Automatic narrative structure identification in literary texts

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Narratives are present in news articles, social media and political or social agendas, just to name a few. The ability to understand narrative trends by comparing different narratives on a large scale can benefit researchers in a wide range of fields from literary criticism to sociology.

Narrative structure describes how different parts of a narrative relate to one another. A paradigmatic approach to narrative structure focuses on the underlining structure of a text without taking into account the linear order of events. The structure of a text is not necessarily linear but can be affected by changes in location or time, or by actions or events (e.g., flashbacks or flash-forwards). The structure determines how the plot of a story unfolds and has an effect on how it is perceived. Connecting elements of a narrative through the structure of a text leads to the development of a storyline.

Theories on narrative structure are based on the claim that regularities can be found in narrative structures. Well-known structure theories include the three-act structure, generally attributed to Aristotle, and the four-part structure, an extension of the three-act structure. The five-point dramatic structure was introduced by Gustav Freytag (1894) and the seven-point structure was popularised by Dan Wells after claiming that he used it to write novels.

These structure theories are typically analysed using qualitative approaches. However, with the rise of digital text, large-scale analysis of texts has become possible. Although qualitative approaches may lead to more fine-grained analyses, they take up large amounts of time and resources and remain subjective.

We propose a quantitative approach to analyse narrative structure. A quantitative approach has the benefit of providing an objective analysis of a large amount of text, in a short time. If successful, the system we propose could provide scholars with empirical evidence for a narrative structure theory. However, this presents the question, can a system recognise the complex structure of a narrative?

Research on the computational analysis of narrative structure includes Jockers (2015), who aims to identify the change in sentiment over a text. Gius et al. (2019) have created guidelines for annotating scenes in literary text. These guidelines are used in a series of ongoing research on automatic scene detection in German prose.

The initial phase of the system we propose, identifies transitions in a text. The transitions divide the text into different sections that follow one another to create the structure of a text. The second phase of the system aims to identify the similarity between the automatically identified structure of a text and a manually identified structure, following a structure theory.

In previous work (Heyns and van Zaanen, 2022), we have proposed a system to automatically identify transitions in a text. Here transitions are considered to be a location in the text where there is a relatively large change in topic. The text is first split into sentence-length segments. Topics are then identified in the text using Latent Dirichlet Allocation (LDA) (Blei et al., 2003). The entropy is calculated at each possible transition point. Transitions are placed at the lowest entropy position in the text. This will be the position with the most contrast between the LDA topics before and after a transition. Note that the system does not simply identify a position where the LDA topics change, but rather where a group of LDA topics that co-occur, change.

The system developed in Heyns and van Zaanen (2022) uses no manual annotation, which is ideal when trying to analyse narratives on a large scale. However, it is difficult to evaluate the accuracy of proposed transitions without comparing them to human judgement. Gius et al. (2019) argues that manually annotated datasets are imperative for developing automatic scene or narrative systems. Note that the sections that we try to identify in our work are different from both Jockers (2015) where sections are identified based on sentiment change and Gius et al. (2019) where they identify sections based on scene changes. We try to identify the structure of a text, based on topic co-occurrence.

We propose to compare the transitions identified by the system, with manually annotated transitions. We would like to know if human judgement agrees with the system as well as determine how well human judgements will agree with one another. Humans find it difficult to decide where to place narrative transitions. Similar studies (Reiter, 2015; Gius et al., 2021) have found that manual annotations can vary greatly because of the subjective and context-dependent nature of a text. Reiter (2015) has found that summarising a text before attempting to annotate it, helped to create greater agreement between manual annotations.

This work will take inspiration from Gius et al. (2019) by establishing rules to identify sections in a text. We will create a manually annotated dataset that will also benefit future studies in automatic scene and narrative detection. This dataset will serve as a baseline for comparing the automatically identified sections using the system described in Heyns and van Zaanen (2022).

To evaluate, we compare the automatically identified sections with manually annotated sections using a distance metric. We compare the start and end points between the automatically annotated sections and the manually anno-

tated sections. The automatically identified structure shows promising results by reflecting the manually annotated structure.

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