Chapter 3

Improving Collaborations in the Neuroscientist Community

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ABSTRACT

In this paper, the authors present an approach called SATIS (Semantically AnnotaTed Intentions for Services), relying on intentional process modeling and semantic web technologies and models, assists collaboration among the members of the neurosciences community. The main expected result of this work is to derive and share semantic web service specifications from a neuroscientist’s point of view to operationalise image analysis pipelines with web services.

1. INTRODUCTION

Computational neuroscience aims at analyzing neurological datasets and studying brain functions. The analysis of users’ image processing pipelines shows many commonalities in data sets and processing chains. The manipulated data are mostly images completed with clinical information and additional annotations. As highlighted in Montagnat, Gaignard, Lingrand, Balderrama, Collet, and Lahire (2008), basic processing, as for instance intensity corrections or tissue classifications, are common to several image analysis pipelines, while each pipeline also contains specific processing such as brain structure segmentations or image interpretations. In practice, there is no sharing of common basic processing units among the different processing chains. In this context, web services appear to be a privileged mean to support dedicated processing pipelines for each targeted application and to share common basic processing units inside a neuroscientist community.

To facilitate the exploitation of web resources (documents, actors or services), the semantic web research community aims at making explicit
the knowledge contained into resources. This knowledge is represented by ontologies which structure terms, concepts and relationships of a given domain. Ontologies are often used to extract and represent the meaning of resources. This meaning is expressed through annotations supporting semantic resources indexing in order to formalise and make their content explicit. Resource retrieval inside the community relies on the formal manipulation of these annotations and is guided by ontologies.

As it is shown in Figure 1, our work takes place in the context of a community of neuroscientists building image processing pipelines for their targeted application and therefore relies on web services (from their own registry or from a web registry). Web services are annotated by metadata supporting their manipulation. But when the number of web services becomes important in the community registry, it may be difficult for neuroscientists to be aware of available web services. It may also be difficult for each neuroscientist to rely on web services provided by other neuroscientists while building image processing pipelines. Moreover, a registry of web services annotated by metadata is not enough to support image processing pipelines operationalisation by non computer scientists. Additional support is required to help them to understand how the available web services can meet their needs.

Therefore, we propose SATIS as an approach to specify high-level business-oriented activities with the help of an intentional model and to derive web services specification from this high-level description. As one of our aims is to improve collaboration and sharing inside the community, we also propose to consider high-level intentional specification of processing pipelines as resources of the community. Therefore, we provide means to annotate high-level intentional specification in order to assist their retrieval and sharing among the neuroscientists of the community.

*Figure 1. Neuroscientists’ community*