

Artificial Intelligence Insight Series - Neuromorphic Chipsets

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Abstracts

The application of Artificial Intelligence (AI) is growing exponentially. This rapid expansion of AI software development, therefore, calls for a focused effort to build new hardware that can process the emerging AI algorithms.

Future of AI hardware will be defined by biologically-inspired neuromorphic chipsets, which provide a real time boost for AI systems. Brain-like chips deliver natural intelligence in major AI applications in the long-term, and have the desirable characteristics of intelligent sensors. The ultimate aim is to develop process technologies, materials, memories, and other building blocks for the integration of the neuron chips into sensors.

Industry Adoption:

Focus is on the impact of neuromorphic hardware across different industries. Current status or limitations, and the future requirements and use cases for each industry have been considered to build the adoption scenario. The advantages offered by neuromorphic chipsets for the different verticals address how the new brain-inspired technology can help bridge the gap in the future.

The different industries included are:

Automotive

IoT Ecosystem

Cybersecurity

Financial Services

Space

Medical Systems

Competitive Intelligence:

The report includes an overview of the key players and active research projects in the domain. It covers different entities ranging from established semiconductor players and specialized neuromorphic solution providers, to universities and research institutes. The different parameters related to implementation level, market readiness, future focus, etc., are also highlighted. Additionally, the section includes an overview of emerging players and startups in ecosystem that are providing differentiated offerings and defining new frontiers in neuromorphic architecture and design.

Patent Analysis:

A patent study has been conducted to understand the evolution of patent publications and countries of the patent filings. The key assignees and technology domains shaping the neuromorphic IP landscape have also been covered to assess upcoming trends.

A total of 700 patent publications have been identified as specific to neuromorphic hardware, out of which, the top five IP players are IBM, Qualcomm, SK Hynix, Intel, and Brain Corporation. The patent section also covers key technology areas, emerging entities, patent collaborations and geographical distribution of assignees.

Key Insights:

Neuromorphic chipsets are laying the foundation for achieving artificial general intelligence (AGI) capabilities

Low power consumption, pattern recognition and stochastic operation are some of the key features that are driving adoption of neuromorphic chipsets across industries

Leading players are offering prototypes and making collaborative efforts with

research institutes for applying neuromorphic technology in real-world applications

Startups and organizations focused on ultra-low-power solutions, neuromorphic vision systems, always-on operation and AGI models are gaining traction

The patent study highlights an increased focus towards the development of autonomous systems, including initial investigations on electronic synapses for the implementation of reinforcement learning and other innovative architectures

Neuromorphic chipsets play a critical role in the high-performance architectures envisioned for 2040 for building massive computational infrastructure

Key questions addressed in the report:

What is the state of commercialization for neuromorphic chipsets?

Which are the industries that would will drive the adoption of neuromorphic hardware?

What are the active entities in the domain? At what stage is their product offering?

What are the emerging entities in the neuromorphic chipsets space?

Which startups are attracting significant amount of funding? And what is the outlook for these companies?

How is the patent portfolio of the top assignees aligned in terms of various technology areas of interest including neurons, synapses, interconnects, memory, edge devices, etc.?

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