# Towards Tool Criticism: Complementing Computational with Manual Literary Analyses

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# Table of Contents

# Introduction

# TOOL CRITICISM

"Tool criticism is the critical inquiry of knowledge technologies used for research purposes. It reviews the qualities of the tool in light of the research activities and reflects on how the tool [...] affects the research process and output." (Van Es et al., 2018)

# RESEARCH OBJECTIVES

1. Approach tool criticism through two prominent applications: Topic Modelling (TM) and Sentiment Analysis (SA).

2. Use TM and SA tools on a self-designed corpus of literary relevance: dystopian novels of the 19th and 20th century.

# Research Data

# DYSTOPIAN NOVELS

| Languages | Novels | Tokens | Types | Token-type ratio |
|---|---|---|---|---|
| American English | 39 | 3,167,702 | 136,954 | 23.1 |
| British English | 35 | 2,660,983 | 112,012 | 23.8 |
| German | 28 | 1,872,969 | 98,497 | 19.1 |
| TOTAL | 102 | 7,701,654 | 480,651 | 16.1 |

Table 1: Overview of the data-set.

The novels were published between 1836 and 1979. Thus, the corpus covers a time span of 143 years.

Full corpus available at: https://www.doi.org/21.11101/0000-0007-CAA0-0

# Experiments

# METHODOLOGY

**Sentiment Analysis**:

- Syuzhet (Jockers, 2017)
- Stanford Core NLP Sentiment Annotator (Socher et al., 2013)
- Berlin Affective Word List – Reloaded (Võ et al., 2009)

# METHODOLOGY

**Sentiment Analysis**:

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# STANFORD SENTIMENT ANNOTATOR

- Recursive Neural Tensor Network: Prediction accuracy of fine-grained sentiment labels reaches 80.7%.
- Training data: Stanford Sentiment Treebank.
  $\rightarrow$ Includes labels for 215,154 phrases in the parse trees of 11,855 sentences.

# STANFORD SENTIMENT ANNOTATOR

**Experiment**

1. Research data: Cleaned English part of the corpus.
2. Settings: Stanford Core NLP Sentiment Annotator implementations.
   It is integrated into Stanford Core NLP 3.3.0 or later versions.

   → Rating system:
   Very negative - Negative - Neutral - Positive - Very positive

# BERLIN AFFECTIVE WORD LIST RELOADED

- A list of more than 2,900 German words.
  $\rightarrow$ Represents negative, neutral and positive affective valences.
- 200 psychology students annotated the data set in the categories:
  - Emotional valence
  - Arousal valence
  - Imageability valence

# BERLIN AFFECTIVE WORD LIST RELOADED

**Experiment**

1. Research data: Cleaned German part of the corpus.
2. Settings: A dictionary-based algorithm.
   It scans the novels for the terms present in the BAWL-R and analyses their different valences (Roth-Kleyer, 2018).

   → Rating system:
   Depends on the analysed valence.

# Outputs

# STANFORD SENTIMENT ANNOTATOR

American English:

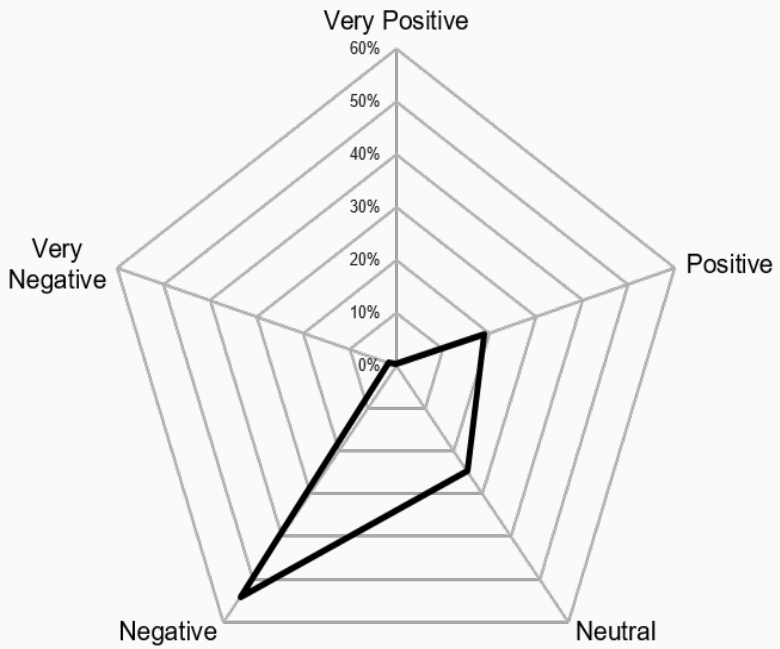


Figure 1: Sentiment distribution in the American part of the corpus.

British English:

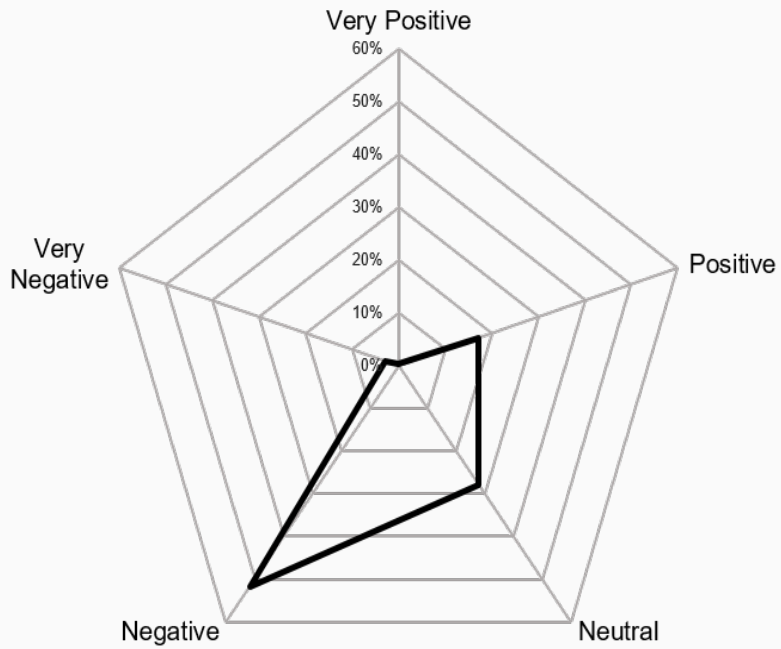


Figure 2: Sentiment distribution in the British part of the corpus.

# BAWL-R

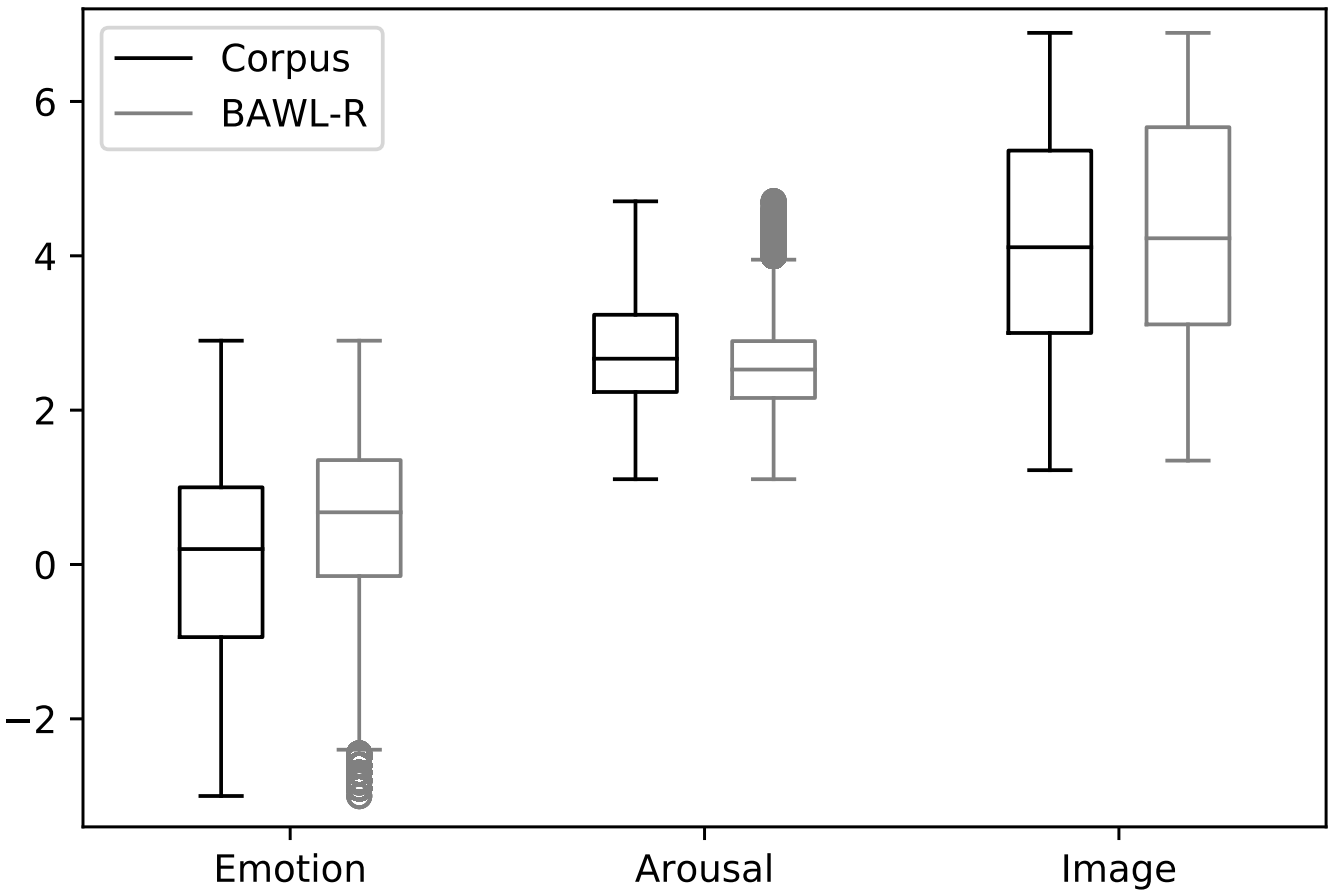


Figure 3: Comparing the values of **German dystopian novels** and the BAWL-R dictionary.

# Conclusions

# AUTOMATED and MANUAL ANALYSES

**Computational analysis:**

- Dystopian novels (DN) carry primarily negative sentiments (50.69%).
- Extreme emotions are rare (very positive: 0.29%; very negative: 1.99%).
- DN have a slightly positive emotional valence.
- DN are average arousing.
- DN are average imageable.

**Manual analysis:**

- DN are pessimistic literature that criticises certain aspects of the authors' and audiences' realities.

**Concerns:**

- 200 psychology students are a sharply pre-defined group of annotators.
- Single terms: might not reveal much about a complex text's sentiments.
- Irony, sarcasm and cynicism: Computational tools cannot detect these stylistic traits.

→ **Question:** Can sentiments in texts be analysed holistically?

# WHAT'S NEXT

The sentiments a text carries depends on the recipient's cultural and social background.

The emotionality of a text differs individually based on the recipient's personality and emotional state.

→ **Experiment:** Sentiment Annotation

1. Choose a canonical dystopian novel: *Brave New World* (Huxley, 1932).
2. Use a Crowd Sourcing Platform to globally reach people for the annotation task.
3. Check the hypotheses above by evaluating the test persons' demographic information and their annotation.

# Thank you!

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