Prosjektskisse for bacheloroppgave i informasjonsteknologi.

Cellular automata with plasticity: cellular learning automata

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This thesis is part of ongoing research projects at the OsloMet Living Technology Lab (part of OsloMet AI Lab) on neuro-inspired unconventional computing machines. The long term goal of this project is to build computing machines that go beyond the current von Neumann paradigm of computing, by taking inspiration from how the brain works. Cellular Automata (CA) are interesting models of cellular computing, where the actual information processing, transmission of information and storage are massively distributed and parallelized, and each component of the system interacts only locally with the closest neighbors. One such example of cellular automata is the Game of Life, which is proven to be computationally universal.

While CA can produce very complex computations, they lack one key aspect of (biological and artificial) neural networks, i.e., plasticity. Neuroplasticity is the ability of the brain to change (learn) over time. One class of automata that can learn over time is Learning Automata (LA), a special type of reinforcement learning automata.

This project aims at creating a new CA-based machine learning paradigm by combining CA and LA, i.e., Cellular Learning Automata (CLA). In this way, each cell in a CA may change over time its function (transition rule) based on the actual local activity of the system, providing a mechanism of plasticity in cellular automata (a kind of Hebbian learning for CA).

Videre betingelser for prosjektet:
Aktiv deltakelse i forskningsmiljøet på ai-laben og formidling av resultater som de foreligger mot slutten av prosjektet.