

Event-based Convolutional Spiking Neural Networks in Radar Data Processing



Technical University of Munich

Background

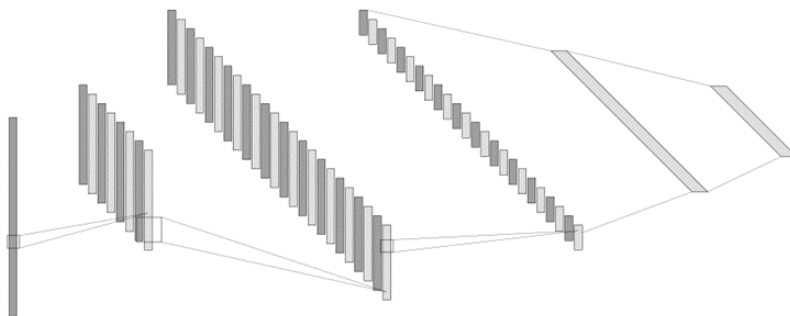
Radar is an emerging sensor technology used in various fields. Some include target detection in aviation and marine applications, environment perception in cars and infrastructure (our focus), gesture recognition in mobile phones and light switches, and privacy protected indoor surveillance.

Modern solutions rely on both classical as well as neural network-based signal processing in order to cope with the demanding complexity. Often, the systems have to work under restricted power budgets and time frames, which in some cases forbids the utilisation of heavy neural networks and gives rise to alternative processing solutions.

Description

The objective of this thesis is to develop a completely new radar signal processing chain based on spiking neural networks. It should be examined whether a convolutional network approach is suited for these event-based networks.

The architectures can be tested on simulated data or real-world data sets consisting of hand gestures and automotive scenarios.



Tasks

This student project consists of the following tasks:

- Getting familiar with the topics radar and spiking neural networks
- Designing toy examples which illustrate the underlying principles
- Designing and developing a network architecture and learning rule
- Testing the system on simulated and real-world data
- Documenting the results



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Research project:

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Type:

Master Thesis

Research area:

Spiking Neural Networks, Signal Processing, Radar

Programming language:

Python

Required skills:

Python, Machine Learning, Signal Processing

Language:

Englisch/German

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