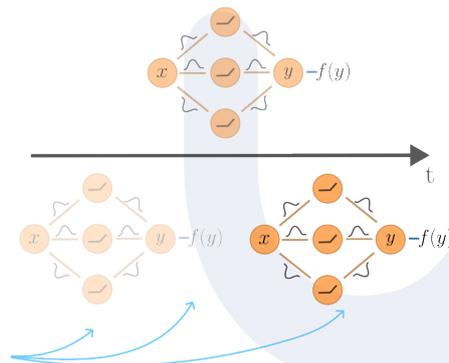


Online Learning with filter-based Bayesian Neural Networks



Most Machine Learning models are "batch-learners" that cannot handle data that arrives in a continuous stream, often suffering from catastrophic forgetting where new information wipes out old knowledge. Filter-based Bayesian Neural Networks (BNNs) offer a smarter alternative by treating learning as a recursive process rather than a one-time event. Because they naturally track uncertainty, these networks can "remember" what they've already learned while safely incorporating new data on the fly. This makes them ideal for real-world systems that maybe

need to be learned sequentially. However, despite their potential, we still lack a systematic analysis of how well these filter-based BNNs actually handle sequential data in practice.

What to do

- Analyze the problem and get familiar with BNNs and filter methods
- Investigate the ability of filter-based BNNs to learn system dynamics by processing a sequential measurement stream
- Find out about potentials and limitations of the involved algorithms and develop new ideas

Requirements

Students in Computer Science, Robotics, Electrical Engineering, Mechatronics or related. You should have a good idea of probability theory and machine learning. Experience in scientific programming in Python is welcome. Strong self-motivation, endurance and mathematical problem solving skills are expected.

Emphasis:

Theoretical Study

Software Implementation

Hardware Implementation

We offer:

- excellent support and advice
- highend infrastructure
- contact to industry and research partners

Contact:

Leon Winheim

E-Mail: Leon.Winheim@kit.edu

Language:

German or English