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**Artificial intelligence - Operator interface - Part 1: Basic
mathematical classes**

人工智能 算子接口 第1部分：基础数学类

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents". Drafting.

This document is Part 1 of GB/T 46069 "Artificial Intelligence Operator Interfaces". GB/T 46069 has already published the following parts.

- Part 1: Basic Mathematics;
- Part 2: Neural Networks Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed and is under the jurisdiction of the National Information Technology Standardization Technical Committee (SAC/TC28).

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Introduction

In recent years, China's artificial intelligence industry has shown a prosperous development trend, with related software and hardware developing in a diversified manner, including cloud servers and edge computing.

With the proliferation of different types of processors for devices and terminals, various computing libraries, intermediate representation tools, and programming frameworks have also emerged.

A flourishing landscape. The vast abundance of AI software and hardware has greatly facilitated the efficient deployment of applications, but it has also brought about a diverse range of challenges.

The challenges of increasing complexity and fragmentation. On the one hand, AI software practitioners need to consider the interaction between their software and various mainstream AI processors.

Adaptation involves investing significant effort in improving software portability; on the other hand, the development of each AI hardware device requires fundamentally adapting to commonly used manual processes.

Intelligent software provides support; otherwise, it's difficult to integrate into the existing software ecosystem. This MxN level software-hardware mapping relationship has gradually developed...

This has become a major obstacle hindering the development of artificial intelligence applications.

Artificial intelligence operators are the fundamental computations for building artificial intelligence applications. They encapsulate related hardware operations, and artificial intelligence software calls these operators.

Sub-interfaces are used to utilize hardware resources to complete computations; operator interfaces serve as a bridge between artificial intelligence software and hardware. GB/T 46069, "Artificial Intelligence," is a standard standard for this field.

The "Artificial Intelligence Operator Interface" standardizes and normalizes the core data structures, functions, and interface parameters of artificial intelligence operators, aiming to reduce the cost of artificial intelligence...

This involves fundamental work that addresses the challenges of software and hardware compatibility and promotes ecological development.

GB/T 46069 "Artificial Intelligence Operator Interface" is proposed to consist of five parts.

- Part 1: Fundamental Mathematics. The aim is to establish the general principles and core data structures applicable to artificial intelligence operator interfaces, and...

Standardize the basic functions and parameter requirements of the interface for

fundamental mathematical operators.

- Part 2: Neural Networks. The purpose is to standardize the basic functions and parameter requirements of neural network operators.
- Part 3: Machine Learning Classes. The purpose is to standardize the basic functionalities and parameter requirements of machine learning operators.
- Part 4: Large Model Operators. The purpose is to standardize the basic functions and parameter requirements of large model operators.
- Part 5: Automated Testing Framework. The purpose is to provide automated testing methods and reference implementations for operator interfaces, verifying the operators.

Development standards compliance.

Artificial intelligence operator interface Part 1: Basic Mathematics

1 Scope

This document specifies the basic functions and parameter requirements of the interface for fundamental mathematical operators in the field of artificial intelligence.

This document applies to the design, development, and application of mathematical operator libraries for artificial intelligence, as well as the development of related software, hardware, and systems.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 operator

A functional unit that performs a specific computational task.

Note. These tasks can be encapsulated at different levels, including but not limited to the abstraction and optimization of low-level hardware operations.

3.2 operator interface

A standardized set of rules for describing and implementing interfaces for various mathematical operations, logical operations, or other complex computing units.

Note. The operator interface defines a standardized set of application programming