

Deep learning – results, origin and relation to statistical physics

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Machine learning (ML), a fundamental concept of AI research, has recently been dominated by advanced statistical techniques (known as deep learning). The origin of the methods comes from network optimization and prior knowledge of brain with serious physics inputs. The progress in theoretical architectural models (such as Recurrent Neural Networks (RNN), Convolutional Neural Networks, Long Short-Term Memory networks (LSTM) and Deep Boltzmann Machines) as well as numerical methods make advanced NN to approximate arbitrary functions better than traditional ML methods given sufficiently large amounts of data. A list of cognitive tasks that deep learning systems beat humans grows monthly. This fact changes the way society operates technologically. Among others, instead of coding (i.e. entitling computers with rules) it would be more effective to teach a system providing data.

The examples of applications mainly from Natural Language Processing and understanding area will be given. Increasingly larger number of companies are bringing to market innovative, smart products and services using AI. Search, mapping genotype to phenotype, advanced medical diagnosis and testing and drug creation are one of the most promising applications. Further progress will be achieved by using knowledge from reverse engineered brain functions.

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