

4. Approach Definition

4.1 Introduction

This chapter outlines the principal characteristics of our approach. It concludes the long literature review carried out in chapter 2 and chapter 3 by briefly summarizing the research gap previously highlighted, and then providing a description of the approach we are going to use to address it.

As such, this brief chapter plays the role of ‘glue’ between two parts of this thesis work: a) the initial analysis of *existing* research enterprises, and b) the forthcoming description of the *new* research we carried out in order to fulfill the key unsolved problems.

4.2 The research gap

In order to better understand our approach, let us first recall that from the review of the literature on Semantic Web and learning technologies we highlighted the following research gaps:

- 1) There are no existing examples of ‘digital narratives’ (cfr. section 2.2.5) realized for the field of philosophy. Hence, questions such as “*which are the most common story-structures in philosophy?*” have not been answered yet.

- 2) Semantic navigation technologies have proved to be useful. However especially in the case of 'ontology-driven' navigations (cfr. section 2.4.1) there has been little application of these technologies in learning scenarios. For example, it would be interesting to investigate which *contextualization* mechanisms a learner could benefit from.
- 3) A number of SW systems have been tested on humanities-related domains, such as history of art or classic literature (cf. sections 2.4.2 and 2.4.3). However, we also highlighted the fact that usually such systems operate by making use of quite simple domain models. On the contrary, when humanities' scholars go about investigating their subjects they seem to use conceptual frameworks whose formalization is by no means simple. For example, we may recall the fact that traditionally humanities' scholars are more interested in processes like the *subjective interpretation* and *debate* on resources, rather than the more 'scientific' search for *objective schemas* or *taxonomies*. In other words, existing research does not provide suitable semantic models for the descriptions of the features that make *humanities' discourse* unique.
- 4) Finally, how can we put together the three points above in the form of a real-world system usable by philosophy learners? That is to say, how to construct a SW-oriented digital-narrative system for the specific field of philosophy?

These gaps can be summarized by saying that *there is not any existing solution yet for supporting philosophy learners in the emerging web of data*, More precisely, we could state this problem by saying that the *existing mechanisms*

for semantic navigation do not seem to comply with the specific features of the philosophical domain. For instance, these features can be linked to the central role *ideas* (e.g., a *theory* or a *problem*) have in the world of philosophy. Or they could be linked to the fact that such ideas may have a number of possible *interpretations*, all of which are potentially of interest to a philosophy scholar. In the following section we describe how we intend to approach this problem.

4.3 Our approach

Broadly speaking, the approach we have taken can be characterized by having two parts, a more theoretical *pedagogical approach* alongside a more practical *technological approach*. We will describe them in turns.

4.3.1 Pedagogical approach

From the pedagogical point of view, our aim is essentially to instantiate the theories discussed in section 2.2. That is, by making use of the theories of *constructivism* and *cognitive apprenticeship* we intend to construct a system targeted at learning of philosophy.

In particular, we believe that these theories are very important in relation to the design of computer-supported educational tools. It is in fact very easy to mistake the computer for a purely delivering device for instructional content, without keeping into consideration the role of the learner, or the situation within which the learning activity happens. On the contrary, having clear in mind the

characteristics of *cognitive apprenticeship* leads to the realization of systems which help the user extend his/her knowledge, building on what is already existing in the learner's mind. These systems let him/her construct autonomously specific learning routes, depending on the situation he/she is involved with.

In other words, the theories of *situated cognition* and *constructivism* serve us for framing a very specific pedagogical scenario: i.e. one where **learners' can engage in multiple ways with the subject domain's representations**, so to let them have an active role in the discovery and creation of new knowledge.

Moreover, by taking inspiration from the theory of *learning as storytelling*, we intend to pursue the construction of this 'learner-driven' educational software in the form of a '**digital environment for learning philosophy through story-construction**'.

Drawing from the structural approaches to story representation typical of *narratology*, we intend to look at philosophy as the 'system of stories' it is composed by. By doing so, we will try to 'dissect' the narrative structures within the philosophical realm, treating *theories* and *principles* as *protagonists* and *characters*, and *problems* and *fields-of-studies* as *motifs* and *places*. In fact, even though the general framework explicated by Chatman and the other structuralists constitutes a useful high-level model to follow, as we will see, the peculiarities of the philosophical domain require that we search for a set of more domain-specific narrative structures.

In conclusion, by capitalizing on these pedagogical and narratological theories we can outline the design of a software tool aimed at supporting the abstract and ‘artificial’ type of learning required by the philosophical discipline. Such software tool must be capable of supporting the development of the skills highlighted by Carusi (Carusi, 2003) (i.e. *analysis*, *argument* and *interpretation*), thus providing an environment specifically tailored to philosophy-learners.

In particular, we intend to focus on two of these skills: *analysis* and *interpretation*. More precisely, it is our aim to foster the development of these skills in learners’ by providing them with an environment where philosophical entities (e.g., facts, ideas, philosophers) can be investigated ‘recursively’, by means of contextualized, story-inspired, user-driven navigation mechanisms.

It is our assumption that, by being able to switch between various interpretative contexts on the same items, learners can more gradually experience the inherent complexity of the philosophical world. Similarly, the provision of mechanisms for describing resources according to multiple and competing point of views will help students in understanding the importance of the net of relations, which philosophical ideas entertain with each other.

4.3.2 Technical approach

From the technical point of view, the most important feature of our approach is the use of semantic technologies for the formal specification of the relevant entities in the philosophical domain.

We intend to build a formal ontology *about* philosophy as the main technology enabling the navigation of (learning) resources related to the philosophical

domain. This ontology is going to be also the backbone of our narratology-inspired design. It will provide the necessary semantic description of the basic elements composing a *story*, so that it will also be possible to formalize the way a *discourse* recomposes the same elements according to different criteria.

More precisely, our technical approach will be realized by carrying out the following tasks:

1. Investigating what are the key types of entities playing a role in the complex dynamics of the philosophical discourse. In particular, this entails an investigation of both the *abstract* entities philosophers create and talk about, and the other entities involved in the philosophical scholarship at large (**requirements definition**).
2. Creating an ontology based on these requirements, with the purpose of representing through formal languages the major entities and relations in the domain, and supporting automatic reasoning and inference over such representations (**ontology construction**).
3. Defining a series of functions which, by operating on the ontological representations, are capable of recollecting and composing philosophical data so to *mimic* the ways people 'tell the story' about philosophy. In particular, we shall focus on the *narrative* functions most apt to support *learning* of the discipline (**learning pathways definition**).
4. Building a prototype e-learning software which capitalizes the various levels of formal representations by providing an engaging, ontology-based

environment for learning about a philosophical topic (**system construction**).

The above points will be detailed in the following chapters: in particular, chapter 5 (points 1 and 2) and chapter 6 (points 3 and 4).

4.4 Conclusion

We are now ready to move on to the second part of this research thesis: the description of our formalization of the philosophical domain and of PhiloSurfical, a system for navigating through a philosophical text. This will be done in chapters 5 and 6.

The rest of the thesis is instead devoted to the evaluation of our work: in particular, in chapter 7 we evaluate the philosophical ontology, while in chapter 8 we present the results of an evaluation of the PhiloSurfical tool.

Finally, in chapter 9, we conclude by summarizing our work's major contributions and suggesting how future research could continue it.