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Affordances and limitations of algorithmic criticism

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Chapter 5

Machine reading and close reading

5.1. Introduction

Building on from the descriptions of the nature of literary informatics research and of the type of data that are used and produced within such research, this chapter identifies a number of essential qualities of machine reading. The qualities that are established in this chapter allow for a contrastive comparison of algorithmic criticism and traditional criticism based on close reading. This comparison is complicated, however, because of two reasons. A first difficulty is that the concrete possibilities that are offered by machine reading are not fixed. New technological advances in fields such as text mining, natural language processing, computational linguistics and data science often result in turn in innovative possibilities for literary informatics research. Second, the many technological affordances that are available at a given moment in time are never utilised exhaustively. Digital methods are generally adopted only when researchers can imagine relevant applications. Technologies often need to be moulded to specific scholarly requirements, and the efficacy of this process often depends on the inventiveness and the technical proficiency of individual scholars. It is important, for this reason, to make a distinction between the general technological possibilities which are created by text analysis algorithms on the one hand, and the actual ways in which these algorithms have been applied on the other. In assessing the differences between machine reading and close reading, this chapter concentrates principally on general trends in the actual ways in which machine reading has been implemented in past and current research projects. When this text signals specific shortcomings, this is not necessarily a remonstration against machine reading *per se*. In some cases, such deficiencies can be remedied in future studies through a different use of existing technical possibilities.[352]

[352] An additional difficulty is posed by the fact that the properties of close reading are similarly unstable. To allow for a systematic analysis, this chapter uses the definition that was provided in Chapter 2. To reiterate, close reading was defined as a form of engagement which is concerned with the text as an independent unit, which illuminates the meaning of the text though an examination of its form, and which often overlooks the historical and social contexts.

5.2. Distinctive characteristics of machine reading

5.2.1. A focus on linguistic aspects

Chapter 2 explained that the descriptive analysis performed during close reading may focus on prosodic aspects (rhyme, metre and rhythm), devices based on sound (e.g. alliteration, assonance and consonance), devices based on a change in meaning (e.g. metaphor, simile, personification), devises based on ordering or repetition (e.g. anaphora, chiasmus) and on textual phenomena such as diction, mood, tone, volume, texture and intensity. At present, the tools that have been applied and developed within literary informatics research offer limited support for the analysis of these textual phenomena. As was shown in Chapter 3, machine reading is based on algorithms which can recognise and quantify individual words, grammatical and syntactic categories and, to some extent, the semantic contents of texts. To align computer-based research more closely with traditional forms of literary research, it is necessary to develop ways of quantifying those phenomena which are studied in conventional research but which, so far, have often been neglected in computer-assisted research. To quantify a phenomenon, it is important, firstly, to ensure that the computer can recognise instances of this phenomenon. Once such instances have been detected, they can also be counted and analysed statistically.

In some cases, the literary techniques which have been studied in more conventional approaches can be quantified by making use of the basic data that can be generated using existing tools. Data about word frequencies, for instance, can potentially be used to support an investigation of the diction.[353] In characterising the diction of a literary text, it is useful to determine whether or not the author draws from particular registers of speech (e.g. colloquial versus formal, concrete versus abstract, Germanic versus Romanic). Existing tools, however, do not supply any supplementary data that may be used to classify the diction. If such a functionality is needed, scholars will need to manufacture such classifiers themselves, potentially by building on existing tools or lexicons. Data about syntactical categories, which can be generated by POS taggers, can likewise be used to categorise the text's syntax. It can be relevant to classify the syntax either as simple or complicated, or to identify particular syntactic constructions. Such tasks would demand a more advanced processing of the basic annotations that are supplied by POS taggers.

Metre and rhyme can be explored, to some extent, by making use of pronunciation dictionaries. This approach has not been researched extensively, however. David Kaplan has examined the possibility to automate prosodic analy-

[353] As was explained in Chapter 2, the term "diction" refers to the vocabulary or the register of speech that is chosen to express a particular message.

ses, but a number of important issues, such as the strong connection between the rhythm and the meaning of the verse line, and the difficulties caused by diachronic and synchronic variations in pronunciation, have been left unaddressed. By the same token, no standardised tools are available for the detection of devices based on repetition or on unusual word order, such as paronymy or anaphora. It can be conceived, nevertheless, that tools for the detection of literary techniques based on word order or on repetitions of words can be developed when data are available about separate words and about the lemmas of these words.

Next to the literary techniques which can potentially be investigated via algorithms, there are also a number of literary techniques whose detection, in all likelihood, will continue to resist automation. The description of phenomena such as metaphor, personification, mood and toon critically demand an apprehension of the complex semantic environment in which words are used. A computer-based analysis of the meaning of literary texts is complicated for a variety of reasons. Machine reading is premised on the idea that language is predictable, or that the full variety of phenomena can be captured in comprehensive lists. Software applications can be instructed to process signs that are meaningful to human readers, but, like the English-speaking person from John Searle's influential Chinese Room Argument,[354] the machine completely lacks an understanding of what these signs signify. The signification of words can rarely be deduced automatically, since there are no logical connections between words and their denotations. Words have only come to be associated with a specific object or concept through social or cultural conventions. Software applications which aim to assay the semantic contents of texts, such as semantic taggers, often make use of lists which supply possible dictionary meanings. The many distinct social contexts in which words have been used have often resulted in a wide range of potential meanings, however, and the precise signification of polysemous words can, in many cases, be inferred solely by considering the semantic context in which these occur. For domains in which the terminology is relatively stable, researchers in the field of artificial intelligence and natural language processing have defined rules,

[354] Damper offers a concise outline of the argument: "Searle envisages a situation in which he is hidden in a room and is presented questions in Chinese written on an 'input' card, posted in to his room by unseen enquirers. Searle knows no Chinese; indeed, he is quite unaware of the enterprise in which he is engaged and is ignorant of the fact that the strange marks on the cards represent questions framed in Chinese. He consults a manual telling him (in English) precisely what equally strange marks to write on an 'output' card, which he posts back to the outside world. By virtue of the 'machine intelligence' embodied in the manual (which is actually a formalisation of the steps in an AI program), these marks on the output card constitute an answer to any input question. To a Chinese speaker external to the room, by virtue of its question answering ability, the system passes the Turing test for machine intelligence (Turing, 1950), yet the system implemented by Searle-in-the-room is entirely without understanding simply because Searle understands nothing". See Robert I. Damper, "The Logic of Searle's Chinese Room Argument", in: *Minds and Machines, 16:2 (18 October 2006)*, p. 164.

often based on probability statistics, which stipulate that if groups of words occur in particular combinations the text must be about a specific topic.

Such applications cannot easily be developed for the description of the meaning of the signifiers used in literary works. An important obstacle is formed by the fact that words are often used in a figurative sense. They are deliberately given new meanings which are dissimilar from their dictionary definitions. Literary authors, moreover, often experiment with the connotations of texts. Unlike denotations, such connotations are not formally codified. Brooks writes that the paradoxes in literary writing generally "spring from the very nature of the poet's language" which is "a language in which the connotations play as great a part as the denotations".[355] At present, however, no reliable tools are available for finding the connotations of words. Because of the fact that algorithms generally fail to apprehend the connotations of words, it is often difficult to detect instances of irony, paradox and ambiguity, which centrally preoccupied the New Critics.

While human scholars may comment on all aspects of literary texts, the breath of computer-based annotation remains limited to those aspects which can be quantified by algorithmic means. Creating instructions for the recognition of devices based on shifts in meaning, such as metaphor, personification, euphemism, circumlocution, synaesthesia, understatement, authorial intrusion and metonymy is likely to remain cumbersome. An algorithmic resolution of the "unsayable subtlety and stubborn particularity of poetic language",[356] independent of any human intervention, seems beyond the reach of most of today's text mining applications.

5.2.2. Abstracted renditions of collections

The form of close reading that was sanctioned by the New Critics typically concentrates on patterns and relations that are situated at the micro-level of texts, consisting of sentences, paragraphs or stanzas. The New Critical inclination to view works of literature as "well wrought urns, that is, united, cohesive units" also prompted a reluctance to explain textual qualities via references to historical or biographical factors.[357] This narrow and apolitical stance of the New Critics was contested fiercely by theorists associated with post-structuralism and, notably, with New Historicism. Jane Gallop stresses that these movements served as necessary course correctives within literary studies.[358]

Digital methods clearly enable scholars to shift the focus from the micro-level to the macro-level, and to study aspects of collections in their entirety. Margaret Masterman, writing in 1963, surmised that the computer can function as a "tele-

[355] Cleanth Brooks, *The Well Wrought Urn: Studies in the Structure of Poetry*, pp. 5–6.
[356] Willard McCarty, *Humanities Computing*, p. 6.
[357] Verena Theile, "New Formalism(s): A Prologue", p. x.
[358] Jane Gallop, "The Historicization of Literary Studies and the Fate of Close Reading".

scope to the mind", enabling scholars to make new types of observations.[359] She envisioned applications which can lead to radically new insights about the phenomena which are investigated. Bolstered by Masterman's metaphor, Willard McCarty argues that computation is valuable particularly if it can veritably effectuate an epistemological transformation, and if it can convincingly result in "different ideas rather than simply more evidence, obtained faster and more easily in greater abundance".[360] On a more perspicuous level, the image of the telescope is also relevant because of the fact that it accentuates the possibility to expand the scope of literary analyses. Machine reading enables scholars to investigate all the literary output of a specific author, all the texts in a literary genre or all the texts from a particular historical period. This latter possibility clearly differentiates machine reading from close reading. The various forms of derived data about texts collections, which generally result from processes such as such as filtering, sorting or calculation, are difficult to obtain through manual means. The retention of all relevant textual phenomena normally exceeds the mnemonic capabilities of individual scholars. Calculations of the ratio between types and tokens, or of correlations between the frequencies of specific words, would demand a superhuman patience and perseverance. Human critics may admittedly form a global impression of the distribution of specific phenomena via an extensive reading of an author's works, but a computational analysis can frequently modify or subvert such perfunctory impressions by dint of its comprehensiveness and its consistency.

If texts are analysed at the macro-level, this form of research is comparable, in conceptual terms at least, to the methods that were followed by many structuralist literary critics. Inspired by the linguistic theory of Ferdinand de Saussure, structuralist criticism is based on systematic analyses of the language that is employed in literary texts. It typically aims to contribute to an understanding of the inner laws of the style of a literary genre, or of literary language in general. As in literary informatics, the reading focuses on "discourses beyond the limit of the sentence". [361] Studies which concentrate on genres or periods in their entirety cannot equitably be accused of the elitism and the myopia that is often associated with New Criticism, whose aesthetic criteria largely excluded works by female authors, or works produced in developing countries. The rules that are implemented in algorithms can usually be applied to any machine-readable text, without discrimination. The texts to be mined obviously need to be available in a machine-readable form. While the methods in themselves are not partial to particular types

[359] Margaret Masterman, "The Intellect's New Eye", in: *Freeing the Mind: Articles and Letters from The Times Literary Supplement during March-June 1962*, London: Times Publishing Company Ltd. 1962.

[360] Willard McCarty, "A Telescope for the Mind?", in: Matthew Gold (ed.), *Debates in the Digital Humanities*, Minneapolis: University of Minnesota Press 2012, p. 114.

[361] Michael Groden, *The Johns Hopkins Guide to Literary Theory and Criticism* (Baltimore: Johns Hopkins University Press 1994), pp. 890–891.

of texts, or to particular types of authors, it may be assumed that the nature of research corpora can also be determined, to some extent, by the policies of digitisation programmes, which may occasionally reflect a bias. While certain digitisation initiatives indeed limit themselves to texts which are considered part of a certain canon, the majority of programmes include institutional holdings or on historical periods in their entirety, however, without discriminating on the basis of the contents of texts.

Machine reading can be applied productively to study questions of literary history. Visual representations of derived data can astutely enable scholars to investigate historical developments in phenomena such as literary genres or literary productivity. One aspect of machine reading which may potentially undermine its effectiveness for historical research, nevertheless, is the fact that it generally treats all texts equally, even when they originate from different historical era. In this respect, literary informatics reiterates the ahistoricism of New Criticism. Computational analyses are often based exclusively on the words of the texts, disregarding the political and social contexts of literary works. Although the New Historicist movement has drawn attention to the notion that the form of a particular text can only be understood properly by considering the historical context, digital tools generally apply the exact same algorithms to all the texts in a corpus.[362] The consistency with which machine reading algorithms analyse texts implies a return to the precept that literary texts ought to be viewed as authorless and timeless documents.

As has been shown, however, the possibility to expand the scale can be very beneficial to research in the field of literary history. An important requirement, clearly, is that the metadata associated with the various texts must include an indication of the date of creation. When it is estimated that the criteria for detecting specific formal features are accurate and sufficiently inclusive, machine reading may disclose historical developments in the occurrences of these features. Literary informatics is simultaneously a formalist approach and a method which can be used to expose historical patterns. It allows for a detailed examination of the language that is used with a text, and it also enables scholars to place such characteristics within a broader historical context. Because of this two-fold attentiveness, computer-assisted research appears to have some allegiance to the emerging field of New Formalism. The latter field sanctions a form of close reading which is informed by a historical awareness. It recognises "the form literature has taken and the aesthetics it has appropriated", and uses a knowledge of literary history to explain what makes a particular text distinctive or prototypical.[363]

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[362] The fact that word meanings can change over the course of history produces clear challenges for studies which focus on diachronic developments. Text analysis tools can technically be instructed to treat these words differently, based on the dates of creation of the texts in which they are used. Such applications are rare, however.

[363] Verena Theile, "New Formalism(s): A Prologue", p. 5.

5.2.3. Abstracted renditions of individual texts

While literary history mostly investigates literature as a collective system in an attempt to extract general laws, the discipline of literary criticism typically aims to expose the unique properties of extraordinary works of literature. For critics, algorithm-based reading can be useful only if it can actually reveal meaningful aspects of the texts they are interested in. Machine reading can be relevant to literary criticism in two distinct ways. Analyses at the macro-level, first, can help scholars to discover individual texts with noteworthy properties. They may reveal, for instance, that a specific cluster of texts has exceptional values for a given metric, or they may indicate, conversely, that texts which were traditionally considered exceptional appear to be completely ordinary when viewed statistically. Such findings can stimulate reflections about texts, and such reflections can in turn spur new interpretations. Computational analyses may result in patterns which, in many cases, can only be explained by revisiting the individual texts. As was also shown in Chapter 4, studies which use digital methods for the purpose of literary criticism often use the results of the structural analyses of the data as a starting point for subsequent qualitative analyses performed by the human scholar. The scholars who were associated with the MONK project, for instance, view text mining primarily as a method which can initiate critical provocations.[364] In such studies which merge statistics and hermeneutics, the close reading can verify or falsify the results that are produced by machine reading, and vice versa.

Next to focusing on large collections, the computer can also concentrate on the infinitesimal details of individual texts. All computational analyses initially derive from prior descriptions of the minutiae of text fragments. By combining different algorithms for the identification of words, syntactical categories or literary devices, scholars can often collect more details than would ever be possible via conventional close reading. Such atomic observations at the micro-level can subsequently be aggregated at many different levels of analyses, to reveal patterns that lie beyond these individual textual units. Digital text analysis tools can serve both as microscopes and as macroscopes, as they can focus on any level of analysis in between the massive and the minuscule.

When data are shown at the level of individual works or at the level of smaller fragments within these works, such perspectives can enable the form of research which Alan Liu refers to as "close reading 2.0". Liu observes that the digital humanities have concentrated predominantly on the exploration of big data collections, and argues that the field has undervalued computer-assisted analyses of "individual objects of humanistic interest in the era of distant and macro-analytics".[365] A

[364] Matthew Kirschenbaum, "The Remaking of Reading: Data Mining and the Digital Humanities".

[365] A. Liu, "The State of the Digital Humanities: A Report and a Critique", in: *Arts and Humanities in Higher Education*, 11:1-2 (1 December 2011).

number of scholars, nonetheless, have used digital methods to create an improved understanding of singular works. Tanya Clement's algorithmic analysis of Gertrude Stein's novel *The Making of America*, for instance, is often cited as a highly innovative and a strongly compelling illustration of the potential of computational methods. In his monograph *Reading Machines*, Stephen Ramsay discusses a systematic investigation of the stylistic differences between the six speakers in the novel *The Waves* by Virginia Woolf, and Eric Bulson has used digital methods to examine the "numerical unconscious" within James Joyce's *Ulysses*.[366] Such experiments with text mining and machine learning are primarily driven by the conviction that computation can generate innovative and surprising perspectives on texts which have already been subjected to minute examination via conventional close reading at an earlier stage.

A crucial quality of machine reading is that it enables scholars to produce systematic abstractions of texts. Literary texts often contain complicated combinations and repetitions of words, literary devices and connotations. Via algorithmic analysis, scholars can partly reduce this complexity and focus closely on a limited number of textual aspects. Stephen Ramsay places algorithmic criticism in a much broader context and argues that all criticism, based either on digital or on analogue resources, is essentially algorithmic in nature. Critics invariably study texts from a particular perspective, and the construction of such critical angles "relies on a heuristic of radical transformation". Criticism entails the creation of "a new text in which the data has been paraphrased, elaborated, selected, truncated and transduced".[367] When scholars view texts through a critical lens, they accentuate and magnify specific aspects and obscure certain other aspects. The transformations that can be created via computation typically differ in the sense that they are generally based on logical or mathematical operations such as classification, filtering or clustering.

5.2.4. Non-responsive and context-independent analysis

In the case of human reading, the interaction with the text is mostly of a responsive and flexible nature. Readers recognise that the meaning of a particular word can be affected by factors such as religion, gender and social status, and they tend to apply their knowledge of the social and the historical origin of texts during their assessments of particular text fragments. Following Gadamer, it can be posited that interpreters generally enter into a dialectic relation with texts, in which prior conceptions of the nature of the work can be modified during the reading process.[368] During descriptive analyses of texts, human scholars commonly make use of certain rules for the recognition of literary devices, but they also permit deviations

[366] Eric Bulson, "Ulysses by Numbers", in: *Representations*, 127 (2014).
[367] Stephen Ramsay, *Reading Machines: Toward an Algorithmic Criticism*, p. 16.
[368] David Hoy, *The Critical Circle: Literature, History, and Philosophical Hermeneutics*, p. 70.

from such rules in unclear of ambiguous cases. The computer, by contrast, simply applies the rules that are stipulated in an algorithm in a staunch and unwavering manner. The machine reading process is unrelentingly consistent, and produces the exact same type of metrics for all the texts in a particular corpus. It is centrally based on counts, and the rules that stipulate the criteria for being counted allow little room for exceptions.

Additionally, a close reading of a text often consists of a minute examination of the various phenomena that occur on a micro-level. Scholars traditionally consider the way in which the effects of specific literary techniques may strengthen or, perhaps, undermine, the effects of other literary techniques within the same passage. Such investigations of the many complicated connections that can exist between words and literary devices can help to illuminate the way in which the text produces meaning. Whereas conventional close reading is mostly attentive to the total effect that is produced by the various literary techniques in combination, many of the computational analyses which have been surveyed in Chapter 3 concentrate on singular textual aspects. Studies frequently limit themselves to analyses of most frequent words, or to analyses of syntactic categories, without probing for the potential correlations that may exist between distinct literary techniques.[369] Machine reading, importantly, is based on a form of processing which is context-independent. Text mining algorithms are typically based on simple counts of the occurrences of textual aspects, and once a textual phenomenon has been converted into a number or into a label, it is difficult to use characteristics of the original context during analyses of these numbers. The data values are disoriented from their original setting, and they become entities which can be manipulated on their own terms. Aspects of style are frequently investigated solely through a bag-of-words model, but the unequivocal neglect of the original word order categorically precludes the investigation of what appear to be essential features of a writing style. The style of a particular author can be characterised by a particular timbre, a punctuation regime, unusual word combinations, the use of alliterative effects, and the overall flow and rhythm of sentences, but such stylistic characteristics are usually disregarded. Many of the studies which have examined the differences between literary characters have likewise focused exclusively on the differences between the words that are spoken. Other aspects, such as the development of personalities throughout a text, or distinctions between flat and round characters, cannot readily be quantified and are consequently left out of consi-

[369] There are a number of important exceptions, however. David Kaplan, for instance, quantified a large number of aspects of literary works and examined these simultaneously through various types of multivariate analyses. See David Maxwell Kaplan, *Computational Analysis and Visualized Comparison of Style in American Poetry*. Kaplan's approach was adopted and modified by Justine Kao and Dan Jurafsky. See Justine Kao & Dan Jurafsky, "A Computational Analysis of Style, Affect, and Imagery in Contemporary Poetry".

deration. Algorithmic processing often takes phenomena out of their original context and proceeds to scrutinise these in a rather narrow fashion.

5.2.5. Suspension of interpretation

In Chapter 2, it has been explained that the descriptive analyses that are performed as part of close reading processes generally provide the groundwork for interpretation. Within conventional literary criticism, textual analyses traditionally seek to elucidate the meaning or the themes of texts. Interpretation often consists of a consideration of the connection between this meaning and its contents. The thematic concerns of a text cannot unproblematically be established via algorithms, however, as there is rarely a close and predictable relationship between the words that are used and the themes which are being developed by these words. Some of the studies that have been discussed in Chapter 3 have attempted to identify themes computationally, however, using techniques such as topic modelling or semantic tagging. Arguably, the "theme" has been defined somewhat narrowly in such studies as the literal "aboutness". Methods based on vocabulary may disclose the setting of a text, the images which are evoked, or the objects or events which are depicted. In figurative language, however, the referents of words generally stand in a symbolic relation to the text's abstract and more recondite thematic concepts. The identification of such abstract themes, moreover, is often debatable. A degree of intersubjective agreement may be reached concerning the concrete objects and events which are evoked by words, but a description of the more abstract concepts connected to works of literature inevitably demands a subjective interpretation.

In Chapter 2, it was argued additionally that the validity of an interpretation cannot be considered independently from the interpreter. In view of Gadamer's hermeneutical philosophy, an interpretation can be considered valid if it results in an improved self-understanding on the part of the reader. The attempts to grasp the meaning of the text and to clarify the concrete ways in which the author produces and reinforces this meaning via form and via language eventually serve to generate new insights and new questions about man's experience of the world. The interpretation of poetry demands a recognition of the fact that texts can make meaningful statements about human experience. Brooks and Penn explain that poetry is "a response to, and an evaluation of, our experience of the objective, bustling world and of our ideas about it" and that it is concerned with "the world responded to sensorially, emotionally, and intellectually".[370] Since the precise ways in which a text produces meaning is likely to remain incommensurable, text analysis tools cannot support unsupervised explorations of the relation between form and meaning.

[370] Cleanth Brooks, *Understanding Poetry*, p. 9.

More broadly, quantitative analyses of data on linguistic features do not directly generate clear-cut answers about the meaning of the text. They initially result in statistical products which still need to converted into statements about the domain which is investigated. Computers may be used to expose patterns in the occurrences of specific features, but they cannot independently account for the nature of these patterns. The computer can augment "the critic's power of perception and recall in concert with conventional principles",[371] but the human critic continues to bear the responsibility to supply a logically coherent interpretation, based on the patterns which are suggested by quantitative analyses. Craig stresses that any "departure from the purely enumerative … is an act of judgement and is open to question".[372] To clarify or explain the trends or the patterns that emerge from such forms of processing, scholars will often need to make certain conjectures, making use of additional, extra-textual information. To explain the significance or the relevance of such findings, a leap is needed from a purely quantitative approach to a more interpretative engagement.

It is misleading, nevertheless, to claim that computational analyses are fully devoid of interpretation. As will be discussed more elaborately in the following chapters, the data that are analysed by text mining algorithms typically result from subjective and debatable decisions about the way in which complicated humanistic phenomena ought to be quantified. The results that are produced by algorithms often vary strongly along with the initial parameters that are provided and with the more specific settings that are chosen. The nature of analytic processes can consequently reflect idiosyncratic preferences and subjective interpretations of the goal and the scope of the analysis. In claiming that algorithmic processing suspends interpretation, I mainly aim to stress the notion that quantitative analyses do not provide any explicit explanations of their results. They basically offer descriptive information about the objects which are investigated, and they do not in themselves indicate the scholarly relevance of particular findings. Interpretation is likely to remain an inherently human capacity.

In Chapter 2, it was also explained that literary critics often aim to evaluate literary texts in a qualitative sense. Among the many decisions which algorithmic criticism aims to automate, the determination whether or not a text has literary quality will probably continue to be cumbersome. Works of literature have been judged in many different ways, and the methods which have been used to assess texts in an evaluative manner, moreover, are often difficult to formalise. In their monograph *Theory of Literature*, Wellek and Warren explain that the different schools of literary criticism have spawned a variety of evaluative norms and standards. It has been claimed, for instance, that great literature ought to be

[371] John B. Smith, "Computer Criticism", p. 14.
[372] Hugh Craig, "Stylistic Analysis and Authorship Studies", p. 277.

"expressive of the 'great' values of life".[373] Alternatively, Russian Formalists such as Victor Schlovsky and Roman Jakobson have evaluated the quality of literature by considering the level of estrangement from mundane language.[374] Wellek and Warren note that this latter criterion is ultimately relativist, as later readers can clearly grow accustomed to modes of expression which were previously innovative. Additionally, the value of a work of literature cannot be judged solely by considering the reactions which are evoked within the reader, as this approach "does not correlate the nature of the response with the nature of the object". Judging a work exclusively on the basis of the poem itself, conversely, presupposes "absolute standards thought of as existing without reference to human need or cognition".[375] All acts of critical evaluation demand a prior definition of the nature and the objectives of literature in general. Since such views on the artistic goals that literary texts should strive to attain are almost inevitably tied to particular approaches in critical theory, it seems impossible to determine literary quality in an absolute sense. In most cases, the outcomes of quantitative processing still need to be assessed on a qualitative level by a human scholar, who can ascertain if a text can indeed function as "a cause, or a potential cause, of the reader's 'poetic experience'".[376] For a machine that requires predictability and formalisation, it is surpassingly difficult to come to grips with the notion that literary quality can emerge from unanticipated deviations from bendable aesthetic norms.

5.3. Conclusion

Although its nature may evolve as technology progresses, algorithmic criticism is presently a formalist critical approach, concentrating principally on the vocabulary and the grammar of literary works. Because of the current inability to reliably describe the complex semantic contexts of tokens, algorithms can currently only identify a limited number of literary or linguistic phenomena. Algorithms, importantly, do not add any interpretation, but they can be used to produce statistical artefacts which may provoke interpretation. Whereas the technology expedites the analysis of non-exclusive and non-elitist corpora, the sizes of the corpora often remain modest because of the fact that research frequently blends statistical processing with a hermeneutic and a qualitative form of engagement.

Literary scholars aiming to adopt computational methods currently encounter difficulties and limitations which may compromise the value of these methods. For this reason, it is important to investigate if it is possible to address or to remedy some of the central challenges that have arisen within literary informatics. Four

[373] Rene Wellek & Austen Warren, *Theory of Literature* (Harmondsworth: Penguin Books 1963), p. 245.
[374] Ibid., p. 242.
[375] Ibid., p. 248.
[376] Ibid., p. 249.

important areas of further research may be identified. First, it can be useful to examine the feasibility and the desirability of developing new algorithms for the detection of the literary devices which are commonly studied in conventional literary research. At present, text analysis tools mostly concentrate on vocabulary or on syntactical categories, and often fail to create data on the occurrences of literary devices based on sonic patterns or devices based on changes in meaning. Second, if it is found that it is indeed possible for algorithms to detect some of the literary devices that have hitherto been neglected in computer-based scholarship, it is equally important to reflect on the interpretative possibilities that can emanate from statistical analyses of such data. Data analysis, more generally, aims to extract relevant information from text corpora through the application of a variety of statistical procedures. Data analysis is frequently an onerous process, in which the concrete needs emerging from research questions must be connected to specific analytic methods. Which statistical algorithms can genuinely produce new and relevant insights about the literary works that are studied?

A third aspect which deserves closer scrutiny is the fact that it is based on data whose formats invariably imply ontological commitments. Such predefined ontologies can limit the ways in which the data can be analysed. Does the imperative of having to work with data formats obviate particular types of questions, or are scholars still free to study the questions they are genuinely interested in? When scholars manage to develop new algorithms for the detection of specific literary devices, can such observations still be captured using existing data formats? Fourth, additional research needs to be conducted into the scholarly possibilities of data visualisations. Graphical rendition of large volumes of quantitative data can be valuable, as they often allow for a swift identification both of values which are commonplace and of values which are exceptional. Since literary scholars have rarely been trained in the creation of data visualisations, however, it can occasionally be difficult to read and to interpret such non-textual resources correctly. An additional difficulty is that data visualisations often result in abstract patterns. Since literary criticism aims to demonstrate the particular value of individual works of literature, the question may be asked if such abstractions can veritably be of value to literary scholars.

For the purpose of this thesis, these four sets of questions have partly been investigated on a practical level during a case study. This case study was conducted to supplement the results of the theoretical examination of the strengths and the shortcomings of literary informatics with insights emerging from hands-on experimentation with computational methods. As has been argued by various authors, hands-on experiences are often indispensable in studies that seek to understand the ramifications of the digital medium. Practical work often produces concrete challenges which could not have been anticipated by a purely theoretical framing of the subject. Writing about digital humanities research, McGann

explains that digital applications may usefully be viewed as tools for "imagining what we don't know".[377] Experiments with computation often encourage scholars to develop knowledge about problems which had initially been outside of their awareness. The practical experiments that were conducted for this thesis usefully helped to produce a more solid understanding of the nature of algorithmic criticism, and, as will be shown in the following four chapters, they effectively helped to trace some of the crucial difficulties connected to the creation, the representation, the analysis and the visualisation of data about literary texts.

[377] Jerome McGann, *Radiant Textuality: Literature after the World Wide Web* (New York: Palgrave Macmillan 2004), pp. 105–120.