

On Hybrid and Systems AI

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Abstract. Our minds make inferences that appear to go far beyond standard machine learning. Whereas people can learn richer representations and use them for a wider range of learning tasks, machine learning algorithms have been mainly employed in a stand-alone context, constructing a single function from a table of training examples. In this talk, I shall touch upon a view on AI and machine learning, called Systems AI, that can help capturing these human learning aspects by combining different AI and ML models using high-level programming. Since inference remains intractable, existing approaches leverage deep learning for inference. Instead of “just going down the neural road,” I shall argue to also use probabilistic circuits, a deep but tractable architecture for probability distributions. This hybrid approach can speed up inference as I shall illustrate for unsupervised science understanding, database queries and automating density estimation.

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