DHQ: Digital Humanities Quarterly
2012
Volume 6 Number 2

Towards a Conceptual Framework for the Digital Humanities

Paul S. Rosenbloom <rosenbloom_at_usc_dot_edu>, Department of Computer Science and Institute for Creative Technologies, University of Southern California

Abstract

The concept of a great scientific domain broadens what is normally considered to be within the purview of science while identifying four such domains – the physical, life, social and computing sciences – and suggesting that the humanities naturally fit within the sciences as part of an expanded social domain. The relational architecture that has been developed to aid in understanding disciplinary combinations across great scientific domains then guides an exploration of the structure and content of the digital humanities in terms of a space of relationships between computing and the humanities.

Introduction

For roughly a decade (1998–2007) I led new directions activities at the University of Southern California's Information Sciences Institute across the domain of computing and its interactions with engineering, medicine, business, and the arts & sciences. Reflections on this extended multidisciplinary experience have led to the articulation of a new perspective on the nature and structure of computing as a scientific discipline [Rosenbloom 2004] [Rosenbloom 2009] [Rosenbloom 2010] [Rosenbloom 2012] [Denning 2009]. In the process has come: a new conception of what a *great scientific domain* is; the realization that computing forms the fourth such domain, with the physical, life, and social sciences comprising the other three domains; the recognition that much of the core content and future of computing is inherently multidisciplinary; the understanding that this multidisciplinarity can be reduced to a small fixed set of across-domain relationships, defining the *relational architecture*; the demonstration that the relational architecture yields a novel organizational framework over computing; and the application of this framework to illuminating some of the connections between computing and other scientific disciplines. It has also suggested several tentative conclusions concerning disciplines outside of computing, such as that mathematics and the humanities can both be considered as part of the scientific enterprise, but that neither amounts to a great scientific domain on its own. Mathematics instead nestles naturally within a broad understanding of the computing domain, while the humanities fit within a comparably broad understanding of the social domain. 1

The purpose of this article is to further explore these notions with respect to the emerging area of the *digital humanities*, with their focus on the interchange between computing and the humanities. In particular, we will look at the idea that the humanities can be viewed as a part of science — in fact, as part of the social domain — and at the framework that this yields for understanding the space of relationships between computing and the humanities. Such an exploration requires some understanding of computing, the humanities, and the philosophy of science. I am a professional within the first of these, but no more than an interested amateur with respect to the latter two. So there are inherent risks in this enterprise, but the hope is that the utility of its results will overbalance any naiveté exposed in the process. 2

The Humanities as Social Science

As I have been reflecting on computing, and following the resulting implications where they lead, I have come to accept the notion that any enterprise that *tends to increase our understanding of the world over time* should be considered as essentially scientific, and thus part of science. This is more akin to Lakatos's concept of a *progressive research* 3 *programme* [Lakatos 1978] than to Popper's focus on *falsifiability* [Popper 1959], although not limited by Lakatos's conception of the necessary role of correct predictions in establishing progressiveness. The ability to make correct predictions provides one means of assessing whether the world is better understood over time, but it need not be the only way. For example, development of a simple theory whose scope and predictions are comparable to those of a more complex extant theory may also provide an increase in understanding even without yielding additional correct predictions.

On the flip side, it is important that a scientific enterprise also not tend to increase our misunderstanding over time. 4
Fortune telling and religious prophecy can lead to correct predictions, particularly when ambiguity is combined with generous post-hoc interpretations and rationalizations, but neither has demonstrated any ability to predict better than random guessing. On the whole, they thus can contribute much more to misunderstanding than to understanding despite occasional hits. Such activities are clearly not scientific. But, while the difference is clear here, there can be grey areas where it is difficult to determine whether some activity tends to increase our understanding. Work on a normative *scientific method* attempts to deal with this by prevalidating the approach taken to understanding. As long as the scientific method is used, what comes out of it will be science. The problem, of course, is that much of actual science does not proceed by such a method, and it would be greatly impoverished if it were forced to do so. Moreover, much trivial science follows the method to the letter.

When I read a scientific article, what I care about is learning something new and important that I can be convinced is 5
true (or at least plausible enough to be worth considering further). I am agnostic, at least in principle, concerning what methods were used to invent or discover the new thing, or what methods were used to convince me of their reality, as long as they achieve the desired ends. Great science requires all three of these attributes: novelty, importance and veracity. Good science makes some compromises. To many researchers, all that is important for good science is veracity, and work may be publishable with miniscule quantities of the other two attributes as long as there is sufficient evidence of — or methodology for establishing — truth. In contrast, I often learn more from sufficiently novel and important conjectures — even before there is a great deal of evidence or methodology in their favor — leaving me more comfortable in labeling such papers as good science than traditional small-but-validated results. I don't learn of necessary truth from such articles, but they may still revolutionize my way of thinking about a topic, opening up new possibilities and plausibilities never previously considered. This is a form of increase in understanding more akin to that emphasized by Kuhn in his work on scientific revolutions, and that is absolutely crucial to long-term progress in science [Kuhn 1962].

This distinction is actually reminiscent of an interchange in Austen's (1818) *Persuasion*, between Anne Elliot and Mr. 6
Elliot, concerning the nature of good company. The former prefers "the company of clever, well-informed people, who have a great deal of conversation," while the latter states that "Good company requires only birth, education, and manners, and with regard to education is not very nice." Mr. Elliot then goes on to state of Anne's notion that "that is not good company; that is the best." What is "best" in both company and science is that which improves understanding, whether based on novel facts or new ways of thinking. The forms are of secondary importance at best.

The scientific method provides a validated approach for developing insights, but it is not the only method, nor 7
necessarily always the most appropriate method. For any particular domain, and any particular problem within that domain, there may be zero, one, or more methods applicable to them. If we define the *strength* of a method for a domain or problem as the degree of veracity it can guarantee for the results it generates, good science should in general be pursued via one from among the strongest applicable methods. Using weaker methods when stronger ones are available can be one of the hallmarks of bad science. We need to be careful though about what is meant by two methods being applicable to the same problem, and thus the circumstances under which a stronger method should necessarily dominate. If two methods can yield the same insights, and one provides more assurance with respect to these insights, then the two are applicable to the same problem and the stronger should be preferred. However, if the problems are nominally the same but the two methods provide different insights about it, then the weaker method may still be of value, and the problems they tackle are in an important sense different.

The potential diversity of appropriate methods, both within and across domains, does suggest a form of *methodological* 8 *pluralism* in which multiple methods may be necessary to increase our understanding of individual domains, and those methods that are strongest in one domain, or on one problem, may not necessarily be strongest, or even applicable, in other domains or to other problems. Yet this need not, and should not, go anywhere near as far as Feyerabend's *epistemological anarchy*, with its denial of preeminence for any particular methods and its notion that conventional science is just one among many ideologies [Feyerabend 1975]. All else being equal, the strongest among the applicable methods should always be the most appropriate.

Domains can be ranked by the strength of the methods they are able to effectively use, with the physical sciences traditionally able to use stronger methods than the life sciences and the life sciences stronger methods than the social sciences. But this should not be confused with a claim that this hierarchy correlates with the quality of the science pursued within the domain. We have the need to understand all of these domains, and good science is equally possible within each, based on the strongest methods available for them. The methods used within the humanities, although generally even weaker than those standard in the social sciences, can be applied to increase our understanding within their domain, while stronger methods have so far not proven so successful. They thus can potentially serve as the basis for good science. Still, it is worth noting that even good science can be relatively unproductive if the best available methods are insufficient to increase our understanding of it to any significant extent. 9

The notion that the term "science" is appropriate for all human intellectual endeavors that meet the criterion of tending to increase our understanding over time can, to some extent, be viewed as a return to the original notion of philosophy, or *love of wisdom*, from which modern science descended through the splintering off of natural philosophy. But whether the generic is called philosophy, or science, or even *Wissenschaft* — a German word for science that includes not only those academic disciplines typically labeled as science in English but also other areas of academic study, such as the humanities [Hansson 2008] — the key point is to consider how our understanding is increased across the full range of subjects of interest, along with the methods best able to increase this understanding. 10

The notion of a great scientific domain actually goes beyond even this broad notion of understanding, to also include *shaping*. Understanding involves a flow of influence from the domain of interest to a scientist, altering how the scientist views the domain. Shaping is a creative activity that goes in the reverse direction, with influence flowing from the scientist to the domain, resulting in alterations to the domain itself. Shaping may more conventionally be thought of as engineering, but traditional engineering only tends to focus on mathematically oriented shaping of the physical domain. Many other traditional professional activities — such as law, business, education, and medicine — are shaping activities as well, but in the social or life domains. In computing, it can be very difficult to separate understanding from shaping because most of what is to be understood has first been shaped, and in fact created, by people. However, the same kinds of issues will become continually more important in the future of the other domains as we are increasingly able to create and modify physical, life, and social entities at their most basic levels. 11

Interestingly, the humanities are already very much like computing along this dimension, in that they primarily study human-created artifacts. In Simon's terms, both computing and the humanities are "sciences of the artificial" [Simon 1969]; although even the distinction between natural and artificial is unlikely to remain tenable in any fundamental sense as we increasingly understand people as part of nature rather than as special beings outside of it, and as our increasing power to shape all kinds of entities further blurs the lines between what does and does not involve human intervention. With understanding and shaping being two sides of the same coin, and with them being (increasingly) intertwined across all scientific domains, I have been arguing that the top-level decomposition in science should focus on divisions by subject matter into great scientific domains, rather than on science (understanding) versus engineering (shaping) or artificial versus natural. The latter distinctions can then be appealed to as useful only via second-order within-domain organizational principles. 12

Broadly, a great scientific domain concerns the *understanding and shaping of the interactions among a coherent, distinctive, and extensive body of structures and processes*. Each such domain is then characterized by its distinctive structures and processes. Structures are things of interest in a scientific domain, while processes actively alter these structures over time. The physical sciences focus on (non-living) matter and energy, and their associated forces. The life sciences focus on living beings and the processes by which they live, die, and reproduce. The social sciences focus on 13 humans, their products, and their cognitive and social processes. The computing sciences focus on information and its transformation. In physics (physical sciences) we might, for example, talk about particles and forces; in cell biology (life sciences), the focus may be on cells plus how they originate, operate, and die; in cognitive psychology (social sciences), the concern might be with the human mind and how it yields intelligent behavior; and in compilers (computing science), the interest may be in programs and how they get translated into executable form.

It is the dynamic richness and vitality of the interactions among an extensive body of structures and processes that leads to great scientific domains. It is also what drives the need for experimentation across much of the sciences. It isn't that science itself inherently requires experimentation, but that complex interactions among structures and processes can severely limit the effectiveness of the analytical methods that can be so useful in less dynamic domains. Mathematics, for example, focuses almost exclusively on structures — equations, theorems, proofs, etc. — and is thus able to make great strides without resorting to experiments. However, its resulting lack of processes and their interactions with structures make it a *static* domain that does not reach the level of a great scientific domain on its own. Because mathematical structures are informational in nature — rather than physical, biological, or social — it makes sense to consider it as part of the great scientific domain of computing, with its broader focus on information (structures) and its transformation (processes). According to this view, mathematics is a part of theoretical computing that uses one of the strongest methods known — proof — in understanding specific types of informational structures. The computing domain as a whole broadens this to cover the understanding and shaping of the full set of dynamic interactions possible among all kinds of informational structures and transformational processes. Altogether, this domain comprises not just computer science and mathematics, but also computer engineering, computational science, informatics, and information theory, science, and technology. 14

The story for the humanities is analogous to that for mathematics. The humanities are full of structures — books, paintings, statues, etc. — and analyses of such structures, but there is, in general, little process to interact with these structures. There are some limited exceptions to this, such as: disciplines like history for which there is significant ambiguity as to whether they belong to the humanities or the social sciences; and linguistics, whose informational aspect implies an overlap with the domain of computing. However, aside from these multidisciplinary outliers, the predominant lack of processes in the humanities deprives it of the dynamic richness that demands experimentation and enables a great scientific domain. 15

This essentially static essence of the humanities has been noted before, such as in #janlert2000 where the artificial (shaped) nature of the humanities is also discussed. The key additional point here is that, where there is process in the humanities, it is principally human activity. When this is combined with the fact that the artifacts studied by the humanities tend themselves to be about people, it ought to be clear why it is natural to consider them as part of the social sciences, when broadly construed as the great scientific domain that deals with (non-biological) human structures and processes. The humanities become a mostly static component of this domain focused on structures that help to reveal the essential human condition, but span both the understanding of such structures and their shaping (i.e., their creation). The close relationship between the humanities and social sciences is already recognized implicitly in universities that combine the two into colleges of humanities and social sciences, and in disciplines such as history that are ambiguous about where they belong, but the suggestion here involves an even tighter coupling, at least conceptually. 16

The political problem with such a merger is, of course, that stronger methods tend to drive out weaker ones that strive to coexist in the same environment. Even in subdomains where the stronger methods are not applicable, their presence in the same intellectual environment can sap the credibility of the weaker ones. Computer science grew out of mathematics in a number of universities, but had to separate itself, at least in part, to have the freedom to perform experiments, a method that although weaker than proof is essential in studying much of computing. The analytical and critical methods of the humanities are weaker than those used in the more traditional sciences, or even than those used in the rest of the social sciences, but they are presumably particularly attuned to their subdomain of the social sciences, and can thus still be valuable to the extent that they remain among the strongest methods available for increasing our understanding of important aspects of people and their culture. Even acknowledging this political problem, though, shouldn't keep us from an awareness of the true conceptual connection that exists between the humanities and the 17 social sciences, or of the understanding that this connection is possible without diminishing either participant.

A Relational Analysis of the Digital Humanities

The relational architecture provides a means of analyzing scientific topics and disciplines in terms of the great scientific domains they involve and the relationships among these domains that are implicated. It also provides a vehicle for systematically investigating the space of interdisciplinary overlaps that can occur among domains. In this article, the focus is on analyzing the digital humanities in terms of the potential space of overlaps the architecture identifies between computing and the humanities. In computing, architectures often induce languages, and the relational architecture is no exception. The *Metascience Expression (ME) language* was developed to enable concise semi-formal representations of complex, particularly multidisciplinary, scientific disciplines and topics, in service of understanding them both individually and in aggregate. Expressions in ME are provided in the remainder of this discussion in conjunction with explanations in English. 18

At the top level of the relational architecture, the four great scientific domains are denoted by their initial letters: P(hysical), L(ife), S(ocial), and C(omputing). The discipline of digital humanities then concerns the relationships between two of these domains: the social sciences (S) and the computing sciences (C). If the addition symbol (+) is used to denote that there is some form of relationship between two domains, we can express the digital humanities as S+C. However, we can also introduce a new initial for the H(umanities) — with H understood to be a subdomain of S (H ⊂ S) — to specialize the overall expression more particularly for the digital humanities to H+C. 19

The relational architecture further partitions the generic notion of across-domain relationships (+) into two general types: *implementation* (/) and *interaction* (↔). Together, these two types of relationships have proven adequate for understanding the multidisciplinary aspects of computing so far investigated, and have even proven useful in illuminating many aspects of computing not traditionally considered multidisciplinary. 20

An implementation relationship (/) exists between two domains when multiple structures and processes in one domain combine to bring into being elementary structures and processes in the other. The physical domain implements the life domain (L/P) when molecules and their forces combine to yield cells and their processes. Similarly the life domain implements the social domain (S/L) when neurons in the brain combine with each other to implement thoughts in the mind, and the brain joins with the rest of the body to yield human behavior. Sometimes this general form of relationship yields a true or full implementation and at other times only a *simulation*, where some definitional aspects of the implemented domain are missing. For example, a computational simulation of a person — a *virtual human* (S/C) — may look and behave much like a real person, but cannot actually be one (at least as long as biological realization is part of the definition of a person). In other cases, it may be hard to differentiate whether something is real or simulated. Can, for example, the discipline of artificial intelligence produce real intelligence without biological realization or can it merely yield a computational simulation of intelligence? Disagreements continue over this question. Still, whether reality actually results, or merely a simulation is produced, either can be considered generically as an instance of implementation. 21

The implementation relationship yields multiple flavors of digital humanities. When computing implements the humanities (H/C) we get digital cultural artifacts, such as digital paintings, sculptures in virtual environments, immersive experiences, and digital books. Given the dynamic nature of computing, we can expect an ever-larger fraction of the future of H/C to involve active rather than static artifacts, whether they are thought of as digital plays, videogames, or simply interactive experiences. Sometimes H/C artifacts are digital reproductions (simulations) of existing non-digital artifacts and at other times they are unique artifacts in their own right. But even a reproduction may itself be a true cultural artifact; a copy of a famous work of art may, for example, be a cultural artifact despite not being the original it appears to be. In addition, all computing artifacts can themselves be viewed as (implementing) cultural artifacts even if there was no such intention when they were constructed. The area of *critical code studies*, for example, views conventional computer programs as cultural artifacts, and applies the humanities' analytical methods to aid in deriving a more complete contextual understanding of them [Marino 2006] The implementation of the humanities by computing also yields computational linguistics, where computers implement and simulate human language processing. 22

In the other direction, the largely static nature of the humanities means that it cannot generally yield a full implementation of computing (C/H) — a book or a painting simply cannot compute all by itself — although special classes of dynamic cultural artifacts, such as complex mobiles, could conceivably be made to compute, and thus to provide a full implementation. What a book or a painting can do is provide a depiction or representation of a computer, essentially yielding a limited form of static simulation. In addition, if we extend the notion of the digital humanities from the overlap between computers (i.e., hardware and software) and the humanities, to the overlap between computing (as a great scientific domain) and the humanities, then the representation of information in general by cultural artifacts — which is also denoted as C/H — could be absorbed within the digital humanities. However, a broader appeal to the dynamics of the great scientific domain of the social sciences — within which the humanities exist as a static subdomain — is necessary more generally to fully implement computing. For example, a *Wizard of Oz* experiment involves a person acting as a computer (C/S) in a situation in which a computer is either not available or would be more trouble to program for the situation than it is worth. In such a circumstance, the person is simulating a standard electronic computer — that is, a computer implemented by the physical sciences (C/P) — but simultaneously socially implementing an actual computer (C/S). 23

Interaction involves a peer relationship between two domains. For example, in human computer interaction (S↔C), there is a bidirectional flow of information and influence between entities from the social and computing domains. However, the relationship can in general either be bidirectional, as in this example, or unidirectional. Computational sensing, for example, involves flow of information from the physical world to a computer (P→C), while robotic manufacturing involves flow of influence from the computer to the physical world (P←C). In the digital humanities, flow from the humanities to computing represents the automated computational analysis of cultural artifacts (H→C); for example, determining clustering of authors based on their literary styles [Luyckx, Daelemans and Vanhoutte 2006]. It could even be considered to include recent work on machine reading, where computers automatically extract meaning from text [Etzioni 2007]. In the reverse direction, a flow from computing to the humanities represents computational composition (C→H). This is an area still in its infancy, but that already includes, for example, computational composition of simple poems [Manurung 2000], stories [Pérez y Pérez 2007] and drawings [McCorduck 1990]; and is likely to eventually include novels, plays, movies and interactive experiences. 24

These two directions of interaction can loosely be considered as representing computational understanding of the humanities (H→C) and computational shaping of the humanities (C→H). In both cases, it is the computing domain that must be the active partner in the interaction because of the static nature of the content of the humanities. However, one way to remove this limitation is to shift the focus from the static structures of the humanities to those active scholars and scientists who study it. In the relational architecture, scientists are typically represented as members of the social domain (i.e., people) who internally represent and simulate part of their domain. For the humanities, this yields H/S. We can then represent the analysis of computing artifacts by humanities scholars, as is for example studied in critical code studies, by C→H/S. However, if the scientist is an expert in the combination of the humanities and computing — denoted as (C↔H)/S — such studies should actually be denoted as C→(C↔H)/S instead. Either way, this is a compound relationship involving both implementation and interaction. It also includes the full social domain, to represent the scientist, in addition to the humanities and computing. 25

Other complex variants of the digital humanities can also be represented in an analogous manner. For example, human-computer collaboration in understanding the humanities becomes H→H/(C↔S), signifying analysis of the humanities (H→) by a human-computer entity (C↔S) with expertise in the humanities: H/(C↔S). Similarly, more traditional forms of informatics within the humanities — where the computer serves as a tool for use by the scientist rather than as a full scientific partner — become H→(C↔H/S), where the humanities expertise is now limited to the human participant. These relationships can also go in the reverse direction for shaping, or be bidirectional to represent the interplay between understanding and shaping. But either way, they involve two forms of interaction between computing and the humanities: the interaction of computing with the humanities researcher and the interaction of this pair with the humanities subject matter. 26

Linguistics provides an interesting special case. It is a core topic within the humanities, and obviously has a tight coupling with sister disciplines such as literature, but language is inherently informational and its use is predominantly 27 social. A natural expression for its subject matter would therefore be something like C/S↔C/S — denoting informational interactions among people. If, as discussed earlier, the purview of the digital humanities is expanded to include the full domain of computing — not just computers themselves but information and its transformation — then linguistics as a whole becomes a prime example of this broader notion of the digital humanities; or at least of computational social science, since the expression uses S rather than H.

For comparison, and to help evaluate the relational approach to understanding the structure and scope of the digital humanities, it is informative to juxtapose it with the five major modes of engagement between computing and the humanities discussed by Svensson: "information technology as a tool, as a study object, as an expressive medium, as an experimental laboratory and as an activist venue" [Svensson 2010]. We can ask both whether these five modes fit naturally into the relational architecture and whether the architecture might indicate any significant areas missing from the list (while acknowledging that the list was unlikely to have been intended as comprehensive). 28

To start, it does turn out that all five modes fit naturally within the architecture, although some yield more complex expressions than others. Computing as a tool used by humanities researchers maps directly onto the informatics example above: H→(C↔H/S). In this mode, the computer helps researchers acquire, manage, and analyze data about cultural artifacts. Computing as an object of study implicitly views it as (implementing) a cultural artifact: H/C. However, if we also want to explicitly represent that such an artifact is being analyzed by a humanities researcher, this expression can be extended to H/C→H/S. Computing as an expressive medium also takes the form H/C because cultural artifacts are being implemented on computers, although here we may want to expand this to H/C←H/S to emphasize the creative shaping aspect that is central to this mode. The difference between the computer as an artifact and the computer as a medium thus reduces to whether the focus is on understanding what already exists as a cultural artifact — even if not initially intended as such an artifact — versus deliberately creating new cultural artifacts. Computing as an experimental laboratory relates back to computing as a tool, and thus to informatics: H→(C↔H/S). However, instead of using computers as one-shot analysis tools, interactive exploratory analysis is supported in this mode. In contrast with traditional experimentation in active domains though, from what I can understand of the description of this mode, it really does seem to be more exploratory analysis than experimentation. Computing as an activist venue involves a shaping activity, but here the shaping is of society at large rather than merely the scientific domain of the humanities: S←(C↔H/S). 29

Based on the relational architecture, the two most obvious topics missing from the list of five modes of engagement correspond to two simple relationships: C/H and C→H. With respect to the first, the earlier discussion of the static nature of the humanities implies that a full implementation of computing via the humanities is impossible, except for the limited special case of dynamic artifacts. However, cultural artifacts about computing — whether books, movies, or other forms — do fit naturally here, as would all cultural artifacts embodying information if the digital humanities were broadened to the full domain of computing. Any of these possibilities yields a sixth mode of engagement based on implementing or representing information and its transformation. The closest we have seen to C→H among the five modes discussed by Svensson is H/C→H/S, where a humanities researcher studies fragments of computing as cultural artifacts. The simpler expression can be considered as a more abstract characterization of this kind of activity, with the focus narrowed to just the relationship between the two primary domains involved. However, this simple expression can also denote computing actively shaping the humanities, harking back to automated composition — authoring, painting, etc. — by computers. As discussed earlier, this is an area still in its infancy, yet it is one that could grow to become a major component of the digital humanities. 30

As a final comment on the digital humanities it is worth noting that while Svensson's list is cast in terms of engagement with information technology — i.e., the more applied tool-building aspect of computing — computing as a great scientific domain is much more than just a set of tools. It is also theoretical results about information and its transformation, algorithms for transforming information, and a wealth of interdisciplinary topics involving interactions with one or more additional domains, from artificial intelligence (S/C) and robotics (L/(P↔C)) to automated construction (C→P), brain computer interfaces (L↔C), quantum and biological computers (C/P and C/L), online social networks (S↔C)* — where the star (*) represents interactions among arbitrary numbers of human-computer pairs — and the simulation, or possibly even implementation, of everything (Δ/C, where Δ denotes all domains). The set of possibilities opened up for the digital 31 humanities by this broader perspective on computing, and in particular by domain combinations that go beyond H and C to include more complex relationships with additional domains, has yet to be tapped. We have seen a few examples already where it has been useful to bring in the full social domain (S), but it is not hard to conceive of further such topics, such as collaborative human-computer composition: (S↔C)→H. Combination with the physical domain leads to possibilities such as the computational analysis of both the content and physical embodiment — i.e., implementation by the physical domain — of cultural artifacts such as books, paintings and sculptures, yielding the expression H/P→C, or H/P→S/C if the analysis occurs via artificial intelligence. The relational architecture cannot all by itself identify where the interesting points are in this larger space, but it does provide a systematic structure over the space, while also guiding us towards an initial population of this structure.

Conclusion

The focus of this article has been on using the concept of a great scientific domain to understand the humanities as a subdomain of the social sciences, without diminishing either in the process, and then exploring the nature and structure of the digital humanities via the space of possible multidisciplinary relationships afforded by the relational architecture between the humanities and computing. The result is hopefully a better understanding of both the humanities and computing, and in particular of their overlap in the context of the digital humanities. 32

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