

# Some Thoughts on Computational Narratology

## Dynamic Evolution and Compositional Change in Literature

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## Learning to walk before we run

“In humanities research, the use of data analytics and high performance computing is advanced under the banners of ‘distant reading’ and ‘macroanalysis’. These technologies are supposed to give us entirely new insights that have previously been unobtainable. The results however often resembles technical demonstrations rather than solutions to research problems. In order to really benefit from analytics and HPC, we first need to *operationalize* and *automate* microanalysis.”

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- A *narrative* is a sequence of intentionally dependent events ('objects bounded in time') directed at some goal-state
- [example] An action (perception of) has a narrative structure, the success of which depends on the (causal) coherence between the sub-actions and intended goal

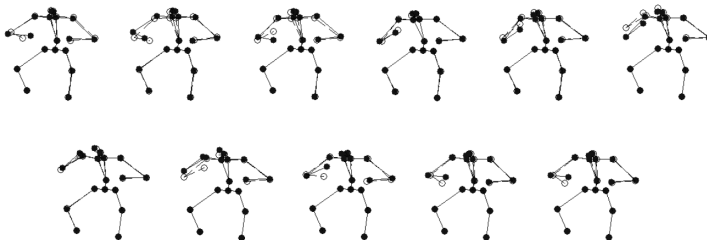


Figure 1: Partonomy of 'drinking beer'

Capture a narrative's evolution (perception of) by focusing on the *coherence* of affective dynamics and co-occurrence structure of one text

## Data

- Kazuo Ishiguro's Nobel-prize winning *Never Let Me Go* (2005) which is driven by a “great emotional force”
- Sentence-level sentiment estimation based on the *Syuzhet* lexicon

## Problem

- Psychological/affective experience of a narrative
- Aesthetics optimality for literary fiction

# filtered story arc

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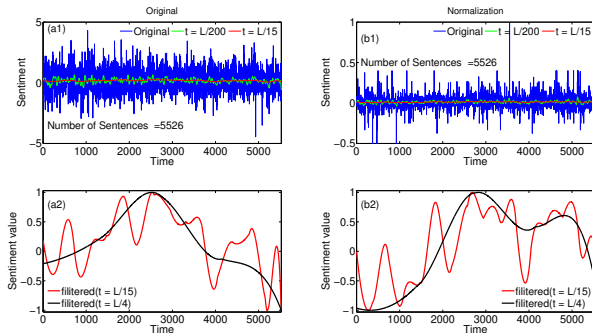


Figure 2: Sentiment time series of *Never Let Me Go*

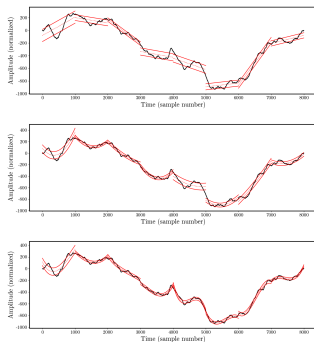


Figure 3: Computation of local fluctuations around linear, quadratic, and cubic trends

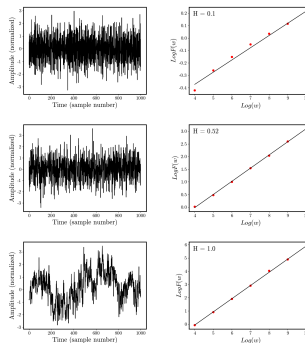


Figure 4: Estimation of Hurst parameter

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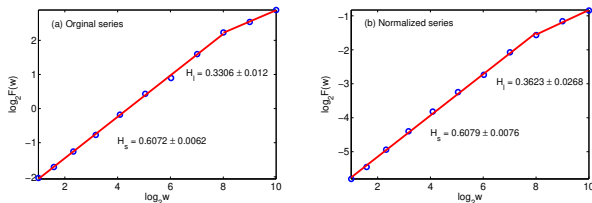


Figure 5: The Hurst parameters of original and normalization sentiment time series of *Never Let Me Go*



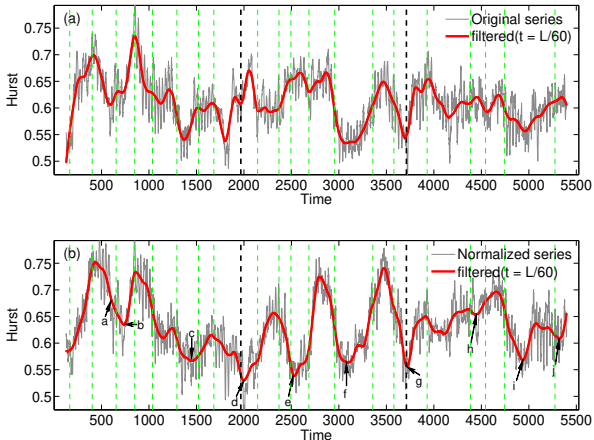


Figure 6: The evolution of Hurst under 256 window size of original and normalized sentiment time series

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- The (global) Hurst exponent of a novel's sentiment story arc provides an index of a novel's narrative coherence. This index can be used as an evaluation metric of how the novel's moods, feelings and attitudes will be perceived by a reader.
- As an evaluation metric, the Hurst exponent of a novel can be interpreted accordingly:  $0.5 < H < 1$  indicates a coherent narrative;  $H = 0.5$  indicates a narrative that is incoherent, almost random; and  $H < 0.5$  indicates a overly rigid and potentially bland narrative.
- the optimal narrative manages the reader's motivation by neither being completely coherent ( $H \approx 1$ ) nor incoherent ( $H = 0.5$ ), but somewhere in between.
- For  $H > 0.5$ , the (local) time-varying Hurst exponents reflects variation in the novel's plot, such that local minima reflect disruptions or points of narrative change, positive incline reflect continuous (persistent) narrative development, and decline a movement towards disruptions.

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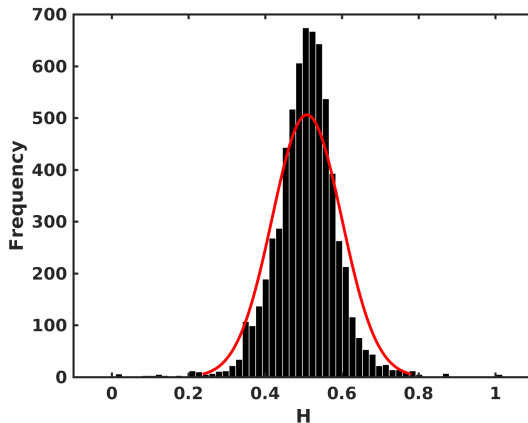


Figure 7: global H for Danish textual cultural heritage

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## Data

- Saxo Grammaticus (c. 1160 - post 1208) represents the beginning of the modern day historian in Scandinavia
- *Gesta Danorum* ("Deeds of the Danes") is the single most important written source to Danish history in the 12<sup>th</sup> century

## Problem

- bipartite composition of *Gesta Danorum*
- is the transition between the old mythical and new historical part located in book eight, nine, or ten
- is this transition gradual (continuous) or sudden (point-like)
- qualitative observations and contextual knowledge to argue for a particular change in content and composition

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# lexical change detection

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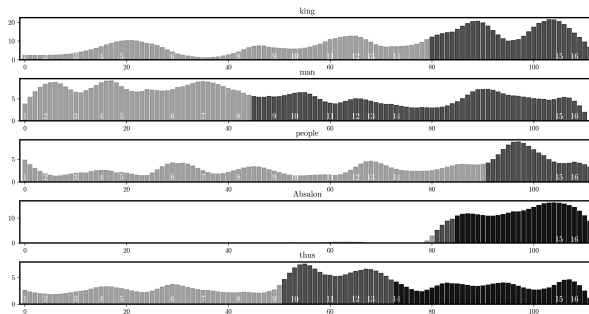


Figure 8: Most frequent keywords and entities in *Gesta Danorum* in windows of 50 sentences

# topical distances

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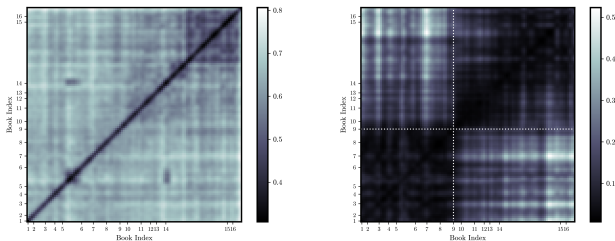


Figure 9: Cosine distance matrix for vector space model and relative entropy between documents in seeded topic model of Saxo

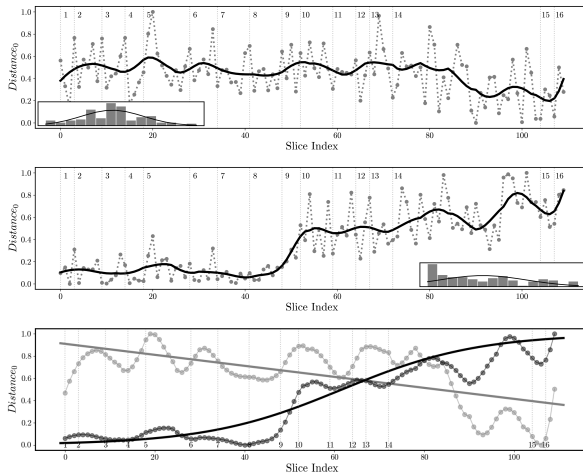


Figure 10: Model dynamics

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- *Gradual* transition that starts in the latter part of *book eight* and ends in book ten
- greatest rate of change in book nine, which explains the point-like position
- using co-occurrence structure of a document show superior results in comparison to classical VS model



## THANK YOU

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slides: [http://knielbo.github.io/files/kln\\_narratology.pdf](http://knielbo.github.io/files/kln_narratology.pdf)

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