

# Neural-Symbolic Integration and Its Relevance to Deep Learning and the Semantic Web

Invited Talk by Pascal Hitzler

## 1 Abstract

Research on the integration and interplay of symbolic and subsymbolic (or connectionist - based on artificial neural networks) systems has a considerable history in both computer science and cognitive science. With the recent advances in deep learning, i.e., in subsymbolic approaches, questions how to interface these methods with symbolic data or systems resurface with renewed urgency, and since Semantic Web data is inherently symbolic, these questions are inherently important for our field. Relevant aspects concern the application of subsymbolic methods to semantic web research topics such as data mapping and integration, or knowledge graph generation (formerly known as ontology population). They also concern the investigation of methods to utilize semantic web data to improve or explain deep learning systems. And on a more fundamental level they touch on the deep question how (human) symbolic conceptualizations and (artificial) neural networks fit together. In this talk, we will revisit some of the old questions and results in the light of current developments, and will discuss possible research directions.

## 2 About the presenter

Pascal Hitzler is endowed NCR Distinguished Professor and Director of Data Science at the Department of Computer Science and Engineering at Wright State University in Dayton, Ohio, U.S.A. His research record lists over 350 publications in such diverse areas as semantic web, neural-symbolic integration, knowledge representation and reasoning, machine learning, denotational semantics, and set-theoretic topology. He is Editor-in-chief of the Semantic Web journal by IOS Press (the leading journal in the Semantic Web field), and of the IOS Press book series Studies on the Semantic Web. He is co-author of the W3C Recommendation OWL 2 Primer, and of the book Foundations of Semantic Web Technologies by CRC Press, 2010 which was named as one out of seven Outstanding Academic Titles 2010 in Information and Computer Science by the American Library Association's Choice Magazine, and has translations into German and Chinese. He is the initiator of the Neural-Symbolic Learning and Reasoning (NeSy) workshop series and a member of its steering committee, and a member of the Association for Ontology Design and Patterns (ODPA). He also frequently acts as conference chair in various functions. For more information, see <http://www.pascal-hitzler.de>.