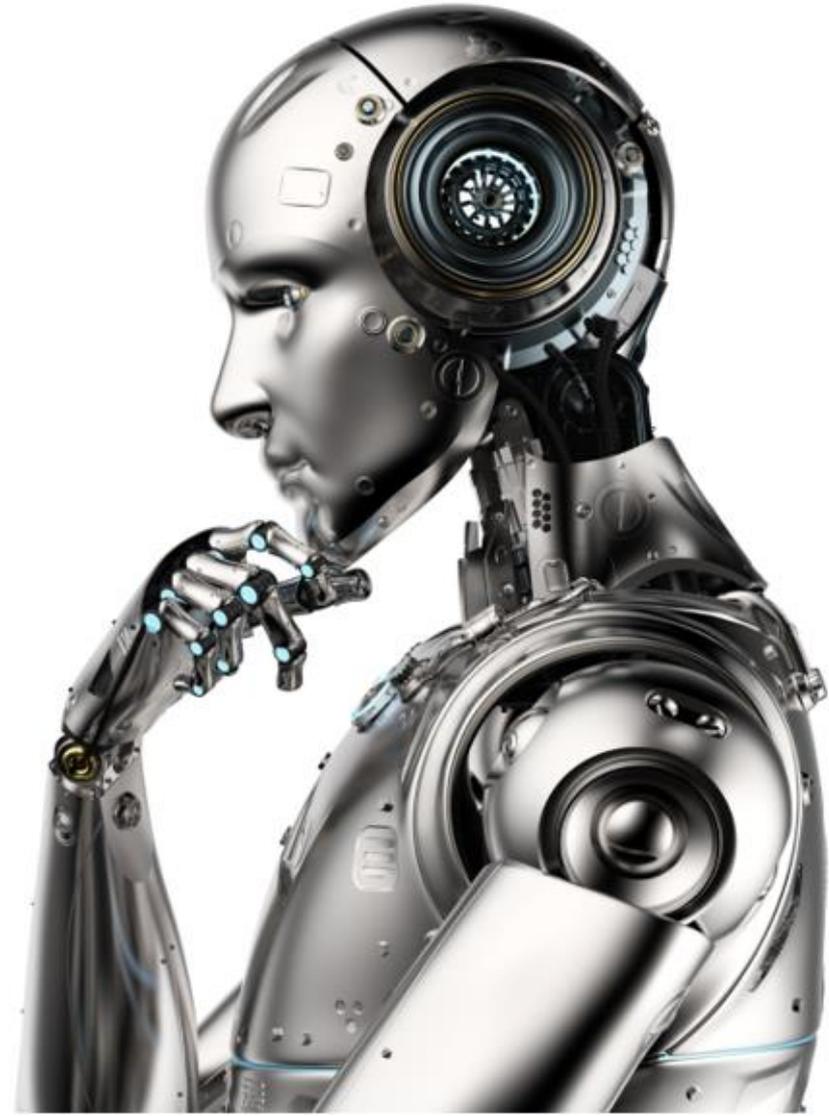# Doctoral Seminar

2-day Course: **1st Session: 1 & 2 July 2021**

2nd Session: 15 & 16 July 2021

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Symbolic Artificial Intelligence

Artificial Intelligence is back in fashion. It has become efficient thanks to the technical progress made in computing power and storage capacity. Artificial Intelligence is at the heart of many applications and technological innovations in various domains: medicine, smart city, economics, digital humanities, etc. It is nowadays most often associated with Deep Learning based on neural networks. But "human intelligence is much more than just pattern recognition, and Artificial Intelligence is much more than just Machine Learning" (cyc.com). Indeed, it is not enough to be fast and efficient. There are also domains where it is necessary to explain and justify decisions taken by machines: economics, medicine, military applications, to name a few. An explicit representation of knowledge in a formalism that can be understood by both humans and machines is necessary. It is the matter of Symbolic Artificial Intelligence, so-called in opposition to Connectionist Artificial Intelligence.

Doctoral Seminar

2-day course: 1-2 July & 15-16 July 2021

1st Day: Introduction & Definition

9:00 am - 12:00 am: Introduction to A.I.

The first half-day is an introduction to Digital Humanities, Linked and Open Data, and the Semantic Web. We will see, in particular, the different definitions and the history of Digital Humanities. This introduction will be illustrated with several examples from fields as different as virtual reality (virtual museum visits), computer processing (NLP) of text corpora, image processing, content management (cultural object databases), etc. Since the Web has become the most important medium for publishing Cultural Heritage contents, we will introduce the basic notions of Linked Open Data and the Semantic Web. We will end this first half-day with Kerameikos, a linked and open data project representing and linking different collections of ancient Greek vases.

2:00 pm - 5:00 pm: Knowledge Representation

The second half-day will be devoted to the representation of cultural data so that they can be shared and accessed on the web. Knowledge Graph is a special kind of database which stores knowledge in a machine-readable format and provides a means for information to be collected, structured, shared, searched and utilized. We will see the W3C languages for data representation (RDF standards). We will also learn how to query such knowledge bases from the Web (SPARQL language). Participants will query the Knowledge Graphs of DBpedia, National Library of France and Condillac Research Group.

2nd Day: Knowledge Representation

9:00 am - 12:00 am: Ontology

The W3C recommendations for knowledge graph building are intended to be as broad as possible (RDF, SKOS, OWL). The specific knowledge of a domain will be represented as ontologies in Knowledge Engineering. An ontology defines the specific concepts and relationships of the domain that will be used to represent and organise the cultural objects.

This will be followed up with hands-on ontology building practice in three available software platforms for building domain ontologies: CmapTools (Florida Institute for Human & Machine Cognition), Protégé (Stanford Center for Biomedical Informatics Research), Tedi (Condillac-LISTIC, USMB).

2:00 pm - 5:00 pm:
The case of Ancient Greek Kraters

The last half-day session is dedicated to an implementation of the notions, principles and tools for the construction of knowledge graphs within the framework of Digital Humanities. We will use as example the ontology of kraters, (''krater'' is a term that denotes the vessels used for the mixing of the wine with water in the Greco-Roman world.)