

MINDS CDT **Webinar**



Vector Symbolic Architectures – How does it make sense to compute with thousands bit random numbers?

Prof. Evgeny Osipov

Job title: Professor

Group: Dependable Communications and Computation

Institution: Luleå University of Technology, Sweden

Speaker email: Evgeny.Osipov@ltu.se

Biography

Evgeny Osipov received PhD in Computer Science from University of Basel, Switzerland in 2005, Licentiate of Engineering from KTH, Royal Institute of Technology, Sweden in 2003 and finished a pre-doctoral school at EPFL, Swiss Federal Institute of Technology in 1999. Presently he is a full professor in Dependable Communication and Computation System at the Department of Computer Science and Electrical Engineering at Luleå University of Technology, Sweden. His major research interests are in application of cognitive computing and artificial intelligence to low-power embedded systems in the context of future cyber-physical systems, Internet-of-Things and intelligent industries.

Abstract

Vector Symbolic Architectures (VSAs) is a family of connectionist computational models. VSA are also known as hyperdimensional computing and is a bio-inspired family of methods for representing concepts (letters, phonemes, features) and their meanings using principles of distributed data representation. The term hyperdimensional computing is rooted in the observation that key aspects of human memory, perception and cognition can be explained by the mathematical properties of high-dimensional spaces (concentration of measure theory). It has been advocated that VSAs have the potential to bridge the gap between symbolic and ANNs paradigms, which make them especially appealing for building novel AI systems on unconventional (neuromorphic) hardware. In this talk I will overview the main principles of Vector Symbolic Architectures as well their most notable applications.

[1] P. Kanerva. Hyperdimensional computing: An introduction to computing in distributed representation with high-dimensional random vectors. Cognitive Computation, 1(2):139-159, 2009.



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