BCL5

5th Workshop on Brain, Computation, and Learning

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Neuromorphic Co-processors: A Moonshot project under the Brain, Computation and Data Science Initiative

Abstract:

Understanding the neural code of the brain -- to a level where we can read from it and hack into it -- is the dream of many neuroscientists. Beyond providing fundamental knowledge, such an achievement will enable fashioning cutting-edge treatments and technologies for managing various brain disorders. This dream has also inspired many modern "trans-humanist" startups, including NeuraLink, Synchron and Precision Neuroscience.

In this talk, I will describe a recent effort by a group of faculty -- spanning multiple departments and divisions across IISc -- who have begun to work together to address a similar challenge. Our goal is to develop an AI-enabled neuromorphic "co-processor" -- a low-power, low-cost device that can read and write from the brain to augment or restore brain function. With this device, we seek to achieve a "moonshot" goal: to restore goal directed reaching in stroke survivors.

I will describe the origin of this moonshot project, preliminary progress, as well as the key next steps, highlighting scientific and technological synergies and challenges. As a specific case, I will present a collaborative effort between labs in CNS and DESE at IISc that involves developing a closed-loop EEG-based brain computer interface (BCI) for training human attention. I will conclude by describing opportunities for diversification and collaboration, with academic researchers, clinicians and entrepreneurs.