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Temporally Dynamic Artificial Neural Network

INVENTION: Investigators at the Salk Institute have developed a trainable, temporally dynamic artificial neural network capable of profiling and predicting events. The artificial neural network is modeled on the dentate gyrus (DG), one of two brain regions that incorporates new neurons throughout the lifetime of mammals in a process known as adult neurogenesis. In the artificial neural network, adult neurogenesis is captured by the continual addition of trainable nodes that integrate into the existing artificial neural network and become less trainable over time. This feature allows the neural network to generate unique outputs in response to input data representative of events occurring in time. The output data of the artificial neural network are well-suited for profiling and predicting events with temporal dynamics.

APPLICATIONS:
The artificial neural network is applicable to a diverse set of fields, including:

- genomic analysis
- brain network modeling
- financial systems, i.e., in stock markets, commodities etc.
- homeland security profiling
- marketing and targeted advertising
- data compression and encryption

ADVANTAGES:
The continual introduction of trainable nodes that integrate into the existing artificial neural network provides the network with the ability to generate unique outputs to events or combinations of events occurring in time. In this way, user-defined events or future events can be profiled and predicted based on the output of the artificial neural circuit.

STAGE OF DEVELOPMENT: The artificial neural network is available as an executable program. Please inquire for computer system requirements.

BACKGROUND: The dentate gyrus (DG) in the hippocampus is one of two brain regions that incorporates new neurons into existing circuitry throughout the lifetime of mammals. This process is referred to as adult neurogenesis. The importance of adult neurogenesis in DG function is not well understood. It has been proposed that the continuous introduction of new neurons facilitates the creation of new memories without disrupting previous memories, although experimental support for this theory is inconsistent. By developing a biologically inspired artificial neural network that includes adult neurogenesis in the form of continually developing trainable nodes that integrate into and mature within the existing artificial circuitry, Salk investigators found that adult neurogenesis may support associations between contemporaneous events.

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