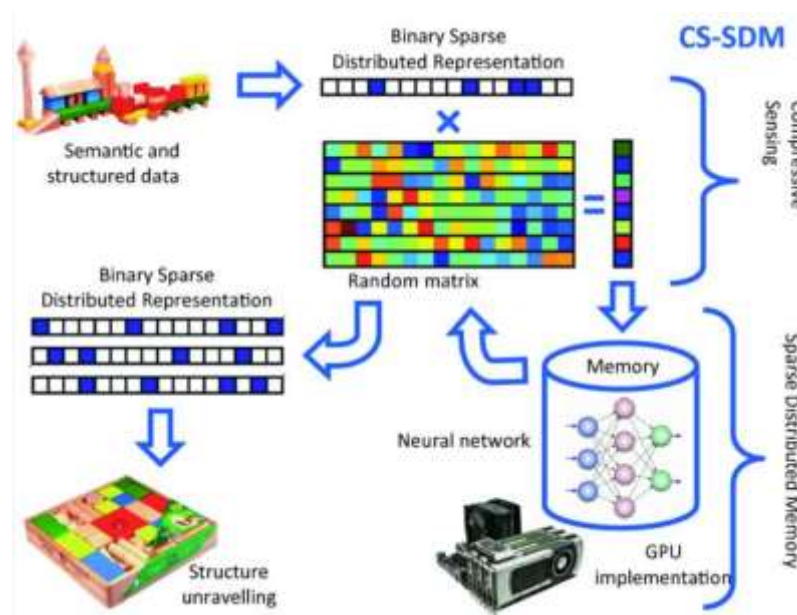


Project - Efficient Context Preserving Encoding and Decoding of Compositional Structures Using Sparse Binary Representations

Despite their unprecedented success, deep learning neural networks suffer extreme opacity and weakness in learning general knowledge from limited experience. Some argue that the key to overcoming those limitations in artificial neural networks is efficiently combining continuity with compositionality principles.

The brain continually processes multiple streams of sensory information. A central question in this context is how the neocortex implements compositionality and encodes and decodes information to enable both rapid responses and complex processing. Answering this question might be the key to unlocking the power of human intelligence in artificial neural networks. There is evidence that the neocortex employs sparse distributed representations for this task.

In this project you will conduct research and test the performance of novel algorithms for the efficient encoding and decoding of hierarchical nested compositional structures using sparse distributed representations, which are essential for representing complex real-world concepts, objects, and scenarios.



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Requirements:

Strong programming skills and good knowledge of Python / Matlab.

Elementary course in Deep Learning (e.g. 236781).