The Evolution of the Idiolect over the Lifetime: A Quantitative and Qualitative Study of French 19th Century Literature

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Abstract
We propose new methods to identify, quantify and describe the grammatical-stylistic changes that take place during the lifetime of an author. To examine the strength of the chronological signal of change, we first developed a method to calculate if a distance matrix of literary works contains a stronger chronological signal than expected by chance. 10 out of 11 corpora showed a higher than chance chronological signal. Second, we proposed a machine learning task: predicting the year in which a work was written. The accuracy and the amount of variance that is explained by the model were high for most authors we studied. After applying a feature selection algorithm, we examined the most important ones, i.e. patterns that have the greatest influence on idiolectal evolution.

Corpus
- 37 million words
- > 400 books dated by year of writing
- 11 prolific French 19th Century Writers
- Download: https://github.com/oseminck/cidre/tree/v2.0

Robinsonian Score
- If there is a chronological signal, we expect that two books that are closer in time are more similar than two books further away in time.
- With stylo R, we calculated a distance matrix (δ) of the works of an author.
- We say that δ is Robinsonian if for any set of three distinct texts text_i, text_j and text_k such that date(text_i) < date(text_j) < date(text_k), max(δ(text_i, text_j), δ(text_j, text_k)) ≤ δ(text_i, text_k).
- We calculate the rate of cells that are Robinsonian and the probability (P-value) that this rate is found by chance.
- A chronological evolution was found in 10 of the 11 corpora.

| Author                        | Robinsonian Score | P-value |
|-------------------------------|-------------------|---------|
| Comtesse de Ségur             | 0.38              | 0.14    |
| Daniel Lesueur                | 0.41              | 0.00    |
| Pierre-Alexis Ponson du Terrail | 0.41             | 0.00    |
| Gustave Aimard                | 0.42              | 0.01    |
| Honoré de Balzac              | 0.44              | 0       |
| Michel Zévaux                 | 0.46              | 0       |
| Jules Verne                   | 0.47              | 0       |
| George Sand                   | 0.49              | 0       |
| Paul Féval                    | 0.49              | 0.00    |
| Henry Gréville               | 0.62              | 0       |
| Émile Zola                    | 0.63              | 0       |
| Reference Corpus              | 0.34              | 0       |

Table: Rates of number of Robinsonian cells

Predicting Year of Writing with Regression Models
- Goal: predict the year of writing of the books of an author.
- Regression model and feature selection using Lasso Lars, resulting in 10 to 61 stylistic/linguistic patterns per author.
- For example, the increasing pattern “…_DETPOSS_NC_…” in the work of Daniel-Lesueur:
  - Ah ! ma mère … ma mère … pensait Hervé, […]
  - Ah ! my mother … my mother… thought Hervé, […]
- Je suis perdue ! … Perdue ! … Ma chérie … Invente quelque chose ! … Ah !
  - I’m lost! … Lost! … My darling… Think of something! … Ah!

Most models were successful.

Reference
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