

Between author and scribe: authorship attribution and verification with pseudo-ensemble methods

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Medieval manuscripts studies can more and more benefit from advances in stylometry, authorship attribution and verification as these domains of computer linguistics increasingly become capable of addressing text situations distinctive for scribal culture. For the medieval concept(s) and practice(s) of authorship barely correspond to our contemporary terms and ideas, the statistical approach may divulge much more information, hitherto obscure for non-statistics-driven scholarship, on particular texts.

Medieval modes of authorship were much more genre-oriented (*auctoritas* in theology, courtly laureates in poetry) and some types of writing did not induce this notion at all for a longer period of time (medieval chronicles as a product of collaboration on multiple levels). In scribal culture authorship was very often shared between different actors (scribes, compilers or co-authors/revisers) whose texts are described by medieval philology e.g. in terms of trustfulness and faithfulness of the scribe, on the one hand, and wanted, enforced or encouraged creativity on the other hand. From the empirical perspective of computational linguistics various text-and-manuscript situations may be boiled down to a series of tasks of the PAN contest for digital text forensics (authorship verification, style and author obfuscation) but with taking into account the premodern specificity of scribal culture (spelling variation, lack of standardised vernacular languages) and the particular research conditions (relatively poor text resources, few, if any, so-called imposter candidates to compare with).

Seeing those particularities medieval texts display a wide range of patterns of copying and writing, shifting from strict text reuse to masking original authorial traces and to creatively bringing about own texts. Across a longer narrative, like a chronicle or an anonymous chivalric romance, not every style breach must determinately imply a change of authorship. Furthermore, the same authorship (as a consistent authorial signal) having been altered and corrupted can vary across different text versions.

As far as digital text analysis is considered we propose a twofold type of investigation: (1) in respect of language representation, we refer to a broad selection of linguistic feature (part-of-speech tags and function words, both encapsulated in n-grams and skip-gram, the latter seemingly under-researched in comparison with the former); (2) in regard to statistics and computation, we use different distance measures, inclusively the minmax metric, which we assemble in further processing with machine learning (Artificial Neural Networks and Support Vector Machines). In this regard, we follow to some extent the design of ensemble methods known from the field of data mining and machine learning, but we apply it for variety of feature categories and metrics (part-of-speech tags and function words; minmax, cosine etc.; n-grams and skipgrams), yet not for classifiers themselves as it is practised in the aforementioned domains. Our aim is to investigate diverse modes of automatic decision making for authorship verification giving very limited background information (e.g. other writings by same authors) and a limited text length (a couple hundred words).

Finally, we try and test our pseudo-ensemble approach on different medieval manuscripts of varying degree of authorship ascription and as well as on the corpora of the PAN contests to present potential implementability of the approach for wider stylometric research.

Selected literature

- Eder, M. 'Short samples in authorship attribution: A new approach' *Digital Humanities 2017: Conference Abstracts*. Montreal: McGill University (2017), pp. 221–24
- Fisher M., *Scribal Authorship and the Writing of History in Medieval England*, Columbus: The Ohio State University Press (2012)
- Kestemont, M., Stover, J., Koppel, M., Karsdorp, K. & Daelemans, W., 'Authenticating the writings of Julius Caesar'. In: *Expert Systems with Applications* 63 (2016): pp. 86–96
- Koppel, M., & Winter, Y. 'Determining if two documents are written by the same author' *Journal of the Association for Information Science and Technology*, 65 (2014), 178–187
- Martin Potthast, Francisco Rangel, Michael Tschuggnall, Efstathios Stamatatos, Paolo Rosso, and Benno Stein. 'Overview of PAN'17: Author Identification, Author Profiling, and Author Obfuscation' In Gareth J. F. Jones et al, editors, *Experimental IR Meets Multilinguality, Multimodality, and Interaction. 7th International Conference of the CLEF Initiative (CLEF 17)*, Berlin Heidelberg New York, September 2017. Springer.
- Stapel R.J., 'The development of a medieval scribe'. In: O. Duntze, T. Schaßan, G. Vogeler eds., *Kodikologie und Paläographie im Digitalen Zeitalter 3 / Codicology and Palaeography in the Digital Age 3*. Schriften des Instituts für Dokumentologie und Editorik 10, Norderstedt: BoD (2015) pp. 67-86.