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Neuromorphic Computing for High Energy Physics

Wednesday, 12 October 2016 12:00 (15 minutes)

With the advent of a post-Moore's law field of computation, novel architectures continue to emerge. HEP experiments, with their ever-increasing computing requirements, are exploring new methods of computation and data handling. With composite multi-million connection neuromorphic chips like IBM's TrueNorth, neural engineering has now become a feasible technology in this novel computing paradigm.
In this talk we will investigate TrueNorth's role in High Energy Physics - evaluating its potential in tracking, trigger, and dynamical systems. Our interdisciplinary group relates experiences and challenges in adapting neuromorphic technology for dynamical algorithms such as a Kalman filter, with HEP datasets including high pile-up tracking data.
With this novel approach to data processing comes specific challenges such as the effect of approximate computation on precise predictions and classifications; we will present our experience with these constraints in track reconstruction. It is not only the algorithms that are affected, in this talk we will also explore how the realization of neural networks and Kalman filters affects its performance: be it an implementation as a neuromorphic simulation or an in-Silicon custom chip.

Primary Keyword (Mandatory)

Reconstruction

Secondary Keyword (Optional)

Artificial intelligence/Machine learning

Tertiary Keyword (Optional)

Trigger

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