Brain-training for baseball robot

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Yamazaki, T. & Igarashi, J. Realtime cerebellum: A large-scale spiking network model of the cerebellum that runs in realtime using a graphics processing unit. Neural Networks 47 (2013) A model of the cerebellum comprising 100,000 'neurons' can help a robot learn how to hit a ball in real-time. The real-time cerebellum was developed by researchers at the University of Electro-Communications, Tokyo.

The human brain continually monitors and influences all bodily movements, helping the body adapt to different circumstances in order to maintain fine motor control. The part of the brain responsible for fine motor control, including precision co-ordination and accurate timing, is called the cerebellum. In the field of robotics, developing an artificial cerebellum capable of 'teaching' a robot to move with accurate timing is a key goal.

Now, Tadashi Yamazaki at the University of Electro-Communications in Tokyo with Jun Igarashi at Okinawa Institute of Science and Technology have created a model of the cerebellum comprising over 100,000 'neurons'—which was implemented on dedicated hardware for parallel

computing known as a graphics processing unit (GPU)—is able to train a robot to accurately hit a ball bowled in real-time.

The 'real-time cerebellum' built by the team is a large-scale version of a so-called 'spiking network model' - a mathematical description of neurons which can learn accurate timing through practice, just as the human cerebellum can. By connecting the cerebellum implemented on a GPU with a small humanoid robot, the team were able to test whether or not their cerebellum could help the robot learn accurate timing.

The researchers' aim was to train the robot to hit a ball bowled in real-time by a bowling machine. They found that, over time, the robot learnt through repeated practice when to raise the bat in order to hit the flying ball accurately. The real-time cerebellum could provide a powerful learning and training tool for robots in various applications in future.

More information: Yamazaki, T. & Igarashi, J. Realtime cerebellum: A large-scale spiking network model of the cerebellum that runs in realtime using a graphics processing unit. *Neural Networks* 47 (2013)

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