HAISP: A DATASET OF HUMAN–AI SONGWRITING PROCESSES FROM THE AI SONG CONTEST

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ABSTRACT

The advent of accessible artificial intelligence (AI) tools and systems has begun a new era for creative expression, challenging us to gain a better understanding of human-AI collaboration and creativity. In this paper, we introduce Human–AI Songwriting Processes Dataset (HAISP), consisting of 34 coded submissions from the 2023 AI Song Contest. This dataset offers a resource for exploring the complex dynamics of AI-supported songwriting processes, facilitating investigations into the possibilities and challenges posed by AI in creative endeavors. Overall, HAISP is anticipated to contribute to advancing understanding of human-AI co-creation from the users' perspective. We suggest potential use cases for the dataset, including examining AI tools used in songwriting and exploring users' ethical considerations and creative approaches. This could help inform academic research and practical applications in music composition and related fields.

1. INTRODUCTION

Open and easy to access artificial intelligence (AI) technologies have created new opportunities for creativity, challenging conventional notions of authorship, expression, and human-AI creativity [1]. Within this landscape, the AI Song Contest (AISC) has emerged as a unique platform where teams of musicians, data scientists, researchers and AI enthusiasts can leverage AI tools to compose original songs, providing a prolific ground for studying the interplay between human creativity and machine intelligence [2].

In this paper we present the Human-AI Songwriting Processes Dataset (HAISP), a curated dataset extracted from the written process documentation of participants in the AI Song Contest. This dataset provides a useful resource for exploring various aspects of AI-supported songwriting processes. It consists of 34 submissions from the 2023 AISC teams, cleaned, organized, and cross-annotated by four annotators using our data dictionary. The HAISP dataset includes information on the AI systems utilized, creative and technical inspirations, methodologies for working with AI, teams' assessments of the songs, and reflections on ethical considerations in AI-generated content. This dataset provides researchers with a unique perspective into the complex relationship between human creativity and AI assistance in songwriting. By analyzing how songwriting processes are affected by the use of AI tools, scholars can gain insights into how AI systems may augment, complement, or challenge creative endeavors. The dataset also supports investigations into the ethical aspects of AI-generated music, including considerations like diversity in training data, intellectual property rights, and accessibility in music creation. It can serve as a valuable resource for scholars, practitioners, and enthusiasts alike, fostering deeper understanding, critical inquiry, and informed discourse in the burgeoning field of human-AI collaboration and creativity. Overall, it provides various insights and opportunities for further research, contributing to our understanding of the interaction between technology and creativity in the digital age.

2. BACKGROUND

2.1 Human–AI Music Creation

Using computational methods for music creation that would be classified as AI today, began in the 1950s, with early examples including Iannis Xenakis using Markov Chains for composition [3] or David Cope's *Experiments in Musical Intelligence* in the 1980s [4]. For more detail on the history of AI music we refer to *The Oxford Handbook of Algorithmic Music* by Roger Dean and Alex McLean [5]. Although the use of neural networks for mu-

sic modeling was mentioned as early as 1989 [6], the recent progress in the field of deep learning led to an increase of powerful and easy-to-use AI tools for music creation [7], from accessible applications for a large audience [8], to tools intended for professional musicians (e.g. [9]).

2.2 AI and Music Information Retrieval

In the area of music composition, researchers have developed many methods [10] and machine learning-powered interfaces that enable interactive exploration of musical variations by mapping user inputs to musical structures. Other tools have recently emerged to assist in various aspects of the music creation process, including infilling missing parts of compositions [11–14], creating new instruments [15, 16], counterpoint improvisation [17], and generating and recommending chord progressions [18–20], harmonies [21–23], and even accompaniment [24, 25].

Many AI models have also been created to aid in music information retrieval (MIR) research. With the explosive growth of digital music archives and streaming platforms, the need for effective MIR systems has become increasingly pronounced, driving research efforts to develop more sophisticated methods for understanding and processing music data through AI, such as the utilization of deep learning, neural networks, and large language models [26–29]. Existing datasets in the realm of AI in MIR primarily focus on training data, such as audio features [30, 31], music [32, 33], and metadata [34, 35].

2.3 AI Song Contest

The AI Song Contest is an annual international music competition wherein teams from diverse musical traditions and disciplines collaborate to compose songs using AI methods. It was launched in 2020 by the Dutch public broadcaster VPRO [2], and has been organized independently afterwards every year. There have been 132 teams so far, with 35 from the 2023 edition included in the dataset. We plan to extend the dataset with the other year's team entries in the future. To participate in the AI Song Contest 2023, teams had to submit their song, a team image, cover art, and an online form in which they described their team, their creative vision, their motivation to participate, the steps of composition, their impression of the human-AI co-creation process, their workflow, all AI tools and databases used and their ethical and cultural considerations. The form has been developed by the AI Song Contest organizing team, slightly modified for each new edition. After successful submission, the songs and process documents are sent to a jury. The top ten entries of the jury voting are open for a public online vote. Whichever team gets the most points from the jury voting combined with the public voting wins the AI Song Contest.

3. OBJECTIVE AND SCOPE

There is a growing recognition of the need for complementary data that provides insights into the qualitative aspects of human-AI collaboration in music creation – the

human side of training and using these AI tools and systems. Recently, researchers have called for a cultural and ethical turn in MIR [36]. Rezwana and Maher [37] and Lee et al. [38] emphasize the importance of understanding not only perspectives but also expectations and ethical concerns of users of AI tools.

To our knowledge, there is no dataset exploring the qualitative processes and reflections of those who have used AI tools for music creation. Recognizing this gap, we were motivated to curate the written submissions of AISC participants into a unique and publicly available dataset that would allow researchers to go behind the scenes and explore the AI-supported songwriting and creation processes of the teams, beyond the final song submissions. By complementing existing quantitative datasets in AI in MIR, the HAISP dataset contributes to a more holistic understanding of the role of AI in creative endeavors and facilitates deeper insights into the collaborative dynamics between human composers and AI systems.

However, there are limitations to the data in this dataset. Firstly, the dataset relies solely on the words of the 34 participants in their written (subjective) process documentation. Compared to other datasets in MIR publications, this qualitative dataset is of limited size which might not lead to conclusions that are broadly applicable. Additionally, the dataset may not capture the full spectrum of AI tools and methodologies employed by participants, as teams may choose not to disclose certain details or may use proprietary technologies. Furthermore, the dataset represents a snapshot of a specific event and a specific outcome, the song, which may not fully generalize to other contexts of AI-supported music creation such as AI tools for jazz improvisation (e.g. see *GenJam* [39]).

Nonetheless, the amount of detail and depth provides an extensive and rich insight into the creative experience of the teams. By compiling and analyzing the teams' process documentation, we seek to illuminate the landscape of human-AI creative collaboration. Through the creation of this dataset, we aim to facilitate deeper insights into the collaborative dynamics between human composers and AI systems, thereby fostering a richer understanding of the potential, limitations, and societal implications of AI in music production.

4. DATASET DESCRIPTION

The HAISP Dataset is accessible as a .csv and .xlsx on OSF under a Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC) license, which allows for broad access and utilization for research purposes. [1]

4.1 Data Collection

For submission to the contest each team had to fill in the AI Song Contest 2023 Submission Form via Google forms. The form consists of entry fields to upload the song and

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[1] https://creativecommons.org/licenses/by-nc/4.0/

Category	Subcategory	Definition
Team Data	Team_ID	The given label of the team for the dataset.
	Number of Team Members	The number of team members in a team.
	Type of Affiliation	The given work or personal affiliation of the team members.
	Country	The given country(s) of origin of the team.
	Found Out About Contest	The way that the team discovered or were informed of the AI Song Contest.
	Motivation to Participate in the Contest	The reason the team gave for joining the competition.
Song Data	Song Length	The length of the submitted song given in minutes and seconds.
	Song Description	The short description of the song written for the contest website.
	Final Ranking	Denotes the final ranking of the team's song in the competition.
	Song Title	The title of the song submitted to the AI Song Contest.
	Song Concept	The overarching idea or theme of the song.
Process	Creation Process	The given order in which the separate pieces of the song, or potentially the whole song, was created, as described by the team.
Song Elements Use of AI	Melody	Whether an AI system was used to generate the melody.
	Harmony	Whether an AI system was used to generate the harmony.
	Bassline	Whether an AI system was used to generate the bassline.
	Drums	Whether an AI system was used to generate drum patterns or rhythms.
	Formal Structure	Whether an AI system was used to generate the formal structure.
	Lyrics	Whether an AI system was used to generate the lyrics of the song.
	Voice Synthesis	Whether an AI system was used to generate the singing voice of the song.
Song Process Use of AI	Idea Generation	Whether an AI system was used to generate the idea for the song.
	Composing/Arranging	Whether an AI system was used to organize the elements of the song.
	Evaluation	Whether an AI system was used to evaluate the output or final song.
	Mixing & Mastering	Whether an AI system was used to do the mixing and mastering of the song
	Performance	Whether an AI system is or would be used for live performance.
AI Tools Used	Model Used	The AI models as used and indicated by the teams in the song creation process.
	Database(s) Used	The databases as used and indicated by the teams in the training and song creation process.
Ethical Considerations	Diversity, Ethical, and Cultural Considerations	Ethical and cultural considerations stated by the teams regarding their process and use of AI.
Human Evaluation of AI Co-Creation	Evaluation of Output	The words that teams used to assess the output of the AI system(s).
	Evaluation of Process	The words that teams used to assess the process of working with the AI system(s).
	Ownership	Teams statements regarding ownership of the system output and/or final song.
	Motivation to Use AI	The reasons that teams mentioned why they used AI in the process.
Other	Other	Additional information that does not fit in another category.

Table 1. Categories of HAISP Dataset. The HAISP dataset consists of data collected in 31 categories in total.

visual material (team image and song cover), and a free-text and multiple choice questionnaire. The questions that the teams filled in covered everything in these categories:

- team (bio for the website, location, level of expertise, motivation to participate, how they heard about the AISC);

- song (title, length, link to music video/soundcloud/blogpost, concept/idea, lyrics, live performance);

- human–AI process (short description for the website, models and databases used, steps of the process, creative vision, capabilities/limitations of AI tools in the creative process, workflow, collaboration with team members and AI, input data, ownership and conflict with intellectual property law);

- and diversity, ethical and cultural considerations

All teams had to further give consent for their answers description to be published in a scientific paper.

The answers were collected automatically in a Google Sheet. In total there were 40 submissions collected with one being a corrective submission replacing an existing entry and four submissions being incomplete. After unanswered inquiry these submissions were excluded, leading to 35 participating teams in the 2023 edition. Their complete questionnaires were then handed over to the research group excluding any personal data. One process documentation (teamID: 2023_14) was submitted in Spanish which was excluded from the dataset for linguistic consistency.

4.2 Data Statistics

The HAISP dataset consists of the data from 34 teams of the 2023 edition of the AISC. Looking at the team data, there is a total of 104 team members involved, with an average of three members per team, and 14 countries represented. Of the countries represented, eight teams were based in the United States, six were based in the United Kingdom, and four were based in Guatemala, Sweden, and Germany. Other countries represented included South Korea, Spain, North Macedonia, and more.

Type of affiliation – the given work or personal affiliation of the team members – was determined by coders based on the data, with teams being assigned multiple affiliations based on team members. A majority of the team members (58.8%) were members of academic field (20 mentions), meaning they worked primarily within academic institutions; this included universities, archives, or museums. A partially overlapping 44.1% of the team members were artists or worked in the creative industries, 17.6% worked as researchers outside academia, and 8.8% were classified as independent, (i.e., working in fields unrelated to the study/research/creation of AI or the creation of music but rather participating out of their own curiosity, hobby, or interest).

Teams had primarily heard about the contest from academia (29%), web search, or participation in prior editions of the AISC. The motivation for why teams used AI

in their process and why they decided to take part in the competition can be described as exploratory, while seven teams were also participating in order to display the use of their own or institutionally-created software.

Regarding the AI tools, there were 74 different tools used by teams in the 2023 edition. On average, there were 2.17 tools used per team. Half of the teams used a form of GPT by OpenAI (e.g., ChatGPT) and 38.24% of the teams used tools by Google Magenta (e.g., Magenta Studio, Tensorflow, DDSP). Other tools that were frequently used were TransformerXL [40] (14.1%), AIVA (11.4%) or MusicGen by Meta (3 teams). There were 57 models that have been only used once.

Looking at the use of AI in the compositional process, illustrated in Figure 1, it shows that 21 teams used only AI or co-created with AI for arranging, 18 teams used AI for idea generation and 10 (would) use AI in a performance. Nine teams mentioned the use of AI for mixing/mastering while only four teams used AI for evaluation of the output. Co-creation means this part was created by the human working with AI, human that only human was involved, AI that only AI was involved. Failed attempts to use AI in a specific step of the process were mentioned only in one case. Interestingly, the number of using "AI only" for these steps are low, with most uses (8) for "idea generation". Only one team, 2023_28, mentioned a failed attempt to use AI in a specific step of the process: mixing and mastering.

Looking at the use of AI to create the elements of the songs – melody, harmony, bassline, drums, formal structure, lyrics, voice – depicted in Figure 2, 29 teams used AI, either in co-creation or solely for melody, while 19 used it for harmony and lyrics. Interestingly, while for melody, harmony, bassline, and drums the co-creation outweighs the AI-only approach, this is the opposite for formal structure, lyrics and voice synthesis. Team 2023_20 was the only team reporting a failed use of AI for creating harmony and voice synthesis with AI.

The teams' own writings on their song concepts, their described creation process, their evaluation of diversity and ethical issues within said process, their thoughts on ownership of the song, and their overall evaluation of their human-AI co-creation process and the outcome of said process can be found in the dataset and can be used for further analysis.

4.3 Methodology and Validation

After reviewing the initial survey responses, we proceeded to create the data dictionary through a mixed-methods approach. The categories were created inductively by five researchers, iterating four times to reach final consensus. For each iteration of the data dictionary, two coders tested it on two sample entries to ensure that the categories were properly defined and applicable for the data.

We generated the dataset via consensus coding [41]. One researcher coded a selection of the data entries, collecting them into the dataset. A second coder then reviewed the initial coding, validating the coding by either
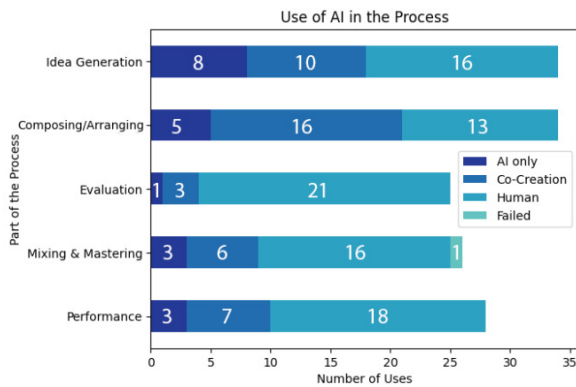
Figure 1. Overview of the Use of AI for the Compositional Process in HAISP: Idea Generation, Arrangement, Evaluation, Mixing & Mastering, Performance.

Figure 2. Overview of the Use of AI for the Elements of the Song in HAISP: Melody, Harmony, Bassline, Drums, Formal Structure, Lyrics and Voice.

citing a +1 for agreement with the coding choices or -1 for disagreement with the coding within the dataset, adding what they felt the coder was missing within their codes from the data. In the case of disagreement a third researcher helped decide on the final code as a tie-breaker.

4.4 Ethical Considerations

The study was approved by the university Institutional Review Board. When submitting to the contest, one question in the submission form asked directly and transparently for the team's consent for their song and documentation to be used for research purposes. Teams gave consent by ticking a box in the form. While we erased all personal data from the dataset, song names are included due to their public availability on the AI Song Contest website.

5. USE CASE AND APPLICATIONS

Our dataset can be used to understand a variety of MIR tasks and work related to human-AI creative interactions, ranging from goals focused on research to practical creation of music. This section presents four possible use cases.

5.1 Use Case 1: More Insights on the AI Tools used in the Songwriting Process

HAISP lists not only all AI tools that teams used and indicated, but also contains the teams' description of the process of utilizing said tools, with data showing which parts of the creative process (idea generation, composition, mixing/mastering, performance) AI was used on its own, in co-creation with the team, or even when co-creation with the AI system failed. Additionally, it reports the teams' level of expertise and location. This provides not only valuable insights for tool developers and inspiration or guidance on using AI for other artists but also helps to answer research questions such as "How does the utilization of AI tools in music creation vary across different professional affiliations and stages of the creative process?"
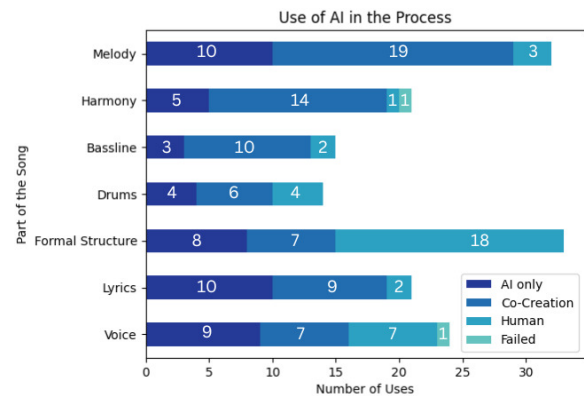
5.2 Use Case 2: Understanding Attitudes and Impact of AI on the Creative Process

Within our dataset, there is reference to how creators use AI within their process, as well as their perceptions around the capabilities and limitations of AI. Additionally, creators share their perceptions of the final creation resulting from their collaboration with AI, providing valuable insights into the impact of AI on artistic expression and creative outcomes.

In their work *Beyond Diverse Datasets* [36], Huang et al. pose questions such as "What is valuable to those communities [that MIR investigates] and what is valuable to the community contributing to MIR?" and "How do musical communities wish for their practices to interact with emerging technologies (if at all), and what do they consider as potential misuses of their traditions?". Our dataset offers a unique opportunity to start exploring these questions, drawing from the diverse perspectives of creators from various cultural, educational, and experiential backgrounds. By analyzing the reflections and experiences of creators documented in the dataset, researchers can gain insights into how different musical communities perceive and interact with AI technologies in their creative practices.

5.3 Use Case 3: Gaining Insight into Users' Understanding of Ethics Around H-AI Co-Creation

Ethical considerations and questions about the validity of data were found frequently in the responses of AISC participants. Working with AI tools during the creation process can trigger questions around control [42], ownership of the final output [43], and freedom of personal expression [44]. Additionally, many participants spoke on the issue of AI systems and tools used during their process potentially being trained on datasets that violate the intellectual property rights of the original artists.

By examining how creators navigate ethical considerations in their process, researchers can uncover how AI tools are adopted and used within different musical traditions. This deeper understanding can inform discussions around the ethical implications of AI in music creation and

contribute to the development of responsible approaches to AI-driven creativity. One research question that this data can provide insight on is "What are the ethical considerations and challenges faced by creators when utilizing AI tools in their creative process, and how do these considerations impact their creative workflows?"

5.4 Use Case 4: Execution of Creative Possibilities

Our dataset can be used to understand the ways in which AI tools can expand the range of creative possibilities in songwriting and music creation. By leveraging this dataset, researchers can analyze how AI models have allowed users to generate innovative methods to address creative challenges, potentially expanding beyond the field of music creation into other creative fields.

One research question that can be explored with this dataset is "How do AI tools, particularly those leveraging big data and machine learning techniques, expand the creative possibilities in songwriting and music creation, and what novel approaches to executing creative problems do they enable?". Specifically, one can explore the utilization of big data and machine learning techniques to address challenges such as data processing, limited musical ability, and idea generation. For example, AI-powered algorithms can analyze vast amounts of musical data to identify patterns and trends, providing inspiration for melody creation, chord progressions, and rhythmic structures. Additionally, machine learning techniques can assist in data processing tasks focused on mechanisms of creation, enabling creators to focus more on the higher level of creation process in music composition [45].

Extending the scope of research beyond music creation into other creative fields, researchers can use HAISP to examine how AI algorithms are applied to address creative challenges and gain insight into the broader implications of AI for fostering creativity and innovation.

6. COMPARISON WITH OTHER DATASETS

There are extensive datasets of AI-based music tools that focus on the methods of the respective AI systems [7] or reviews of AI-based music tools that focus on the metadata of the publication [1]. Another way to approach the topic of AI-supported creative processes is analyzing interfaces of AI-supported tools for creative endeavors [37]. In the MIR community, datasets are common, especially quantitative datasets and training datasets. Apart from [2], who analyzed the creation process of the first AISC teams, there have been no datasets consisting of qualitative data of the human-AI co-creation process released in MIR venues. The HAISP dataset presented in this paper, is a qualitative dataset of a substantial amount of curated user data, including a subjective description and evaluation of the process, practices, and ethical issues around the creative process with AI. Due to the international character of the AISC – with teams from over 20 countries in the 2023 edition alone – these descriptions come from individuals with diverse cultural backgrounds and musical traditions, which

is shown in their reflections and experiences.

The limited amount of data makes HAISP unsuitable for making general and widely applicable statements about human-AI interaction in songwriting. Rather, we see HAISP as a dataset that can be used to extend existing research in various academic disciplines, as it gives very detailed and rich insights that are well-suited to compliment quantitative research insights. Therefore, we made HAISP publicly available and encourage researchers from different fields to work with the data, bringing in their respective perspectives and methods in order to foster an interdisciplinary dialogue on human-AI co-creation.

7. CONCLUSION

In conclusion, the Human-AI Songwriting Processes dataset stands as a potentially significant resource for the exploration of human-AI collaboration and creativity in music composition. Curated from submissions to the AI Song Contest, this dataset offers a view of the dynamics underlying AI-supported songwriting processes. It provides valuable insights into how creators from diverse backgrounds integrate AI tools into their creative workflows, reflecting on the capabilities, limitations, and ethical considerations inherent in human-AI collaboration. Furthermore, the adoption of the HAISP dataset has the potential to advance interdisciplinary inquiry, inspire further research, and contribute to ongoing discourse surrounding human-AI collaboration and creativity. By fostering critical inquiry and facilitating informed discourse, this dataset contributes to our understanding of technology's role in creativity and innovation in the digital age. Future work on the Human-AI Songwriting Processes dataset will involve expanding the dataset to include information from participants in the AI Song Contest prior to 2023, enriching the dataset with a broader range of submissions and perspectives. Additionally, there are plans to conduct further analysis on the dataset, including analysis to explore the descriptive terminology used for AI tools and systems. In closing, the HAISP dataset holds promise for advancing our understanding of human-AI collaboration in music composition. Through its insights and reflections, it encourages continued exploration of the dynamic relationship between human creativity and machine intelligence.

8. ACKNOWLEDGMENTS

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