Einladung zum 250. Institutskolloquium

Thema:	**Machine Learning Tools for Electronic Design Automation**
Vortragender:	**Dr. Ir. Patrick Groeneveld, Cerebras Systems Inc., Sunnyvale, CA, USA**
Leitung:	**Prof. Dr.-Ing. habil. Jens Lienig**
Zeit / Ort:	**24. Juni 2021, 14 Uhr, Zoom-Meeting**

Machine learning finds ever-expanding applications. It's the core technology behind self-driving; it is how Netflix and Amazon Prime suggest the movie you'll want to watch next, and it is how faces are recognized in photo apps.

Machine learning is the general idea that computers can learn from data and act without being explicitly programmed. In reality, most machine learning is *deep learning*, which is a pipelined structure of computational kernels that successively performs transformations on the data. These kernels are arranged as 10-100 layers deep, hence the name. It turns out that a deep learning network can accurately recognize patterns by training the internal weights in the layers. Provided with enough training data, it can do that better than humans. The downside is that each layer in a deep learning network requires a massive amount of floating-point multiplications. Therefore, special purpose hardware such as GPUs and TPUs are used to speed up the process. Modern mobile phones dedicate an increasing number of transistors to machine learning hardware.
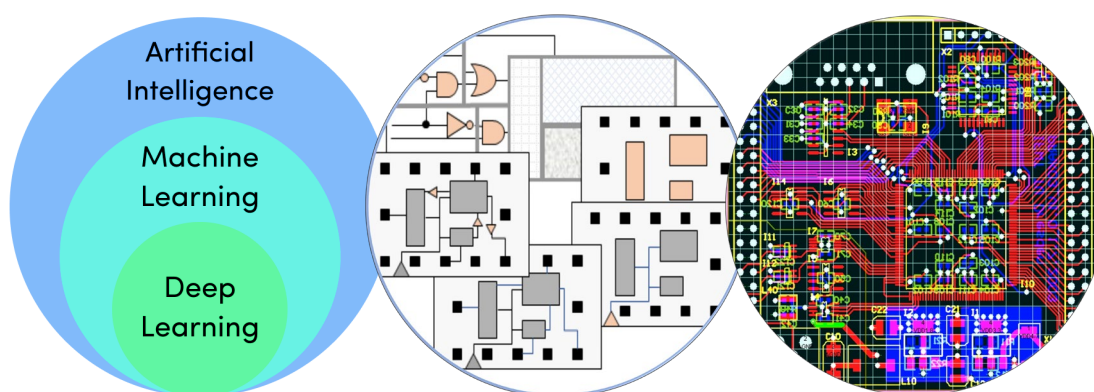
This 45-minutes talk will first explain the core concepts of deep learning in an easy-to-understand way. We will assess the prospects of improving electronic design automation (EDA) tools using machine learning methods next. As an example, we will use a recent paper in the journal *Nature* that shows how Google has built a macro placer that is claimed to outperform both traditional algorithms as well as human designers.