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(editors)

**Tools, Methods, and Solutions
for the Exploration of Romanian Corpora**

INSTITUTUL EUROPEAN

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Roxana Patraş, Loredana Cuzmici
(editors)

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Proxy Structures in Computational Analyses of Text Corpora

Laura PRICOP

Digitus Dei est Hic!

Since the turn of the twenty first century, humanity has been cautiously entering the digital realm, impacting culture, society, economics, and human well-being. This is a realm in which distance as much as data is compressed, and feedback is instantaneous. Are we prepared for this new world? Or, perhaps more accurately: How are we preparing ourselves for this world?

Whether engaged in learning, working, or building relationships with family members or romantic partners, we conduct at least half of our lives through computer screens. Despite the hectic rhythm and apparent chaos of transitioning from the pre-digital era, there seems to be a sort of control, better yet, a controlled desire to achieve, in *compositionist* terms, a “tentative and precautionary progression” (Latour 2010). The current European or national legislation (horizontal or sectoral), enables different institutions and sectors of society—such as government, economy, transport, education, health, sport, culture and cultural heritage—to make their services available within digital environments. The scientific field of humanities, are undergoing a similar process of digitization, which inspired Roberto A. Busa’s famous declaration: *Digitus Dei est hic!* [the finger of God is here!] (Busa 2008). Equally, the presence of artificial intelligence (AI) in our everyday lives is no longer being called into question because AI recently became the engine of the mass digitization phenomenon across application fields. Experts define AI as a cluster of systems of software technologies (e.g. voice assistants, image analysis software, search engines, voice and facial recognition systems) or hardware (e.g. advanced

robots, autonomous vehicles, drones or Internet of Things applications) designed by humans to accomplish complex goals in the physical or digital dimension. These systems have the ability to sense the environment by collecting unstructured data, to interpret knowledge or process information from this data, and then to decide on the best course of action to be taken to achieve a given goal. AI systems can also adapt their behavior by first analyzing how their previous actions have affected the environment and then integrating new symbolic rules or learning numerical models. Recently, AI specialists are focusing on the positive or negative quality of AI usage and on the magnitude of the effects it can have: “the pertinent questions now are by whom, how, where, and when this positive or negative impact will be felt” (Floridi *et al.* 2023).

Therefore, with a view to AI usage the human condition and human dignity in the digital age, scholars in the area had to reformulate several philosophical questions:

- Who can we become? In other words, to what extent is autonomous self-realization possible if it is conditioned externally by technology?
- What can we do? How much freedom do human beings still have if decision-making is initiated and verified by technology?
- What can we achieve? How can individual and societal capabilities still be boosted if such activities are partially undertaken by technology?
- How can we interact with each other and the world? How might societal cohesion still be realized and sustained if it is mediated by technology (Floridi *et al.* 2023)?

My view is that these questions will become even more frequent over time and that, with the “controlled” progress of knowledge, their answers will only ever be partial and consist of temporary responses to punctual issues.

Providing a broad overview of the main questions being asked, this chapter encourages an ethical approach to studying how the use of computational tools affects human thinking habits and behaviour. In this chapter, I attempt to analyze the behavior of the humanities, when they are engaged in processes of digital transformation. Epistemologically, I am interested in hybridization of literature as a

field of knowledge; in terms of logic, I am interested in how proxy arguments, work within the questions posed on computing texts. Proxy arguments refer to an argument made on behalf of or in place of another argument to support a main argument, address weaknesses, and bringing in supplemnetary evidence.

Compatibility between Logic and Literature

Logic and literature are two areas of knowledge that have commonalities in their development. If Plato expelled poetry/literature from the city, Aristotle classified entities in the natural world and categorized various types of utterances. The *Organon* not only showcased Aristotle's analytical prowess but also established a robust correlation between language analysis and the classification of utterances. By delving deep into the nuances of linguistic structures and patterns, the Greek philosopher was able to uncover the underlying connections between language and the different ways in which people express themselves. His groundbreaking work not only enhanced our understanding of language but also shed light on the intricate relationship between logic and human communication. For several centuries, logic was placed, in Aristotle's tradition, alongside grammar and rhetoric as *ars sermocinalis*, and all of the arts of discourse (seen as the means by which people communicate with each other), including literary theory, were later classified in this category (Kneale and Kneale 1975, 377; Murphy 1974, 91).

Recent interdisciplinary studies have attempted to develop a new field in which logic and literature engage in philosophical dialogue.¹ Scholars argue for the “trans-historical portability of literary form to historical accounts of logic and logical form” (Belvins 2020). Accordingly, logic and literature should be devoted both to exploring the possibilities of reconciling logical rationality with the inherently imaginative and

¹ The concept of interdisciplinarity still provokes much debate. Extensive discussion of these arguments is beyond the scope of this chapter; I would, however, like to highlight that Wolf defines interdisciplinarity as a philosophy of integrative thinking (Wolf 1998). By “interdisciplinary philosophy,” I mean the complementary nature of philosophy, which provides a solid foundation and rigorous tools for integrating—and perhaps understanding in more logical ways—the results of research meticulously undertaken by digital humanities specialists.

affective aspects of literature, and to comparing narrative analysis with logical systems of inference. Grounded in this “trans-historical portability,” the compatibility between literature and logic may be addressed within a narrow interdisciplinarity framework. Still, when we consider their comparability within the framework of digital humanities, a field that reflects hybridity and experimentalism *par excellence*, then a higher degree of interdisciplinary integration—in formal as well as methodological terms—may be achieved (Newell 1998). Borrowing a method or concept from one discipline to use it in another serves the aim of testing hypotheses, developing new theories, and/or responding to problems that could not be solved with the tools available within the researcher’s immediate disciplinary paradigm. With the advent of distant reading, literature seems to have internalized quantitative methodologies: this has led to more fine-grained interpretations of textual phenomena but also to the concern that the resulting findings are not robust enough. In fact, computational analyses draw from traditional philological practices, such as indexing, enumeration of forms, and concordance—each of which the computer can perform more quickly if the texts being processed meet certain criteria, like addressability (Wittmore 2016). However, big data also undergoes a process of abstraction or reduction so that it can be easily analyzed and used for modelling.

It seems reasonable to assume that technology-based quantitative methods used in the empirical sciences could be transferred to literary studies. It is possible to adapt digital tools to analyses of literary content if we draw on both a larger interdisciplinary paradigm and basic logic. It is due to this interdisciplinarity that proxy argument is used. In short, in computational text analysis, proxy argument seems to play the role of stabilizing relations between terms or sentences through analogy.

This chapter, which generally falls within the realm of interdisciplinary studies (or rather interdisciplinary philosophy), aims to clarify the structure of proxy argumentation and how it is used in the digital humanities. Although digital humanities research relies on the adaptation of proxy measures and arguments for data selection and interpretation, this knowledge behavior has only been partially theorized. What are these measures and arguments? How are they constructed? How

can they be justified? And how can their validity be verified? In this chapter, I will begin to think about these questions—which are as yet unexplored—by examining the complex network of associations that the proxy argument unveils, enriching the dynamic interaction among different sentences, entities, and attributes conceived within fictional realms. By doing so, I will provide fresh insights into the application of logic in the field of digital humanities, as the application of logic establishes novel points of connection between fresh insights into how concepts from the field of logic can be applied to the field of digital humanities. This exploration will illuminate the ways in which logic is harnessed to navigate the complexities of digital texts and their spatial representations, ultimately enriching our comprehension of both disciplines.

Structure and functions of the argument by proxy

Within the field of logic, literary texts have been disputed for their inability to trigger logical inquiry and have been accused of not containing a sufficient amount of argumentative material (Kneale and Kneale 1974, 9). However, literature, theatre, film and online videogames that take place in virtual environments undeniably describe or enact complex situations that are grounded in moral reasoning (Søndergaard 2021), a basic type of argumentative structure that has often been discussed in relation to elliptical reasoning. Literature, in particular, seems to contribute to the accumulation of knowledge, and this knowledge seems to raise claims to validity by virtue of the moral change, it produces.

From a logical point of view, computational analyses show the tendency to establish binary proxy relations between simple propositions in order to support the epistemological thesis under consideration. A binary proxy relation can take the following form (Fritz 2019):

“Xa” (“a to this X”)

“Xa” can be “Yb”

The conditions for Xa to be Yb are not restricted to the equivalence between a and b or between X and Y. Thus, Xa can be Yb without a being b or X being Y. The

relation a to X is structured by proxy by the proposition that relates a to Y . The use of by-proxy argument schemes does not generate all true sentence conditions (Nelson 1997). True sentence conditions relate to evidence that is empirically verifiable. This shortcoming in the digital humanities can be compensated for by ways of evaluating arguments and an open attitude to how truth is delivered (Symons 2017, 31).

Let us consider a paradigmatic case of an example in natural language: “Raindrops are colorless if and only if tears are colorless” (Xa if and only if Yb). We can see that the statement “tears are colorless” does not necessarily fulfil the truth condition. Even though the premise of tears being composed of blood may seem fictitious, hemolacria is a real medical condition that disrupts the truth value of “tears are colorless.” In this case, the truth of the statement “raindrops are colorless”² cannot be obtained by the proposed proxy argument. On the other hand, the Romanian expression *apă de ploaie* [rainwater]—referring to superficiality—raises truth claims if it has as a proposed proxy argument the Romanian expression *lacrimi de crocodil* [crocodile tears]. This is valid in the case of the Romanian language, so the proposed analogy has a restricted degree of validity due to the context of use. If the expression “rainwater” (Rw) is a proxy for superficiality, then the expression “crocodile tears” (Ct) can support the idea of a behavioral manifestation affected by superficiality. If Rw is a proxy for lack of content, then Ct loses its function of supporting Rw , and the analogy between the two expressions is false; it is a faulty analogy (Govier 2014, Symons 2017, 163-178). There are other types of errors related to the use of analogy: the two-wrongs fallacy, the fallacy of slippery uses of assimilation, and the fallacy of slippery uses of precedent. The two-wrongs fallacy is based on the two-wrongs analogy, whereby, if two wrongs are similar and one of them is tolerated, then the other, by virtue of consistency, should also be tolerated. The fallacy of slippery assimilation is a false appeal to consistency that starts from the premise that, if the differences between successive situations are small, they must all be accepted. This fallacy actually cancels out the small differences between entities which, if

² The truth value of this statement changes if one takes into account the rare meteorological phenomenon that produces the so-called “bloody rain” caused by the presence of Saharan dust particles.

aggregated, would prove significant. The fallacy of slippery precedent argues that a good deed should not be allowed, because this will create a precedent for committing other deeds that are bad. It misreads the distinction between right and wrong.

Some analogies can be convincing, and others can be irrelevant or misleading. In general, two types of analogies are accepted: *a priori* and inductive. *A priori* analogies depend on consistency and support the resolution (acceptance or refutation) of conceptual situations. The analogy may be either hypothetical or fictitious, but its value does not alter the contextual understanding. Inductive analogies have an important epistemological function because they relate known structures to new, unexplored ones. In computational analyses, proxy structures based on *a priori* analogies are frequently found in lexicon-based studies, whereas inductive ones are adopted in analyses that favor experiment and allocate more freedom in terms of both establishing the methodology and exploring and interpreting the results obtained.

Let us now return to the structure of the argument by proxy. If the truth claim is dropped in the case of Yb in order to assert Xa, then it is recommended (Nelson 1997) that the by-proxy argument be combined with Quine's observation theory, because it is only with this conceptual support that the ontological relativity of a proposition can become an epistemological thesis. Quine's observational propositions are the starting point in our direct acquisition of sense-based knowledge. For an observational statement to be accepted, the condition of perceptual similarity must be met. A sentence such as "It is raining outside" can be accepted or rejected if observers receive sensory stimuli that support or contradict the proposition (Quine 1969).

If Yb is accepted as a proxy argument to support Xa, then further explanations are needed to justify the acceptance of the argument. Logic imposes that the acceptability of grounds should be exclusively related to the content of the argument and not to the argumentative structure. In other words, an argument may contain one or more premises that are presented as evidence to support the truth of the conclusion. According to Govier's list, the conditions for the acceptability of a premise in an argument may be as follows:

- a) the premise is supported by a cogent sub-argument;

- b) the premise is supported elsewhere by the arguer or another person, and this fact is noted;
- c) the premise is known *a priori* to be true;
- d) the premise is a matter of common knowledge;
- e) the premise is supported by appropriate testimony—that is, the claim is not implausible, the sources are reliable, and the content of the claim is restricted to experience.

As far as the argument's content is concerned, explanation is based on a different balance of acceptability (Govier 2014, 128). The *explanandum* (i.e. what has been explained) is assumed to be true, and the explanatory factors can also be assumed to be true and used to elucidate causal phenomena, narratives, motives or intentions. Explanations are not separate from argumentation. They can, as Govier mentions,³ complement and support each other.

In computational analyses, it is essential that by-proxy structures be supported by explanations. Otherwise, the methodological approach is opaque and the final result may not be deemed reliable. Disregarding from the truth conditions of a proxy argument shifts the problem of truth over to the realm of linguistics and, more specifically the interpretation of meaning.⁴ If we start from the simple fact that computational analyses usually process corpora of texts (that is, a set of word units and their contexts), then we might incorrectly assume that the meaning of an isolated utterance is equal to that utterance's deeper meaning (Meyer 1986, 284–285). This situation also indicates that an utterance becomes more informative if reattached to its context; therefore, the meanings of particular utterances become visible as part of the contexts. For instance, in the case of temporal mappings, it has been observed that

³ Among the arguments supported by explanations are abductive arguments (arguments that support the best explanation for a given phenomenon) and transcendental arguments (arguments that require that between A and B there is a necessary condition that can be explained if A is used as a factor that explains B).

⁴ The definition of “meaning” and the distinction between *meaning* and *reference* are among the issues that are still hotly debated today. Quine stated that “pending a satisfactory explanation of the notion of meaning, linguists in semantic fields are in the situation of not knowing what they are talking about”. The concept of *meaning* in Quine's terms is a special kind of entity, and the meaning of an expression is the idea expressed (Quine 1980, 47–48).

“relative TOs (temporal operators) are usually intuited from the context of story, rather than directly stated” (Yager 2023).

Many computational analyses are grounded in by-proxy arguments. In digital humanities, variations depend on previous practice, on tools and on the complexity of the corpora under study. To support the by-proxy argument, computational analysts of text corpora may resort to developing complex annotation schemes, as in the case of spatial entities proposed for a Romanian corpus of 19th-century hajduk novels. In practice, researchers have identified and classified toponyms, common place names or locative prepositions specific to the Romanian language. Therefore, in the first phase of the study, in which observation units were initially identified, morphologic categories that carried spatial information functioned as proxies. Then, in order to highlight orientation, movement and metrical spatial relations, researchers expanded the sample to include more complex syntactic units and “focused on nouns and adverbs carrying spatial semantics, taking into account the whole nominal, pronominal or adverbial phrase” (Galleron *et al.* 2021). The spatial turn is also a concern of Grisot and Herrmann (2023), who aim “to detect and examine how different types of space are distributed and affectively encoded in German-Swiss literature.” In this case, the researchers detected *emotion* or *mood words* in a corpus of 125 texts written in German by establishing two broad spatial categories: rural, urban. The creation of emotion lexicons related to spatial entities (in groups of approximately 50 words clustered around the detected entities) served as a proxy for mapping rural and urban spaces as sentimental landscapes rather than as architectural or social configurations. As the authors note, these lexicon-based approaches (recently, the term “bag of words approach” has been used self-critically or pejoratively) faced a number of challenges such as those related to the finite number of words included in the compiled list, to the inconsistency between different lexicons and a certain definition of a concept, and to the difficulty of representing exceptional situations in a ready-made scheme and of devising new functional categories to account for unexpected data encountered during in the research process

Discussion and conclusion

The recent development of digital humanities has brought with it harsh criticism. The field is unfairly accused of, among other things, betraying principles of humanities and of distancing itself from traditional academic research and pedagogy, the main concern being that students will receive training in the use of technologies rather than in critical thinking (Galleron and Imhadad 2020). However, the appropriateness of criticism to reveal, to debunk prejudices, to enlighten and encourage minds in the shattering of illusions and idols is also questioned by Bruno Latour. He outlines a way of reusing criticism, “a critique acquired secondhand—so to speak—and put to a different use” (Latour 2010). The idea of composition on which Latour’s process of reusing criticism is based concerns the economy of knowledge (Ciubotarașu-Pricop 2014), which involves combining 1) knowledge that has been acquired through experience and 2) processed experience, such as inferred effects with respect to the usability of an object or phenomenon. Descartes established three different modes of composition: by impulse, by conjecture and by deduction. In the case of composition by impulse, one makes decisions based on belief in a higher power, based on one’s own freedom or based on one’s imagination. Judgments derived from reached through imagination are credited with the lowest confidence value, and these are followed by judgments obtained by conjecture, which according to Descartes “do not make us more learned” but have a higher degree of probability. In the case of deductive judgments, they are beyond doubt but not beyond error, as in the deduction of a general and necessary thing from a particular or contingent one (Descartes 1964). A follower of Descartes and Locke, Bruno Latour’s compositionism—proposed as an alternative to criticism—aims to reassemble reality piece by piece. For a compositionist, everything is called into question, judgements are touched by Cartesian doubt, nothing is revealed by criticism, science (with a small “s”) is achieved “only by the slow process of composition and compromise, not by the revelation of the world beyond” (Latour 2010).

By recovering imagined, fictional or real worlds, digital humanities scholars carry out compositional labor that needs to be discussed in appropriate terms. The

challenge lies in adapting to language processing a methodology that was developed within the sphere of empirical sciences. Unlike classical logic, textual analysis requires the use of logical forms that closely align with natural/intuitive thought processes. Therefore, analytical processes have shifted from traditional logical reasoning and introduced new approaches such as the argument by proxy.

The methods of the compositional project may establish a connection between two different propositions, supported by explanation and analogy. By using argumentation by proxy, researchers are able to operationalize categories. Knowledge acquired through this process serves to compensate for discontinuities within the text. It also helps to establish and locate new relationships between different observation units. By employing logical forms that align with natural thought processes on the trial-and-error paradigm, digital humanities researchers are able to uncover hidden connections within texts and shed light on the intricate complexities of textual collections. This painstakingly constructed new knowledge makes use of creativity and empathy but also requires rationality to process large datasets.

Finally, what is the special contribution of quantitative analyses? One of the most elegant answers to this question can be found in Witmore's suggestion that computational analysis has the ability to capture the finest and most imperceptible details in a text, as in the full collection of Eadweard Muybridge's photographs capturing the galloping horse: the observer can see the stride with all four feet in the air, unless their perception is mediated by the sequence of snapshots (Witmore 2016). The snapshots of the horse represent a movement that, unless recorded and played back by a camera, is not accessible to the naked eye. The same movement of recording discrete units and playing them back all over again through trial-and-error iterations seems to be the distinctive feature of research in digital humanities.

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