Master/Diplom Thesis

Implementation and Theoretical Analysis of Deep Learning Networks

The MOSAIC Group http://mosaic.mpi-cbg.de develops theory, algorithms, and software for computer simulation and modeling of complex biological systems. Recently, we developed a new approach to efficiently interpolate given data points by polynomials or Fourier series in high dimensions. In cooperation with the lab of Florian Jug (CSBD), we want to use this *Interpolation Solver* to explore fundamentally novel and innovative approaches to *Deep Net training*. Therein, the aim is to simulate a neural network and train it to solve a given problem such as: *image/face recognition* or *analysis of biological data.* Moreover, fundamental questions occurring in this field might be answered due to the new possibility of interpolating the signal that a neural network generates.

In this project, you are going to implement and further develop *Deep Learning methods.* Moreover, you will develop and implement tools to analyze neural networks. In this regard, our *Interpolation Solver* shall be adapted to the notion of *Manifold Learning,* which might help investigate the essential role certain neurons play in a large network.

PREREQUISITES

- Strong Programming skills in C++
- Good mathematical background
- Interests in optimization and graph theory
- Basics in differential and algebraic geometry

CONTACT

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