

数値解析・機械学習 (今倉 暁)

Numerical analysis & machine learning (IMAKURA Akira)



IMAKURA Akira, Ph.D.
Associate Professor
Faculty of Engineering, information and systems,
Center for Artificial Intelligence Research (C-AIR),
University of Tsukuba

E-mail address: imakura@cs.tsukuba.ac.jp
URL: <http://www.cs.tsukuba.ac.jp/~imakura/>



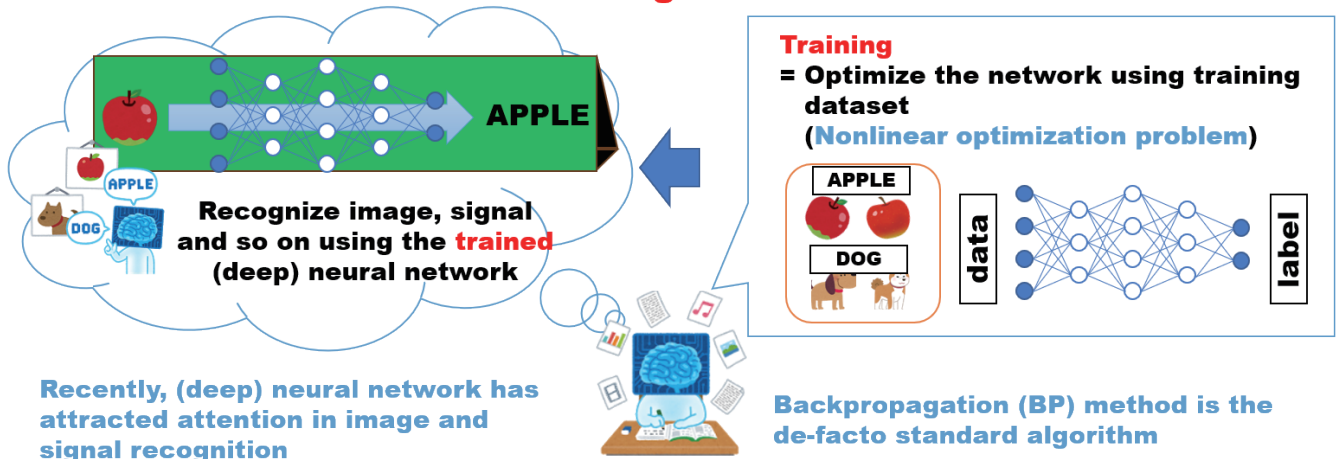
数値解析および行列計算を基盤とした機械学習アルゴリズムの開発

我々の研究グループでは、数値解析および行列計算を基盤とした機械学習アルゴリズムの開発を進めています。大規模シミュレーションの計算時間の大部分は巨大な行列の線形方程式や固有値問題などの基本的な問題の求解に費やされており、我々のグループではこれらの大規模行列計算に対する並列数値計算法の開発を行ってきました。また近年では、これらの行列計算を基盤とした機械学習アルゴリズムやディープニューラルネットワーク計算法を独自に開発しており、医療データを始めとして様々なデータ解析への応用を進めています。

Numerical analysis & machine learning based on matrix computations

Our research group has been developing numerical analysis and machine learning algorithms based on matrix computations. One of the most time-consuming parts of large-scale simulations is matrix computation including solutions of linear systems and eigenvalue problems. We have been investigating efficient and parallel numerical algorithms for computing such large-scale matrix computations. Recently, we have also been developing original machine learning and deep neural network algorithms based on matrix computations and applying some real-world problems including medical data.

Background



Achievements

- **We have been developing a new algorithm based on Non-negative Matrix Factorization (NMF) for optimizing the deep neural network.**
- **Compared with BP method, our NMF-based algorithm achieves**
 - competitive recognition performance for benchmark problems.
 - higher parallel efficiency.

[JST/ACT-I, Information and future] 2016.12-2018.3 and 2018.4-2020.3 (Acceleration Phase)
Development of a nonlinear nonnegative matrix factorization-based algorithm for deep neural networks