

EMILY: An Emily Dickinson Machine

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Abstract

This paper introduces EMILY, a machine that aims to create original poems in the style of renowned poet Emily Dickinson. Dickinson's succinct and syntactically distinct style with unconventional punctuation makes for an interesting challenge for automated poetry creation. A user study compares EMILY's poems to Emily Dickinson originals, demonstrating the machine's ability to evoke mental images and highlighting challenges for future work.

Introduction

Poetry writing is an artform dating back to prehistoric times (Finnegan 2012). A successful poem elicits imagery and evokes emotion through an interlock of relationships between semantics, syntax, grammar, punctuation, rhythm and rhyme. Machine generated poetry is itself an artform distinct from human made poetry, with computer generated poems created across human languages through a variety of computing techniques (see, for example, (Lau et al. 2018), (Zhang and Lapata 2014) and (Hämäläinen and Alnajjar 2019)).

While poetry machines often create original works without focus on any particular poet, there are exceptions. Style imitation has, for example, been applied to the works of Italian poet Dante Alighieri (Zugarini, Melacci, and Maggini 2019), Bob Dylan lyrics (Barbieri et al. 2012), and the works of William Shakespeare and Oscar Wilde, amongst several others (Tikhonov and Yamshchikov 2018).

Poetic style imitation offers the opportunity to immortalize a poet by keeping their voice alive through novel works. From an evaluation standpoint, the generated works can be compared with those of the original creator, enabling a variation of the CC Turing Test by checking whether unbiased observers are able to discern generated artifacts from original ones. Other variations involve comparing the original and generated works on important criteria (ex. stylistic elements of poetry) to help identify where improvement is needed.

One of the greatest English poets, Emily Dickinson (1830-1886), is known for effectively capturing feeling and imagery using few words (Emily Dickinson Museum 2020). Dickinson's style is revealed through unique use of punctuation, syntax, formatting and rhyme (Emily Dickinson Museum 2020). Her succinct and potent poetry makes Dickinson an interesting challenge for style imitation.



Figure 1: The poet Emily Dickinson (1830-1886). Photo Credit: Yale University Manuscripts Archives Digital Images Database.

In this paper, we present EMILY, a poetry machine that aims to replicate the style of Emily Dickinson's poems. We present the methodology behind EMILY, along with a user study that compares machine-created poems with Emily Dickinson originals on several poetic criteria.

Method

The making of EMILY consists of data preprocessing, the creation of custom Markov Chains, and postprocessing. These steps are detailed below.

Data Preprocessing

EMILY was trained on publicly available Emily Dickinson poetry from the Gutenberg project: "Poems by Emily Dickinson, Three Series, Complete by Emily Dickinson" (Dickinson 2004; Project Gutenberg). The data was made of 444 poems, consisting of 10178 lines.

Punctuation meaningfully contributes to Dickinson's unique style and as such deserves careful treatment. We saved commas, periods, question marks, and semi-colons. Dickinson is well known for her uses of dashes (Emily Dickinson Museum 2020), which were also preserved. Some

punctuation, particularly all brackets, were omitted, as they introduced noise without helping to capture Dickinson's style.

Dickinson used to number instead of title most of her poems. We discarded all roman numerals in our preprocessing since our focus is on generating the poems' bodies.

The final preprocessing step was to convert any fully-capitalized words found in the poem titles into lower case. This helped to enrich the data set of Dickinson's words. Words that start with capital letters were left unchanged because Dickinson used capitalized words in the middle of sentences (Emily Dickinson Museum 2020).

Custom Markov Chains

To endow EMILY with Dickinson's style, we chose to build our own custom Markov Chains. This gave us greater control over the creative process, particularly as it pertains to punctuation, which is a central element of Dickinson's poetry. (Barbieri et al. 2012) also observed that unmodified Markov Chains were insufficient for capturing style, in their case as it pertains to Bob Dylan's use of rhyming.

The Markov Chains implementation relies on a dictionary. We create the Markov Chains by iterating through all the words and reading them in reverse. Starting with the first word, we iterate for each word at index i checking if the prior word appears in the dictionary. If so, we add the word to its list of values. If the word before it is not in the dictionary, we add it to the dictionary and start its list of values with the current word as the first word. As a result, we map each word to all the words that proceed it in Dickinson's writing. Doing so lets us capture the relationship of what words show up after each specific word along with their frequency. Words with higher frequency have a higher probability of being generated. Our final dictionary had a total of 8610 keys.

Markov Chains are used to generate the sequence of words for the poems. We format the generated words in the postprocessing phase.

Starting Word For single stanza poems, we randomly select the initial word from all words used in Dickinson's writing. If the poem has more than one body, we rely on the final word in the previous body in order to generate the first word in the sequence body using the Markov process.

Body Each stanza in a poem is 20 words long. This keeps the poems at approximately the length of Dickinson's poems, which consist of short stanzas of 4-5 lines each with 5-6 words per line. The number of stanzas generated for each poem is determined by a variable n passed to EMILY.

Closing Word To help bring out Dickinson's style, concluding words were chosen from amongst those that had punctuation.

Postprocessing: Formatting the Poems

Not only is the choice of words in the poem important to capturing Emily Dickinson's style, but the format of the poem brings in important stylistic elements. We format the poems based on an analysis of Dickinson's poetry.

Dickinson starts poems with capitalized words, and also follows periods, exclamation marks, or question marks with capitalized word. Words that follow a comma or semi-colon are generally lowercase. More importantly, Dickinson is known for capitalizing words in the middle of sentences, not only words that begin a new line (Emily Dickinson Museum 2020).

We traverse through the final list of words and set a flag based on the type of punctuation to determine if the following word should start with a capital or lowercase letter. Following Dickinson's style (Emily Dickinson Museum 2020), any capitalized words not preceded by a comma or semi-colon are left unchanged. The generated list of words is then divided into 5 word sentences, and the first letter of each sentence is capitalized.

User Study

We evaluate EMILY by comparing its machine-created poems to Emily Dickinson originals on several criteria. This study seeks to gain an initial understanding on the quality of EMILY's poems. Larger and more in depth studies are left to future work.

We surveyed 17 participants, 9 female and 8 male. On a scale of 0-5, 0 being "Not at all Familiar" with Emily Dickinson's poetry and 5 being "Extremely Familiar", 3 participants responded with a 4, 5 responded with a 3, 4 with a 2, 1 with a 1 and 4 with a 0.

Participants were presented with a total of 12 poems, consisting of 10 of EMILY's poems and 2 poems by Emily Dickinson. The original poems are Poem 6, "*Faith*" is a *fine invention*, and Poem 12, *Come Slowly—Eden*, which capture many of her stylistic elements.

The choice of questions was influenced by previous work evaluating machine-made poetry (Zugarini, Melacci, and Maggini 2019; Hämäläinen and Alnajjar 2019; Lamb, Brown, and Clarke 2015). For each of the 12 poems, participants were asked the following:

1. Is this a typical poem?
2. Is this poem understandable?
3. How much do you like the word choice in the poem?
4. Does the text evoke mental images?
5. Does the text evoke emotion?
6. Do you like this poem?

Each question was answered by selecting from a Likert scale: Strongly disagree (0), disagree (1), neutral (2), agree (3), strongly agree (4). The scores of each question were averaged across all respondents for each poem, as shown in Figure 2. The scores of each question were also averaged across all generated poems versus the original Emily Dickinson poems, shown in Figure 3.

Results

Our survey shows that question 4, "Does the text evoke mental images?", had the highest average score of 2.17 of all questions for generated poems. Furthermore, *the average score of question 4 outranked the average score for Emily*

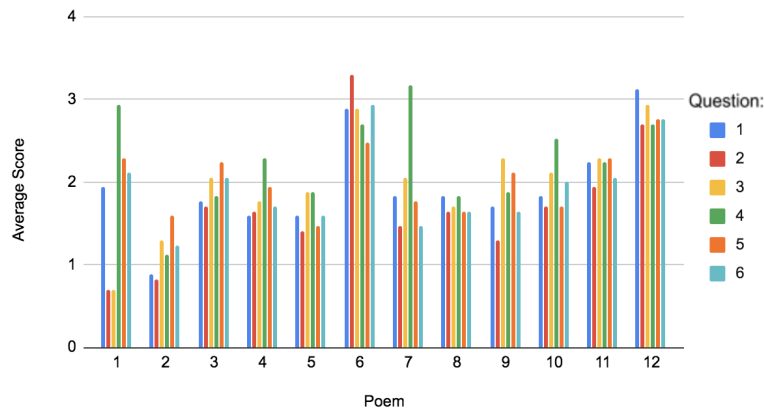


Figure 2: Average scores of questions for each poem based on the Likert Scale. Poems 6 and 12 correspond to original Emily Dickinson poems, while the others were created by EMILY.

Dickinson's poems in 2 of the generated poems. Poem 1, 7, and 10 had the highest score for question 4 as seen in Figure 2. Poems 1, 7 and 10 appear at the end of this section.

Three of our generated poems resulted in at least 3 out of the 5 questions averaging to a score higher than 2, in a range similar to Emily Dickinson's poems' average scoring of 2-3 (Poem 1, 3, and 11). Each of these poems performed well on a different set of questions.

The question "Is this poem understandable?" resulted in the lowest average score across all our generated poems as seen in Figure 3, with a score of 1.43 across all generated poems. Dickinson's poems averaged to a score of 3 on this question. The questions "Is this a typical poem?" and "Do you like this poem?" averaged to 1.72 and 1.76, respectively, identifying areas for improvement.

Most of EMILY's poems resulted in average scores of around 2. Dickinson's poems resulted in average scores closer to 3 with question 4 "Does the text evoke mental images?" and question 5 "Does the text evoke emotion?" averaging out to the mid-2s at about 2.71 and 2.6, respectively.

The overall average scores of Emily Dickinson's poems were higher across all questions compared to our generated poems as seen in Figure 2, which offers an interesting challenge in future work. EMILY's poems fared well compared to Emily Dickinson's poems, averaging to a score of about 2 while Dickinson's averaged to scores closer to 3 with only two in the mid-2s range.

To give the reader a better sense for EMILY's poetry, we conclude this section with the 3 top performing generated poems in the study.

Poem 1

Some shook their yellow gown
And certainly her eye, they
Leap upon the rose smiling
To die. The orchards Eternity!



Poem 7

The wondrous dear, -An
Enemy is the gate the
Children caper when liked, -
Might but a year, hunted,

Tis all can put out
A little plan to his
Eternal chair, his notice to
Pass odors so dense notoriety.



Poem 10

Surrendering the 'house at Lexington,
And then of snow; the
Orchard sparkled like perfidy. A
Year, nor heedless were small,

For 't was to a
Watch, some sweet birds jocosor
Sung; the reason that could
Not put it until mystery!



Comparison to another technique

We compare the results of our custom markov chains model to using a built-in Python markov package, Pypi Markovchain 0.2.5¹, relying on the same Emily Dickinson poems as the data. Preliminary analysis suggests that our custom method is able to produce poems that capture Emily Dickinson's

¹<https://pypi.org/project/markovchain/>

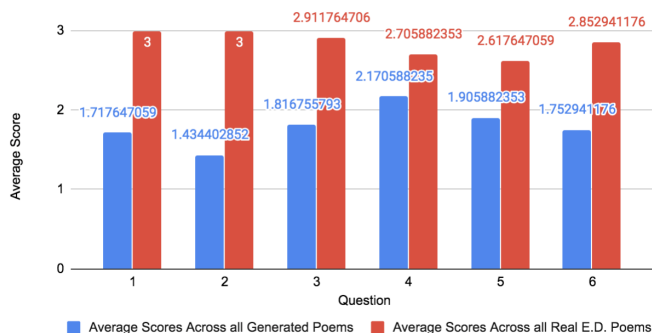


Figure 3: Average scores of questions across all EMILY poems versus average scores of questions across original Dickinson poems.

style more closely, with respect to punctuation, formatting, and overall stylistic similarity. Two examples of poems created with the prebuilt Markov Chains are shown below.

Example 1

In the pumpkins in dungeons are known her
 final inch, chamber and firmaments
 row of the last included
 both, danced to see by side, i failed to me.

Example 2

But murmuring of the bewildering thread;’s
 curtain fell, your way soft descent
 among the sky!

Conclusions

This paper presents EMILY, a machine that aims to create poems in the style of renowned poet Emily Dickinson. Dickinson’s efficient and effective use of words to evoke emotion and imagery, along with distinct syntactic choices, make this an ambitious task, and this paper makes initial steps in this direction. Future work can make further progress guided by the findings of our user study, which highlights areas for improvement.

The initial user study performed here compares EMILY’s poems with original poetry by Emily Dickinson on several dimensions, such as typicality, understandability, and ability to evoke emotion and imagery. The analysis shows that the generated poetry evokes mental images, at times even better than Dickinson’s poems. However, perhaps unsurprisingly, on average, the original poetry scored higher than the machine-made poems. This presents the interesting challenge of automatically creating poetry on par with Emily Dickinson’s.

Preliminary examination comparing poems generated using the custom Markov Chains with those made with a built in Python markovchain package, suggests that the custom

model yields better results. Control over stylistic nuances, through, for example, saving words along with their punctuation, seems to help capture Dickinson’s style, and may be relevant to poetic style imitation of other poets. Future studies will need to formally evaluate the performance of the two models, as well as compare to other techniques, such as machine learning approaches.

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