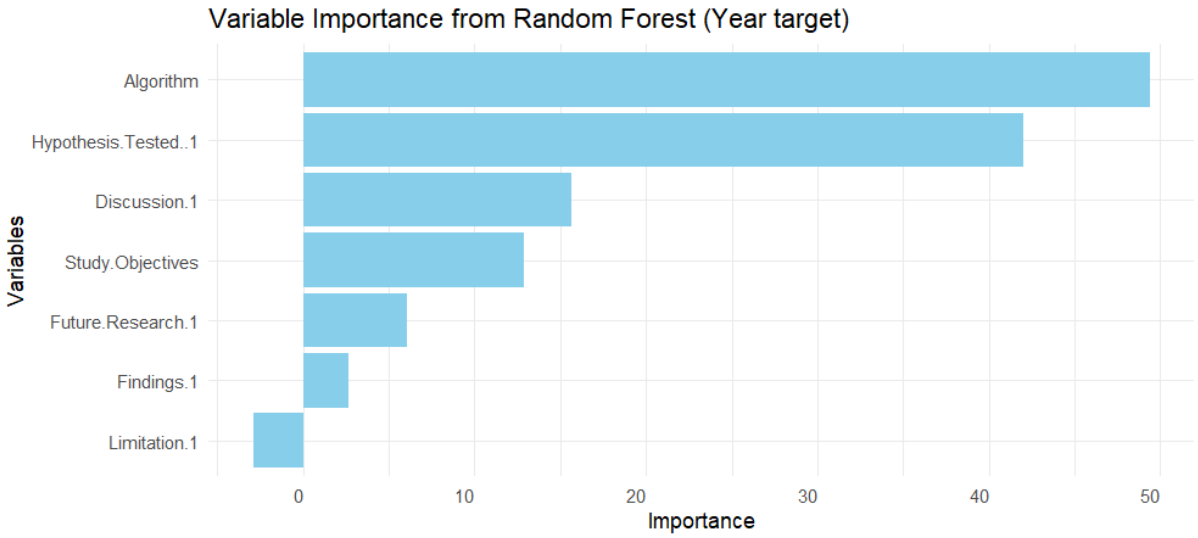


Figure 12. Variable importance estimates from the Random Forest regression model.
Source: Prepared by the authors.

3.4. Support Vector Machine (SVM)

Our last analysis technique focuses on the Support Vector Machine (SVM) approach, which aims to identify the best hyperplane or boundaries to separate different classes within our selected works dataset. For this study, we chose the variable Year as the target for the regression task. Using the SVM model, we can highlight the most influential variables, providing insights into how these aspects correlate with publication trends. This also quantifies the contribution of each feature to the model's decision-making process.

For the linear SVM task, adapted to our study, we utilized absolute normalized coefficients, which allow for a direct comparison of feature importance. For example, a feature with a coefficient of 0.2 is twice as influential as one with a coefficient of 0.1. The results revealed that Discussion, Hypothesis Tested, and Findings categories were the most influential. Notably, the Algorithm category showed moderate importance, suggesting that while the choice of AI technique plays a role, it is not the dominant factor in determining when or why a paper is published. Additionally, the low coefficient for the Limitation category indicates that the way limitations are discussed has remained relatively consistent over time.

To evaluate the model's performance, we used error metrics such as Mean Absolute Error (MAE) and Root Mean Square Error (RMSE), which produced values of 7.30284 and 10.84942 years, respectively. The MAE indicates that the model's predictions differed from the observed publication years by approximately 7.30 years on average, whereas the RMSE of approximately 10.85 years reflects the greater contribution of larger prediction errors. These results suggest considerable uncertainty in predicting publication year based on the selected categorical variables. However, without comparison with a baseline model and classification of the evaluation procedure, these values alone do not establish whether the model achieved satisfactory predictive performance. Below, we present the feature importance results and their corresponding histogram for further illustration.

Feature	Importance
Discussion	0.2807404
Hypothesis Tested	0.2328271
Findings	0.2055907
Algorithm	0.1047681
Future Research	0.0468459
Study Objectives	0.0459659
Limitation	0.0000099

Table 8. Reported normalized predictor-importance scores from the support vector-based regression analysis of publication year.
Source: Prepared by the authors.

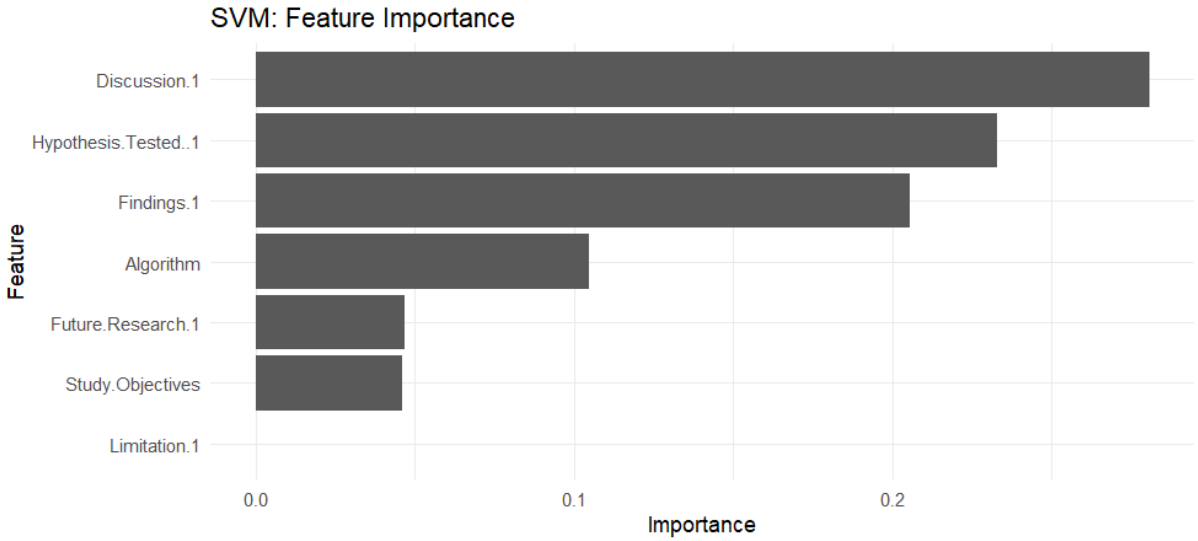


Figure 13. Reported normalized predictor-importance scores from the support vector-based regression analysis.
Source: Prepared by the authors.

Our SVM results reveal that research in AI music composition, based on the selected works, has notably evolved in how studies are structured, hypotheses are formulated, and findings are presented. However, the SVM model also suggests that while clear trends are evident in the field's development, significant variability remains that cannot be fully explained by these features alone.

Taken together, these results suggest that the evolution of AI in music composition research is driven by a dynamic interplay between algorithmic innovation and shifting research questions. While algorithms emerge as structurally dominant features, their influence is mediated by the hypotheses and objectives that guide their application. However, these findings alone do not fully capture the implications of such developments for musical practices. Therefore, a deeper interpretative discussion is required to understand how these trends translate into transformations in compositional processes.

4. Discussion

We now present a brief discussion integrating the analyses previously conducted, combining the outputs from the correlation analysis, PCA, hierarchical clustering dendrogram, RF, and SVM approaches. The clustering analysis and SVM results suggest a clear temporal progression in AI music composition research. The prominence of Algorithms highlights technological evolution as a key driver of research trends. Meanwhile, the PCA results reveal a complex interplay among research elements such as Hypothesis, Findings, and Future Research.

The negative correlation between Hypothesis and Future Research, combined with their importance in the PCA, indicates a dynamic where current studies actively shape future research directions. Similarly, the prominence of Algorithm in both RF and PCA outputs emphasizes the technological foundation underlying the evolution of this research field. The clustering of recent studies, coupled with the moderate SVM results, suggests a gradual consolidation of research approaches over time.

Additionally, the correlation between Study Objective and Discussion, along with their moderate importance in the RF analysis, suggests that the way research is framed and discussed significantly impacts its characterization and influence. Below, we provide a summary table consolidating the overall outputs from the proposed analytical approaches.

Analysis Bias	Output
Correlation Analysis	Significant negative correlation between the Hypothesis Tested and Future Research ($r = -0.45$, $p < 0.001$), suggesting that certain hypotheses may lead to different future research directions.
Correlation Analysis	Positive correlation between Study Objectives and Discussion ($r = 0.25$, $p < 0.05$), indicating alignment between research goals and discussion content.
Correlation Analysis	The result shows negative correlations with Algorithm and Future Research (both $r = -0.27$, $p < 0.05$), hinting at potential shifts in research focus as algorithms evolve.
Principal Component Analysis	Four principal components explain 74.5% of the total variance.
Principal Component Analysis	PC1 (23.6% variance) is strongly associated with Hypothesis Tested, Findings, and Future Research, representing the core research process.
Principal Component Analysis	PC2 (19.3% variance) is dominated by Limitations and Algorithms, possibly reflecting methodological challenges.
Principal Component Analysis	PC3 (18.1% variance) primarily loaded with Study Objectives, indicating the importance of research goals.
Principal Component Analysis	PC4 (13.5% variance) heavily influenced by Discussion, suggesting the significance of result interpretation.
Hierarchical Clustering Dendrogram	The dendrogram reveals several distinct clusters of research papers.
Hierarchical Clustering Dendrogram	Recent papers (2020-2023) tend to cluster together, indicating evolving research trends.
Hierarchical Clustering Dendrogram	Some older papers (e.g., Roads 1985) appear as outliers, suggesting pioneering or unique approaches.
Hierarchical Clustering Dendrogram	Papers from the same authors or research groups often cluster together, implying consistent research approaches.
Random Forest Feature Importance	The Algorithm emerges as the most important feature (%IncMSE = 49.37, IncNodePurity = 2210.03), underlining the critical role of AI techniques in the field's evolution.
Random Forest Feature Importance	Hypothesis Tested is the second most important feature, highlighting the significance of research questions in characterizing studies.
Random Forest Feature Importance	Discussion and Study Objectives show moderate importance, reflecting the relevance of research framing and result interpretation.

Analysis Bias	Output
Support Vector Machine Analysis	Moderate predictive power for publication year (MAE ≈ 7 years, RMSE ≈ 11 years).
Support Vector Machine Analysis	Feature importance aligns with random forest results, emphasizing the role of Hypothesis and Algorithm as being less important.

Table 9. Summary outputs by the proposed chain of analysis techniques
Source: Prepared by the authors.

This narrative study employs a multi-faceted analytical approach to examine the evolution and structure of AI music composition research. Using web search tools such as Google Scholar, Consensus, and ResearchGate, we identified 75 works based on semantic descriptors like 'Artificial Intelligence', 'Music Composition', and 'Creative Practices in Music Composition.' The default relevance filter was used, and results were further refined manually by focusing on abstracts and keywords aligned with the study's goals[2]. The works were categorized into three temporal groups: 'Seminal and Older Works' (pre-2000), 'Balanced' (2000–2022), and 'Current' (2023–2024).

Key findings highlight the importance of Algorithms and Hypotheses, which emerged as central features across various analyses. While these features often aligned, their behavior differed across techniques like PCA and SVM, reflecting methodological nuances and the complexity of the dataset. This suggests a dual dynamic in the field: methodological consolidation alongside ongoing diversification in techniques and research approaches. However, our results also emphasize the need for further exploration, particularly in understanding the interplay between computational models and human interaction in music composition.

The historical trajectory of AI in music composition reveals a fundamental transformation in compositional paradigms. Early approaches, based on rule-based systems, operated through explicit formalization of musical knowledge. In contrast, contemporary machine learning models rely on statistical inference over large datasets. This transition reflects a shift from deterministic to probabilistic composition. Rather than constructing musical structures through predefined rules, composers increasingly interact with generative systems, curating outputs rather than fully determining them. Additionally, AI-based composition also transforms the nature of musical material. Symbolic approaches rely on structured representations such as MIDI, while contemporary models operate directly on audio signals or latent representations. This shift introduces new compositional challenges, as deep learning systems often lack interpretability. As a result, compositional processes increasingly resemble exploratory practices rather than deterministic construction.

Another key transformation concerns the role of AI as a creative agent. While early systems functioned primarily as tools, contemporary approaches position AI as a collaborative partner. In co-creative contexts, composers engage in iterative processes where AI-generated outputs influence compositional

[2] These factors are discussed in "What is search relevance?" https://www.elastic.co/what-is/search-relevance/. Access Date: 23 nov. 2024.

decisions. This interaction introduces a distributed model of authorship, challenging traditional notions of creative control.

5. Case Studies in AI-Based Music Composition

To complement the analytical and statistical findings presented in this study, it is essential to examine concrete and verifiable examples of AI-based music composition. These case studies provide insight into how different technological paradigms have been translated into compositional practice, revealing not only technical capabilities but also shifts in creative workflows, authorship, and musical material.

One of the earliest and most influential systems is David Cope's *Experiments in Music Intelligence (EMI)*, which exemplifies a rule-informed and corpus-based approach to composition (Cope 1987; 1996). EMI generates stylistically coherent works by recombining musical fragments extracted from existing compositions, particularly within Western tonal traditions. This approach reflects a symbolic paradigm in which musical knowledge is explicitly encoded and manipulated, reinforcing a model of composition grounded in formal rules and stylistic imitation. A significant shift toward hybrid human-AI collaboration is observed in the *Flow Machines* project developed at Sony CSL. One of its most widely discussed outputs, the song *Daddy's Car* (2016), was generated using machine learning models trained on a corpus of pop music, with subsequent arrangement and production carried out by human composers (Pachet 2016). In this context, AI functions not as a fully autonomous composer but as a generative assistant that proposes stylistic material. Such systems highlight the growing importance of curation, selection, and refinement as central compositional strategies.

The emergence of large-scale generative models marks a further transformation in AI-based composition. Systems such as OpenAI's *MuseNet* and *Jukebox* demonstrate the ability to generate extended musical sequences and even raw audio signals, including rudimentary vocal content (Dhariwal et al. 2020). Unlike earlier symbolic systems, these models operate on high-dimensional representations learned from vast datasets, enabling the generation of complex textures and stylistic hybrids. More recent developments further expand this paradigm through text-to-music generation. Models such as Google's *MusicLM* (Agostinelli et al 2023) and Meta's *MusicGen* (Copet et al 2023) enable users to generate music from textual descriptions, effectively translating semantic prompts into audio inputs. As a result, composition becomes increasingly mediated by descriptive and conceptual input, raising important questions about the role of intentionality, abstraction, and the relationship between linguistic and musical structures. In parallel, initiatives such as *AI Song Contest* (2020-2024) exemplify a developed co-creative paradigm. In this context, AI systems collaborate with human composers throughout the compositional process, and evaluation criteria explicitly consider both the artistic result and the nature of the human-AI interaction (Huang et al. 2020). Such examples illustrate a shift from tool-based usage toward genuinely collaborative models of creativity.

Taken together, these case studies reveal a clear trajectory in the evolution of AI-based music composition: from rule-based symbolic systems to data-driven generative models, and from autonomous generation to interactive co-creation. This progression reflects broader transformations in how musical knowledge is represented. By grounding the discussion in concrete applications, it becomes evident that AI is not merely extending existing compositional techniques, but fundamentally reshaping the conceptual and practical foundations of musical creation.

6. Final Remarks and Study Perspectives

This study demonstrates that the evolution of AI in music composition is characterized not only by technological advancement but by profound transformations in compositional paradigms, creative agency, and musical material. While statistical analyses reveal structural patterns, critical interpretation highlights a shift toward probabilistic models, co-creative processes, and new forms of musical representation. One of the most important issues concerns the cultural and ethical implications of AI-centered music composition.

Many systems are trained on datasets dominated by Western musical traditions, potentially reinforcing stylistic norms and contributing to cultural homogenization. Additionally, unequal access to computational resources creates disparities in who can develop and use AI technologies. These asymmetries raise questions about authorship, representation, and the democratization of creative tools. Moreover, ethical considerations extend to intellectual property, originality, and the definition of authorship in AI-generated works, requiring further interdisciplinary investigation. This scenario provides a clear framework for the present study, highlighting the need for continued research in the field.

Future studies should build on this foundation by incorporating advanced text-mining techniques for feature extraction and consistent citation analysis to better assess the impact of research. By refining statistical methods and expanding the range of variables, we can deepen our understanding of the evolving role of AI in music composition and its broader implications for creative practice.

References

ANSARI, Asim; BOUGHANMI, Khaled. Dynamics of musical success: A machine learning approach for multimedia data fusion. *Journal of Marketing Research*, v. 58, n. 6, p. 1034-1057, 2021.

BAHULEYAN, Hareesh. Music Genre Classification using Machine Learning Techniques. *ArXiv* abs/1804.01149. 2018.

BANIYA, Babu Kaji; LEE, Joomwhoan; LI, Ze-Nian. Audio feature reduction and analysis for automatic music genre classification. *IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (2014): 457-462. 2014

BENETOS, Emmanouil; DIXON, Simon; DUAN, Zhiyao; EWERT, Sebastian. Automatic music transcription: An overview. *IEEE Signal Processing Magazine*, v. 36, n. 1, p. 20-30, 2019

BENGESI, Staphord; EL-SAYED, Hoda; SARKER, Kamruzzama; HOUKPATI, Yao; IRUNGU John; OLADUNNI, Timothy. Advancements in Generative AI: A Comprehensive Review of GANs, GPT, Autoencoders, Diffusion Model, and Transformers. *IEEE Access*, 2023.

BIAN, Weizhen; SONG, Yijin; GU, Nianzhen; CHAN, Tin Yan; LO, Tsz To; LI, Tsun Sun; WONG, King Chak; XUE, Wei; TRILLO, Roberto Alonso. MoMusic: A Motion-Driven Human-AI Collaborative Music Composition and Performing System. *AAAI Conference on Artificial Intelligence* 2023.

BIRCHFIELD, David. Generative model for the creation of musical emotion, meaning, and form. In: *Proceedings of the 2003 ACM SIGMM workshop on Experiential telepresence*. p. 99-104. 2003.

BONADIO, Enrico; MCDONAGH, Luke. Artificial intelligence as producer and consumer of copyright works: evaluating the consequences of algorithmic creativity. *Intellectual Property Quarterly*, v. 2020, n. 2, p. 112-137, 2020.

BRIOT, Jean-Pierre; PACHET, François. Music generation by deep learning-challenges and directions. *arXiv preprint arXiv*:1712.04371, 2018.

CAMURRI, Antonio. On the role of artificial intelligence in music research. *Journal of New Music Research*, v. 19, n. 2-3, p. 219-248, 1990.

Chen, Jie and Yaqi Tan. Research on multi-system interactive pop music composition based on artificial intelligence technology. *Applied Mathematics and Nonlinear Sciences 9*. 2023

CHOI, Keunwoo; FAZEKAS, George; SANDLER, Mark. Text-based LSTM networks for automatic music composition. *arXiv preprint arXiv*:1604.05358, 2016.

CHU, Hyeshin et al. An empirical study on how people perceive AI-generated music. In: *Proceedings of the 31st ACM International Conference on Information & Knowledge Management*. 2022. p. 304-314.

CHU, Hang; URTASUN, Raquel; FIDLER, Sanja. Song from PI: A musically plausible network for pop music generation. *arXiv preprint arXiv*:1611.03477, 2017.

COLOMBO, Florian; SEEHOLZER, Alexander; GERSTNER, Wulfram. Deep artificial composer: A creative neural network model for automated melody generation. In: **International conference on evolutionary and biologically inspired music and art**. Cham: Springer International Publishing, 2017. p. 81-96.

COPE, David. *Virtual music: computer synthesis of musical style*. MIT press, 2001.

COPE, David. *Experiments in musical intelligence*. Madison, WI: AR editions, 1996.

COPE, David. Experiments in musical intelligence (EMI): Non-linear linguistic-based composition. *Journal of New Music Research*, v. 18, n. 1-2, p. 117-139, 1989.

COPE, David. An expert system for computer-assisted composition. *Computer Music Journal*, v. 11, n. 4, p. 30-46, 1987.

COPET, Jade; KREUK, Felix; GAT, Itai; REMEZ, Tal; KANT, David; SYNNAEVE, Gabriel; ADI, Yossi; DÉFOSSEZ, Alexandre. Simple and Controllable Music Generation. Advances in Neural Information Processing Systems, v. 36, 2023.

CORREIA, António. On the Human-AI Metaphorical Interplay for Culturally Sensitive Generative AI Design in Music Co-Creation. *IUI Workshops*. 2024.

DASH, Adyasha; AGRES, Kathleen. Ai-based affective music generation systems: A review of methods and

challenges. *ACM Computing Surveys*, v. 56, n. 11, p. 1-34, 2023.

DEAN, Roger; McLEAN, Alex. *The Oxford Handbook of Algorithmic Music*. Oxford University Press, 2018. https://doi.org/10.1093/oxfordhb/9780190226992.001.000. 2018

DE MÁNTARAS, Ramon Lopez. Artificial intelligence and the arts: Toward computational creativity. In: The Next Step: Exponential Life. Madrid: BBVA OpenMind, 2017. p. 99-123. 2016.

DE MANTARAS, Ramon Lopez; ARCOS, Josep Lluis. AI and music: From composition to expressive performance. *AI magazine*, v. 23, n. 3, p. 43-43, 2002.

DÉGUERNEL, Ken; GIRAUD, Mathieu; GROULT, Richard; GULLUNI, Sebastien. Personalizing AI for co-creative music composition from melody to structure. In: *Sound and Music Computing (SMC 2022)*. p. 314-321. 2022

DIAZ-JEREZ, Gustavo. Composing with Melomics: Delving into the computational world for musical inspiration. *Leonardo Music Journal*, v. 21, p. 13-14, 2011.

EDWARDS, Michael. Algorithmic composition: computational thinking in music. *Communications of the ACM*, v. 54, n. 7, p. 58-67, 2011.

ESSL, Karlheinz. Algorithmic Composition. In: *Cambridge Companion to Electronic Music*, ed. by Nick Collin and Julio d'Escrivan. Cambridge University Press, p. 107-125. ISBN-13: 978-0521688659. 2007

FERNÁNDEZ, Jose; VICO, Francisco. AI methods in algorithmic composition: A comprehensive survey. *Journal of Artificial Intelligence Research*, v. 48, p. 513-582, 2013

FRID, Emma; GOMES, Celso; JIN, Zeyu. Music creation by example. In: *Proceedings of the 2020 CHI conference on human factors in computing systems*. 2020. p. 1-13.

GREENHALGH, Trisha; THORNE, Sally; MALTERUD, Kirsti. Time to challenge the spurious hierarchy of systematic over narrative reviews? *Eur J Clin Invest*. Jun;48(6):e12931. doi: 10.1111/eci.12931. 2018.

GUADAMUZ, Andres. Do androids dream of electric copyright? Comparative analysis of originality in artificial intelligence generated works. *Intellectual property quarterly*, 2020.

GILMORE, Bob; HIRS, Rozalie. *Contemporary compositional techniques and OpenMusic*. IRCAM-Centre Pompidou, 2009.

HERNANDEZ-OLIVAN, Carlos; BELTRAN, Jose. Music composition with deep learning: A review. In: *Advances in speech and music technology: computational aspects and applications*. Springer International Publishing, 2021, p. 25-50

HOLLAND, Simon. Artificial Intelligence in Music Education: A Critical Review. In: Miranda, Eduardo Reck ed. *Readings in Music and Artificial Intelligence*. Contemporary Music Studies. Routledge, 2000. pp. 239–274. DOI: https://doi.org/10.4324/9780203059746

HOLLAND, Simon. *Artificial intelligence, education and music: The use of artificial intelligence to encourage and facilitate music composition by novices*. Open University (United Kingdom), 1989.

HONG, Joo Wha; PENG, Qiyao; WILLIAMS, Dmitri. Are you ready for artificial Mozart and Skrillex? An experiment testing expectancy violation theory and AI music. *New Media & Society*, v. 23, n. 7, p. 1920-1935, 2020

HUANG, Cheng-Zhi Anna; VINCENT Koops, Hendrik; NEWTON-REX, Ed; DINCULESCU, Monica; CAI, Carrie.

AI song contest: Human-AI co-creation in songwriting. *arXiv preprint arXiv*:2010.05388, 2020

JIN, Cong; TIE, Yun; BAI, Yong; LV, Xin; LIU, Shouxun. A style-specific music composition neural network. *Neural Processing Letters*, v. 52, p. 1893-1912, 2020.

KALIAKATSOS-PAPAKOSTAS, Maximos; FLOROS, Andreas; VRAHATIS, Michael. Artificial intelligence methods for music generation: a review and future perspectives. *Nature-Inspired Computation and Swarm Intelligence*, p. 217-245, 2020.

LASKE, Otto E. Artificial Intelligence and Music: A cornerstone of cognitive musicology. In: *Understanding Music with AI: Perspectives on music cognition*. p. 2-28. 1992.

LAUBER-RÖNSBERG, Anne; HETMANK, Sven. The concept of authorship and inventorship under pressure: Does artificial intelligence shift paradigms?. Journal of Intellectual Property Law & Practice, Oxford, v. 14, n. 7, p. 570–579, jul. 2019. DOI: 10.1093/jiplp/jpz061

LEVITT, David.; SCHWANAUER, Stephan. *Machine Models of Music*. MIT Press, 1993.

LIANG, Feynman; GOTHAM, Mark; JOHNSON, Matthew; SHOTTON, Jamie. Automatic Stylistic Composition of Bach Chorales with Deep LSTM. In: *ISMIR*. p. 449-456.. 2017.

LIANG, Jing. Harmonizing minds and machines: survey on transformative power of machine learning in music. *Frontiers in Neurorobotics*, v. 17, p. 1267561, 2023.

LIU, Bai. Arguments for the Rise of Artificial Intelligence Art: Does AI Art Have Creativity, Motivation, Self-awareness and Emotion?. *Arte, Individuo y Sociedad*, v. 35, n. 3, p. 811, 2023.

LIU, Chien-Hung; TING, Chuan-Kang. Computational intelligence in music composition: A survey. *IEEE Transactions on Emerging Topics in Computational Intelligence*, v. 1, n. 1, p. 2-15, 2016.

LIU, I-Ting; RAMAKRISHAN, Bhiksha. Bach in 2014: Music composition with recurrent neural network. *arXiv preprint arXiv*:1412.3191, 2015.

LIU, Xiya; DAI, Yu. Virtual Computer Systems in AI-Powered Music Analysis: A Comparative Study for Genre Classification and Musicological Investigations. *Journal of Information Systems Engineering and Management*, v. 8, n. 4, p. 23395, 2023.

LOUIE, Ryan; COENEN, Andy; HUANG, Cheng Zhi; TERRY, Michael; CAI, Carrie. Novice-AI music co-creation via AI-steering tools for deep generative models. In: *Proceedings of the 2020 CHI conference on human factors in computing systems*. p. 1-13. 2020.

LOPEZ-RINCON, Omar; STAROSTENKO, Oleg; AYALA-SAN MARTÍN, Gerardo. Algorithmic music composition based on artificial intelligence: A survey. In: *2018 International Conference on Electronics, Communications and Computers (CONIELECOMP). IEEE*. p. 187-193. 2018.

MALT, Mikhail. *Les Mathématiques et la Composition Assistée par Ordinateur (Concepts, Outils et Modèles)*. Tese de Doutorado. Paris: Écoles des Hautes Études en Sciences Sociales, 2000.

MANARIS, Bill; ROOS, Patrick; MACHADO, Penousal; KREHBIEL, Dwight; PELLICORO, Luca; ROMERO, Juan. A corpus-based hybrid approach to music analysis and composition. In: *Proceedings of the National Conference on Artificial Intelligence*. Menlo Park, CA; Cambridge, MA; London; AAAI Press; MIT Press. p. 839. 2007.

MAO, Huanru Henry; SHIN, Taylor; COTTRELL, Garrison. DeepJ: Style-specific music generation. In: *2018 IEEE 12th International Conference on Semantic Computing (ICSC)*. IEEE. p. 377-382. 2018.

MARCINKOWSKI, Arkadiusz Mieczysław. Logos & Techne-about new possibilities of creating art with artificial intelligence. *TASK Quarterly*, v. 26, n. 4, 2022

MCCORMACK, Jon; HUTCHINGS, Patrick; GIFFORD, Toby; YEE-KING, Matthew; LLANO, Maria Teresa; D'INVERNO, Mark. Design considerations for real-time collaboration with creative artificial intelligence. *Organised Sound*, v. 25, n. 1, p. 41-52, 2020

MICCHI, Gianluca; BIGO, Louis; GIRAUD, Mathieu; GROULT, Richard; LEVÉ, Florence. I keep counting: An experiment in human/AI co-creative songwriting. *Transactions of the International Society for Music Information Retrieval (TISMIR)*, v. 4, n. 1, p. 263-275, 2021.

MIRANDA, Eduardo Reck. *Handbook of Artificial Intelligence for Music Foundations, Advanced Approaches, and Developments for Creativity*. [Cham: Springer], 2021.

MORONI, Artemis; MANZOLLI, Jônatas; ZUBEN, Fernando Von; GUDWIN, Ricardo. Vox populi: An interactive evolutionary system for algorithmic music composition. *Leonardo Music Journal*, v. 10, p. 49-54, 2000.

MORREALE, Fabio. Where does the buck stop? Ethical and political issues with AI in music creation. Transactions of the International Society for Music Information Retrieval, Londres, v. 4, n. 1, p. 105–113, 2021. DOI: 10.5334/tismir.86. 2021.

MOURA, Francisco Tigre; MAW, Charlotte. Artificial intelligence became Beethoven: how do listeners and music professionals perceive artificially composed music? *Journal of Consumer Marketing*, v. 38, n. 2, p. 137-146, 2021.

MULLER, Meinard. *Fundamentals of Music Processing - Audio, Analysis, Algorithms, Applications*. Springer, ISBN 978-3-319-21944-8, pp. 1-480. 2015.

MURAIL, Tristan. The Revolution of Complex Sounds. *Contemporary Music Review*, 24(2-3). pp. 121–135. 2005.

NEWMAN, Michele; MORRIS, Lidia; LEE, Jin Ha. Human-AI Music Creation: Understanding the Perceptions and Experiences of Music Creators for Ethical and Productive Collaboration. In: *ISMIR*. p. 80-88. 2023.

NIERHAUS, Gerhard. *Algorithmic Composition: Paradigms of Automated Music Generation*. Springer-Verlag Vienna 2009.

OH, Changhoon et al. I lead, you help but only with enough details: Understanding user experience of co-creation with artificial intelligence. In: *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. p. 1-13. 2018.

PAPADOPOULOS, George; WIGGINS, Geraint. AI methods for algorithmic composition: A survey, a critical view and future prospects. In: *AISB symposium on musical creativity*. p. 110-117. 1999.

PILKA, Kipras. *Artificial Intelligence Capabilities in Music Production: A Multiple Case Study and Application in Mini-album*. Tese de Doutorado. Vytautas Magnus University, Faculty Of Arts, Department Of Contemporary Arts. 2023

PRVULOVIC, Damjan; VOGL, Richard; KNEES, Peter. ReStyle-MusicVAE: Enhancing user control of deep generative music models with expert labeled anchors. In: *Adjunct Proceedings of the 30th ACM Conference on User Modeling, Adaptation and Personalization*. p. 63-66. 2022.

QUICK, Donya. *Kulitta: A framework for automated music composition*. Yale University, 2014.

ROADS, Curtis. Research in music and artificial intelligence. *ACM Computing Surveys (CSUR)*, v. 17, n. 2, p. 163-190, 1985.

ROADS, Curtis. Artificial intelligence and music. *Computer Music Journal*, v. 4, n. 2, p. 13-25, 1980.

ROIG, Carles; TARDÓN, Lorenzo; BARBANCHO, Isabel; BARBANCHO, Ana. Automatic melody composition based on a probabilistic model of music style and harmonic rules. *Knowledge-Based Systems*, v. 71, p. 419-434, 2014.

RUMRILL Philip; FITZGERALD Shawn. Using narrative literature reviews to build a scientific knowledge base. Work.16(2):165-170. PMID: 12441470. 2001.

SHAH, Varun; SHUKLA, Shubham. Creative Computing and Harnessing the Power of Generative Artificial Intelligence. Vol. 2, *Journal of Environmental Sciences and Technology (JEST)*. p. 556–79. 2023.

SILVA, Patricio. *David Cope and Experiments in Musical Intelligence*. Spectrum Press. 2013.

STURM, Bob; IGLESIAS, Maria; BEN-TAL, Oded; MIRON, Marius; GÓMEZ, Emilia. Artificial intelligence and music: open questions of copyright law and engineering praxis. In: Arts. *MDPI*. p. 115. 2019.

STURM, Bob; BEN-TAL, Oded; MONAGHAN, Una; COLLINS, Nick; HERREMANS, Dorien; CHEW, Elaine; HADJERES, Gäetan; DERUTY, Emmanuel; PACHET, François. Machine learning research that matters for music creation: A case study. *Journal of New Music Research*, v. 48, n. 1, p. 36-55, 2021.

STURM, Bob; SANTOS, João Felipe; BEN-TAL, Oded; KORSHUNOVA, Iryna. Music transcription modelling and composition using deep learning. *arXiv preprint* arXiv:1604.08723, 2016.

SUKHERA J. Narrative Reviews: Flexible, Rigorous, and Practical. *J Grad Med Educ*. Aug;14(4):414-417. doi: 10.4300/JGME-D-22-00480.1. 2022

TABAK, Cihan. Intelligent Music Applications: Innovative Solutions For Musicians And Listeners. *Uluslararası Anadolu Sosyal Bilimler Dergisi*, v. 7, n. 3, p. 752-773. 2023.

TAMÁS, Janka; ÁRVAI, László. Development of a music generator application based on artificial intelligence. *Production Systems and Information Engineering*, v. 11, n. 1, p. 1-13, 2023.

YANG, Yaokun. [Retracted] Piano Performance and Music Automatic Notation Algorithm Teaching System Based on Artificial Intelligence. *Mobile Information Systems*, v. 2021, n. 1, p. 3552822, 2021.

YU, Xiaofei; MA, Ning; ZHENG, Lei; WANG, Licheng, WANG, Kai. Developments and applications of artificial intelligence in music education. *Technologies*, v. 11, n. 2, p. 42, 2023.

YU, Chi-Hua; QIN, Zhao; MARTIN-MARTINEZ, Francisco; BUEHLER, Markus. A self-consistent sonification method to translate amino acid sequences into musical compositions and application in protein design using artificial intelligence. *ACS nano*, v. 13, n. 7, p. 7471-7482, 2019.

WU, Shih-Lun; YANG, Yi-Hsuan. The jazz transformer on the front line: Exploring the shortcomings of ai-composed music through quantitative measures. *arXiv preprint* arXiv:2008.01307, 2020.

VANKA, Soumya Sai; SAFI, Maryam; ROLLAND, Jean-Baptiste; FAZEKAS, George. Adoption of AI Technology in the Music Mixing Workflow: An Investigation. *arXiv preprint* arXiv:2304.03407, 2023.

ZHU, Yueyue; BACA, Jared; REKABDAR, Banafsheh; RAWASSIZADEH, Reza. A Survey of AI Music Generation Tools and Models. *arXiv preprint* arXiv:2308.12982, 2023.

ZULIĆ, Harun. How AI can change/improve/influence music composition, performance and education:

three case studies. *INSAM Journal of Contemporary Music, Art and Technology*, n. 2, p. 100-114, 2019

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Data availability: Data will be available upon request.

Conflict of Interest: No conflict of interest has been declared.

Evaluation method: Double-blind peer review.

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