

# You can be Shakespeare!

## A Case Study in Paraphrase Targeting Writing Styles

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### ABSTRACT

We present initial investigation into the task of paraphrasing language while targeting a particular writing style. The plays of William Shakespeare and their modern translations are used as a testbed for evaluating paraphrase systems targeting a specific style of writing. We show that even with a relatively small amount of parallel training data available, it is possible to learn paraphrase models which capture stylistic phenomenon, and these models outperform baselines based on dictionaries and out-of-domain parallel text. In addition we present an initial investigation into automatic evaluation metrics for paraphrasing writing style. To the best of our knowledge this is the first work to investigate the task of paraphrasing text with the goal of targeting a specific style of writing.

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**KEYWORDS:** Paraphrase, Writing Style.

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## 1 Introduction

Identical meaning can be expressed or *paraphrased* in many different ways; automatically detecting or generating different expressions with the same meaning is fundamental to many natural language understanding tasks (Giampiccolo et al., 2007), so much previous work has investigated methods for automatic paraphrasing (Barzilay and Lee, 2003; Dolan et al., 2004; Shinyama and Sekine, 2003; Das and Smith, 2009; Bannard and Callison-Burch, 2005). Although two utterances may be semantically equivalent, they can still be stylistically quite different. For example, the same information is likely to be conveyed using very different lexical and grammatical patterns in advertising materials v.s. technical manuals, or in Shakespearean plays v.s. Hollywood movies.

In this paper, we investigate the task of automatic paraphrasing when targeting a writing style, focusing specifically on the style of Early Modern English employed by William Shakespeare. We exploit modern translations of 17 plays written to help students better understand Shakespeare's work. A parallel corpus is extracted from these modern translations, which is then used to train phrase-based translation models which are capable of automatically paraphrasing ordinary sentences into Shakespearean English. In addition we develop several baseline systems which don't make use of this source of parallel text and instead rely on dictionaries of expressions commonly found in Shakespearean English, or parallel monolingual text gathered through Amazon's Mechanical Turk (Chen and Dolan, 2011).

We evaluate these models both through human judgements and standard evaluation metrics from the Machine Translation and paraphrase literature, however no previous work has investi-

gated the ability of these automatic metrics to capture the notion of writing style. We propose several new metrics for evaluating paraphrases targeting a specific writing style, and measure correlation with human judgements showing promising, yet preliminary results.

Systems which are capable of automatically paraphrasing literary writing styles could be directly beneficial for educational applications, for example helping students to experiment with writing literature in the style of authors they are studying. Additionally note that out of the 37 surviving plays written by William Shakespeare, only 17 currently have modern translations available; although we have not yet formally evaluated paraphrasing in the other direction, we believe this work also has the potential to make the other 20 plays more accessible to students of Shakespeare by automatically generating relatively high-quality modern translations.

## **2 Data**

We compare 3 different stylistic paraphrase systems targeting Shakesperean English. One which leverages parallel corpora of modern translations, another which makes use of dictionaries of stylistically representative expressions, and another which leverages out-of-domain monolingual parallel data.

### **2.1 Modern Translations**

We propose to use Shakespeare's plays and their modern English translations as a testbed for the task of paraphrasing while targeting a specific writing style. Having access to parallel text in the target style allows us to train statistical models for generating paraphrases, and also perform automatic evaluation using BLEU which requires access to a set of reference translations. For this purpose we scraped modern translations of 17 Shakespeare plays from <http://nfs.sparknotes.com>, and an additional 8 translations of overlapping plays from <http://enotes.com>, giving us two reference translations for 8 out of the 17 plays.

After tokenizing and lowercasing, the plays were aligned using Bob Moore's bilingual sentence (Moore, 2002) aligner, which produced about 21,079 alignments out of 31,718 sentences in the Sparknotes data, and 10,365 sentence pairs out of 13,640 sentences in the enotes data. The modern translations from each source are qualitatively quite different. The Sparknotes paraphrases tend to differ significantly from the original text, whereas the enotes translations are much more conservative, making fewer changes. To illustrate these differences empirically and provide an initial paraphrase baseline, we computed BLEU scores of the unchanged modern translations against Shakespeare's original text; the Sparknotes paraphrases result in a BLEU score of 23.67, whereas the Enotes paraphrases prouce a much higher BLEU of 49.60 indicating their similarity to the original text. These corpus statistics are summarized in table 1.

### **2.2 Dictionaries**

### **2.3 Out of Domain Monolingual Parallel Data**

## **3 Evaluation Metrics**

- Describe the need for automatic evaluation metrics.
- Describe previously used evaluation metrics for paraphrase.
- Highlight problems with previous metrics when targeting a specific writing style.

corpus	initial size	aligned size	No-Change BLEU
<a href="http://nfs.sparknotes.com">http://nfs.sparknotes.com</a>	31,718	21,079	23.67
<a href="http://enotes.com">http://enotes.com</a>	13,640	10,365	49.60

Table 1: Parallel corpora generated from modern translations of Shakespeare’s plays

- Propose new metrics.

## 4 Experiments

- Experimental setup.
- Present results from human evaluation comparing various systems.
- Analyze correlation between evaluation metrics and human judgments.

## 5 Related Work

- Kevin Knight’s work on poetry generation
- Any work on writing style (e.g. classification)? Possibly cite work on author attribution...
- work on paraphrase evaluation metrics (David Chen, CCB, etc...)

## 6 Conclusions

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