NLP Paper Review
Shall I Compare Thee to a Machine-Written Sonnet? An Approach to Algorithmic Sonnet Generation

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2 Abstract

1. Devised a sonnet-generation algorithm with novel components
2. Led to rhyming and more meaningful poetry
3. Included PoS, punctuation
4. Winner of 2018 PoetiX Literary Turing Test Award

3 Introduction

1. Create an algorithm that could strike a balance between creative freedom and poetic rules
2. Poetric rules include grammar, rhyming schemes, semantic and poetic styles
3. No algorithm can capture these poetic rules before
4. Their model created better quality poems, with in-line punctuation and PoS based constraints

4 Previous Work

1. A few poetry generation tools use grammatical, metrical and rhyming templates to extract words from sources of varying sizes
2. Later, neural models were introduced – these were trained on poetry and then samples were derived from the model with constraints to satisfy poetic rules

5 Approach

1. They use the CMU Pronouncing Dictionary for 2 constraint parameters –
   (a) Phenome structure of a word
   (b) Stress pattern of a word
2. They generate by first picking rhyming words to the user provided prompt
   (a) Searches are made for rhyming words, as well as topic using GloVe embeddings
   (b) If the user prompt has multiple words, they take the mean embedding
3. They convert the similarities into a p-distribution and sample from it, favouring high similarities.
4. A word level LSTM is deployed to construct the line backwards from each word. Beam search is used to find the 10 highest likelihood paths and a line is sampled from it.

6 Data

1. The Dataset comprised of a collection of song lyrics from –
   (a) Endymion by John Keats
   (b) Collected Works of Walt Whitman
   (c) The Hunger Games by Suzanne Collins
2. They observed that using works from a single author provided a more coherent voice and writing pattern
3. Language models were trained separately on these corpora, and randomly picked for sonnet generation

7 Novelties

1. In-line Punctuation – This made poems more representative of actual human poetry.
   (a) Commas were added as post-processing
   (b) They sample n commas to be placed
   (c) The n commas are placed at every possible position and their likelihood is calculated
   (d) These commas are then placed in the most likely positions
   (e) Commas were added as post-processing, since the search cost would increase in beam search (since words would be searched with and without punctuation) by a factor of 2^d
2. PoS Restrictions – Since PoS errors are the easiest to detect, PoS paths for grammatically incorrect poems were recorded. These tags were used to detect and add restrictions while generating lines in the poem.
3. Dataset – Language models were trained separately on each author's works. This allowed them to retain the language styles of each author, unlike other approaches which used a combination of poems from multiple authors. They were also able to generate rhymes since they used sampling constraints to generate.

8 Evaluation

1. Comparisons were made using the same prompt and existing poetry generation models. They observe better results, mainly due to the fact that they handle grammatically incorrect PoS tags while forming sentences.
2. Since the model picks a rhyming word and generates backward, it also maintains the rhyming scheme provided – preexisting models could not guarantee this.
3. Extrinsic Evaluation – this was performed to analyse how the poem would be interpreted by human readers to assess its quality. Poems were submitted to the 2018 PoetX Literary Turing Test. Generated sonnets were mixed with human generated ones and submitted to a panel. Although the judges were able to identify machine generated poems, they won first place.

9 Summary

The model consists of both pre-processing as well as post-processing steps, and follows an unconventional language modelling approach. Language modelling is

performed separately on sonnets by various authors, and generation is performed after randomly selecting an author's language model. This allows for retention of language based meters and characteristics. The model first samples rhyming words from the training corpus which are similar in topic to the provided user prompt. Similar words are identified using word embeddings, namely the GloVe model. Subsequently, for every rhyming word found, it generates the sentence backwards. This is done using an LSTM model. Finally, once the sonnet has been generated, commas are sampled and placed into their most likely positions to add human touch to the generated poem. The model was found to perform better and produce sonnets with increased human characteristics, as well as stick to fixed rhyming schemes.