Patent Search

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Abstract:

Abstract The volume of unstructured data, including audio and video data, is growing fast due to the Fourth Industrial Revolution. Neuromorphic computing, which ta inspiration from the workings of the brain, is a novel approach to computing that can process massive amounts of data concurrently and efficiently. The SNN is an ex artificial brain that mimics the brain's architecture by simulating the way real neural networks process things. Synaptic devices, like logic devices, have recently garner for application in neuromorphic computing. Many consider this to be the ferroelectric doping concentration ferromagnetic tunnel junction (FTJ), which has been ident promising candidate for synaptic equipment due to its benefits such as compatibility with complementary metal-oxide-semiconductor devices and processes, a simpl terminal framework, and low energy consumption. Literature is absent on the spiked actions of FTJ devices when used in SNN contexts. This work shows that the FTJ g successfully apply the STDP rules of the deep slump and stimulatory effects. A CrossSim software was employed to simulate word recognition and image analysis usi collected data. The simulation findings reveal that the device can accurately distinguish between scribbled pictures, with an efficacy of 96.89% on the MNIST dataset. evidence that FTJ devices could function as a synaptic component in the realization of an SNN.

Complete Specification

Description:Ferroelectric Bridge Junction Device with Computational Modelling and Synaptic Features

Field and Background of the Invention

The rate at which new information is generated every year is rising at an exponential rate. The advent of cutting-edge technologies like big data, AI, and driverless ve has paved the way for this. In particular, there has been an explosion in the volume of unstructured data, including images and voice recordings. Unfortunately, log memories are treated as independent components in the traditional von Neumann application architecture, which is a sequential processing method. Because the RAM process data at different rates, a bottleneck problem results. In addition, substantial network systems' scalability is constrained by the high energy required to inbound and outbound data for multiplication and accumulation. It has been suggested that neuromorphic computation, designed to function similarly to the neur network, could resolve these problems. Their synaptic plasticity characterizes the robustness of neuronal connections. To integrate memory, cognition, reasoning, a training, synaptic plasticity can be adjusted to vary the synaptic weight. A structure with an architecture analogous to the brain must be constructed to establish an system. Since neural networks, with their training rules, may simulate the vast network of connections between cells in the brain, these are attracting much attentic Whether or not synaptic plasticity predominates in a neuronal network is determined by a learning rule called STDP. At first, the idea was put forward as a speculati attempt to mimic the functioning of biological synaptic plasticity. However, research in SNN has only increased since then, with the discovery of STDP as a promising plasticity mechanism. Therefore, it has become a formidable obstacle to creating an artificial synaptic device capable of utilizing STDP learning

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