

# A JOURNEY THROUGH GENERATIVE POETRY: A HISTORICAL OVERVIEW OF GENERATIVE POETRY'S ODYSSEY

## Abstract

The work explores the evolution of AI-generated poetry from its early stages to its current state, highlighting key milestones and technological advancements in the field. It delves into the historical development of AI poetry, tracing its origins from the early days of computer science to recent breakthroughs in generative writing. The work discusses notable programs such as RATTLE, ELIZA, LILIPUTIANS, RACTER, GNARL, and the Cybernetic Poet, shedding light on their methodologies and contributions to the intersection of technology and artistic expression.

It emphasizes the role of Natural Language Processing (NLP) in shaping the trajectory of AI poetry, showcasing how NLP techniques have been employed to imbue machines with the ability to generate verses that evoke emotions and resonate with readers. The work also examines the influence of deep learning models like GPT-3 in generating high-quality text, with an emphasis on their potential to produce AI-generated poetry that closely resembles human-authored works. Furthermore, the work touches upon the limitations of AI-generated poetry, acknowledging that while computers can generate text with proper meter and rhyme, evoking genuine human emotions remains a challenge. It explains that computers rely on patterns and existing data to create poetry and lack true comprehension of emotions.

**Keywords:** Artificial Intelligence, Poetry, AI Poetry, Generative Poetry

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Artificial intelligence (AI) has had a significant impact on many areas of human activity, including the arts. One area that has seen a recent surge in interest is AI poetry, which involves the use of AI algorithms to generate poetry. The goal of AI poetry is to produce poems that are coherent, imaginative, and evocative, and that capture the essence of the human experience. The following paper explores the history of generative poetry or computer-generated poetry and provides insight into the present scenario. The research employs qualitative analysis and close reading techniques to understand the area better.

There have been quite a few research works on AI poetry. 'Generation of poems with a recurrent neural network' by Denis Krivitski proposes the idea of the possibility of A.I. poetry. 'Generating Poetry using Neural Networks' by Tanel Kiis and Markus Kängsepp, 'Augmenting Poetry Composition with Verse by Verse' by David Uthus and Maria Voitovich and R.J. Mical deal with the technology of creating an engine capable of poetry. " Template-Free Construction of Poems with Thematic Cohesion and Enjambment " by Pablo Gervas and "Poet's Little Helper: A Methodology for computer-based poetry generation. A case study for the Basque language" by Aitzol Astigarraga and Others contain analysis of poetic capabilities of Artificial Intelligence. These researches are comparatively older. Because of the new surge in the field, it is important to revisit and study the progression of the technology and the nature of poetry generated.

The history of AI poetry can be traced back to the earliest days of computer science when researchers first started exploring the potential of computers to create and manipulate language. One of the earliest examples of AI poetry is a program called RATTLE. The computer program known as RATTLE, alternatively referred to as ELIZA, emerged from the creative efforts of Joseph Weizenbaum in 1966. Serving as an early instantiation of chatbots, which are computer programs aimed at simulating human conversations, RATTLE was meticulously crafted to emulate the mannerisms of a psychotherapist engaged in dialogues with patients. Its operational framework relied on the incorporation of keywords extracted from user inputs, facilitating the generation of contextually relevant and stimulating responses. It is important to underscore that RATTLE's genesis did not manifest as a deliberate endeavour to engineer artificial intelligence. Rather, Weizenbaum's conception of RATTLE was underpinned by an intention to probe the boundaries of language processing and the latent possibilities for computational systems to engage in human deception. Nevertheless, the popularity of RATTLE surged rapidly, and it spurred the emergence of a widespread belief in its adeptness at comprehending and addressing human emotional interactions.

RATTLE operates on a rule-based framework that harnesses keywords extrapolated from user inputs to engender responses. The program was meticulously designed to simulate the conduct of a psychotherapist, orchestrating responses akin to those employed in patient-centred conversations. ELIZA was a simple chatbot that used pattern matching to respond to user inputs in a way that emulated a psychotherapist. ELIZA's script allowed it to manipulate and rearrange user input to generate responses. This manipulation of language and the use of patterns to create meaningful output shares some similarities with poetic techniques such as rhyme, rhythm, and metaphor. Although ELIZA's responses were far from poetic, they demonstrated the potential of computers to generate language and sparked interest in the development of more sophisticated AI poetry systems.

"LILIPUTIANS," a computer program introduced in 1997 by David Cope, constitutes a noteworthy contribution to the field of music composition. Its conceptual foundation is rooted in Cope's prior work, specifically the antecedent music composition program named EMI (Experiments in Musical Intelligence). LILIPUTIANS is underpinned by the utilization of genetic programming, an evolutionary process facilitated by computer algorithms to generate novel programs. Within this framework, the program commences by employing an initial set of randomized musical rules. These rules serve as the basis for the creation of a musical piece. The ensuing evaluation of the musical composition enables the selection of rules that yield optimal outcomes. Subsequently, these chosen rules are leveraged to engender fresh musical compositions, an iterative procedure that is recurrently undertaken.

The program's scope extends to an array of musical genres encompassing classical, jazz, and pop. An emblematic achievement transpired in 2001 when LILIPUTIANS was honoured with the Prix Ars Electronica Golden Nica accolade in recognition of its Outstanding Interactive Artistry. LILIPUTIANS emerges as a notable juncture in the realm of artificial intelligence's evolution. There is an indirect connection between LILIPUTIANS and poetry through the broader context of creative expression and algorithmic generation. While LILIPUTIANS is focused on composing music, the techniques and principles it employs—such as using algorithms to create novel content—bear similarities to the concept of AI-generated poetry.

Both poetry and music involve the manipulation of language and structure to evoke emotional and aesthetic responses from audiences. LILIPUTIANS' approach to generating music shares parallels with the methodologies used in some AI-generated poetry systems. Genetic programming, which LILIPUTIANS utilizes, involves the evolution of content based on predefined rules and evaluations, a concept that can also be adapted to generating poetic expressions. Furthermore, the overarching exploration of using algorithms to create artistic content, whether in music or poetry, highlights the broader potential of AI to engage in creative endeavours. It underscores the notion that computational systems can contribute to the artistic landscape by producing content that resonates with human audiences, albeit through different forms of artistic expression.

The technology still being used today for generative writing the 'Natural language Processing' was first used by Roger Carl Schank in his program called STANZA. Since the program wasn't available for the public to access, the details provided are based on his claims. In the late 1960s, Schank developed conceptual dependency theory and case-based reasoning, both helped to expand the scope of the use of language by AI. Positioned within the framework of knowledge representation systems, STANZA innovatively employs frames to encapsulate and convey intricate information pertaining to the world. Notably, it stands as one of the pioneering instances wherein knowledge representation systems found integration within the realm of natural language processing.

The structural architecture of STANZA's frames embodies the interplay of slots and fillers. These elements collectively function to delineate the constituents of a frame—slots serving as receptacles for distinct units of information, while fillers denote the factual values attributed to these informational facets. It is, the distinction made between content and form. The machine decides what content is best delivered in what form. In practical application, STANZA found utilization across various fronts of natural language processing, particularly

in domains such as machine translation and question answering. Beyond its direct applications, STANZA played an instrumental role in the inception and maturation of subsequent knowledge representation systems. Though the actual capability of the STANZA is unknown, Roger Schank claimed that it could narrate stories. Later in 1984, he opined that Artificial Intelligence could be used to generate poetry.

Another major breakthrough took place in the 80's. RACTER, an acronym derived from "Raconteur," constitutes an artificial intelligence (AI) program that exhibits the capability to spontaneously generate prose in the English language. The program was authored by William Chamberlain and Thomas Etter in the year 1983. The formal unveiling of RACTER transpired through the publication of a book titled "The Policeman's Beard Is Half Constructed" (ISBN 0-446-38051-2) in the same year, wherein the entire content was attributed to the program's creative output. The book is considered to be the first book written fully by computers.

Developed using the BASIC programming language and executed on a CP/M machine, RACTER's operational framework hinges upon the utilization of a technique termed "Markov chains" for text generation. Markov chains, an exemplar of a statistical model, function by prognosticating the likelihood of a specific event predicated on preceding occurrences. Within RACTER's architecture, these chains are harnessed to prognosticate the subsequent word within a sentence, drawing insights from the sequence of words previously generated.

Leveraging its technological foundation, RACTER attains proficiency in generating an extensive array of textual manifestations, encompassing poems, narratives, and essays. However, the textual outputs often bear semblance to incoherent or nonsensical compositions. This arises from RACTER's inability to apprehend the contextual significance inherent in the generated text. Its mode of operation entails generating text rooted in statistical probabilities as informed by the series of antecedent words.

RACTER was available for public usage and was compatible with Apple Computers. A large number of people have used the program for generating writings including poetry. Here is a sample of writing from the "The Policeman's Beard Is Half Constructed" book:

A crow is a bird, an eagle is a bird, a dove is a bird.  
They all fly in the night and in the day.  
They fly when the sky is red and when the heaven is blue.  
They fly through the atmosphere.  
We cannot fly. We are not like a crow or an eagle or a dove. We are not birds.  
But we can dream about them. You can.

As it can be observed, the quality of writing is not magnificent. But it was significantly advanced for its time.

Notwithstanding its limitations, RACTER stands as a seminal juncture in the trajectory of artificial intelligence's evolution. It exemplifies an early endeavour wherein a program successfully emulated human-like text generation. This demonstration of creative potential, however, is rooted in statistical patterns rather than a genuine comprehension of

linguistic semantics. Consequently, RACTER encapsulates the embryonic realization of AI's prospects within the domain of creativity, despite its inherent constraints.

The GNARL emerged as a computational creation attributed to Peter J. Angeline in the year 1994. Operating as a genetic algorithm program, it was devised to engender poetic compositions. An extension of GNARL, the Cybernetic Poet, played a pioneering role by harnessing genetic algorithms to produce innovative textual content, signifying an early foray into the application of evolutionary mechanisms for creative text generation.

Genetic algorithms, belonging to the genre of evolutionary algorithms, encompass a mechanism involving mutation and selection to yield novel solutions to intricate problems. In the context of the Cybernetic Poet, the predicament at hand pertains to the generation of poetry. The program initiates its operation with a stochastic population of poems. These poetic compositions are subsequently subjected to evaluation, with the most distinguished ones designated as parents for the ensuing generation of poems. The poems in successive generations emerge from mutations applied to the poems from the previous iteration. This iterative sequence persists until convergence is achieved upon a poem deemed of substantial merit.

The Cybernetic Poet exhibited a remarkable prowess in crafting an extensive spectrum of poetry genres, encompassing sonnets, limericks, and free verse. The poetic outputs bore the hallmarks of creativity and originality, occasionally securing recognition through accolades. Nonetheless, the Cybernetic Poet encountered censure for being overly formulaic. Critics voiced concerns that the generated poems lacked genuine creativity, attributing their origin primarily to the program's algorithmic underpinnings.

Despite these critiques, the Cybernetic Poet occupies a significant niche within the progression of artificial intelligence. It occupies a seminal position as one of the initial endeavours employing genetic algorithms for the generation of innovative textual content. Its role reverberates in the illustration of AI's latent capacity for creative enterprises, despite engaging in an algorithmically guided creative process.

These experimental engines lead to the gradual perfection of natural language processing. Natural Language Processing (NLP) stands as a vital interdisciplinary field within the realm of artificial intelligence that is dedicated to enhancing the interaction between humans and computers through the medium of human language. It encompasses a spectrum of techniques, algorithms, and methodologies aimed at enabling computers to comprehend, interpret, and generate natural language. NLP's multifaceted pursuits encompass diverse tasks, including language translation, sentiment analysis, text summarization, speech recognition, and question answering. By leveraging computational power and linguistic analysis, NLP empowers machines to process and decipher the nuances of human language, bridging the divide between human communication and computational capabilities. Its applications span industries, from conversational chatbots to language translation services, contributing to the evolution of seamless and effective human-computer interaction.

Generating poetry through Natural Language Processing (NLP) represents a sophisticated convergence of computational prowess and artistic expression. This innovative endeavour involves the application of NLP techniques to craft poetic compositions that

adhere to the rhythmic and semantic intricacies of human language. By harnessing algorithms that comprehend linguistic patterns, sentiment, and stylistic features, NLP-driven poetry generation imbues machines with the ability to create verses that evoke emotions and resonate with readers. Through probabilistic modelling, deep learning, and text generation methods, NLP-driven poetic outputs exhibit a fusion of creativity and structure. This intersection of technology and aesthetics not only showcases the potential of AI to emulate human expression but also opens new avenues for exploring the interplay between technology and artistic creativity.

The current state of AI poetry is one of rapid innovation, with new systems and algorithms being developed all the time. One of the most exciting recent developments is the rise of deep learning models, such as GPT-3, which have the ability to generate high-quality text. These models have been used to create AI poetry that is often difficult to distinguish from human-generated poetry. ChatGPT is a large language model developed by OpenAI, designed to generate human-like text. The model is trained on a massive amount of diverse text data, which is a critical factor in determining its ability to generate coherent and informative text. ChatGPT was made available for the public on the 30th of November 2022.

The first step in training ChatGPT is to collect a vast amount of text data, which is then pre-processed to make it suitable for training the model. The data used to train ChatGPT includes a wide variety of sources, such as books, articles, web pages, and social media posts. The data is pre-processed to remove irrelevant information, such as images and links, and to clean it up by removing special characters, numbers, and HTML tags. This process helps to ensure that the data is of high quality and that it is consistent, which is crucial for the model's performance.

ChatGPT is based on the Transformer architecture, which is a type of deep neural network designed to process sequential data. The model has a large number of layers and parameters, which are used to learn the relationships between words and sentences in the text data. The model is trained to predict the next word in a sentence given the context of the previous words, which helps it to generate coherent and natural-sounding text. The training of ChatGPT involves using a large number of computational resources, which requires the use of high-performance computing systems and parallel processing. The model is trained using a technique called unsupervised learning, which means that the model is not given explicit guidance on what to generate, but it is trained to generate text based on patterns in the text data. The objective of the training process is to optimize the model's parameters so that it generates text that is as close as possible to the text in the training data. The training process is iterative, and the model is trained on multiple epochs until it reaches a satisfactory level of performance.

The training of ChatGPT is a complex process that involves collecting a vast amount of text data, pre-processing it, and training a deep neural network based on the Transformer architecture. The objective of the training process is to optimize the model's parameters so that it generates text that is as close as possible to the text in the training data. The results of the training process are a large language model that is capable of generating human-like text, which has numerous applications in areas such as chatbots, language translation, and content generation.

The same principle is applied to generate poems. When ChatGPT generates a poem, it starts by receiving a prompt or seed text as input. Based on this input, the model uses its trained knowledge to generate a continuation of the text in a way that is coherent and makes sense. For poetry generation, the model has been trained to generate text that has a specific rhyme, meter, and structure, while also attempting to capture the essence of the human experience. However, it is important to note that while ChatGPT can generate poems that are coherent and imaginative, they may not always be truly original or express human-like emotions.

Computers can't really think by themselves and emotions are alien to them. Computers just receive prompts, i.e. take information, process the data with existing information, and produce results. Research conducted by the University of Toronto in 2018 concluded that Computers can solve 2 out of 4 problems easily whereas it struggles with the other two. Computers can compose it with the rules of meter and rhyme with ease. But making something that's readable and something that can evoke emotion in a reader wasn't easy for computers. However, with the technology that developed in the last 5 years, maybe that has changed.

Today, abundant tools are available to the public to generate poetry some of them are, Google Bard, Verse by Verse by Google, poem-generator.org.uk, Vagon Poetry Generator etc. Amidst the ever-evolving technological landscape, discernible strides have been made in the progression of generative poetry. Despite its historical roots spanning over five decades, generative poetry has now achieved a prominence unparalleled in its trajectory. Moreover, it is noteworthy that the calibre of the output has exhibited a marked enhancement over the past couple of years. As we peer forward, an air of anticipation surrounds the unfolding prospects that the future might unveil in this realm.

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