

PATENT APPLICATION

SENSOR DATA COMPRESSION ALGORITHM

Patent Application No. 16/789,432

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ABSTRACT

A system and method for compressing high-volume sensor data streams using adaptive machine learning algorithms. The invention provides real-time compression of industrial Internet of Things (IoT) sensor data while maintaining data integrity and enabling efficient transmission and storage. The system employs a novel multi-layer neural network architecture to identify temporal patterns and redundancies in sensor data streams, achieving compression ratios of up to 90% while preserving critical signal characteristics.

BACKGROUND OF THE INVENTION

[0001] Industrial IoT deployments generate massive volumes of sensor data that strain network bandwidth and storage resources. Existing compression methods either sacrifice data fidelity or require significant computational overhead, making them unsuitable for real-time applications.

[0002] There exists a need for efficient compression of sensor data streams that preserves signal integrity while reducing storage and transmission requirements.

SUMMARY OF THE INVENTION

[0003] The present invention provides a system and method for compressing sensor data streams using an adaptive neural network architecture. Key features include:

- a) Real-time analysis of data stream characteristics
- b) Dynamic adjustment of compression parameters based on signal patterns
- c) Selective preservation of critical data points
- d) Lossless reconstruction of original signals within defined tolerance ranges

DETAILED DESCRIPTION

[0004] The system comprises:

Component Architecture

Data Ingestion Layer

- High-speed sensor data input interface
- Signal preprocessing and normalization
- Temporal buffer management

Pattern Recognition Engine

- Convolutional neural network for pattern identification
- Adaptive learning module
- Pattern classification system

Compression Engine

- Dynamic dictionary generation
- Entropy coding module
- Error checking and validation

Operating Parameters

[0005] The system operates within the following parameters:

- Sampling rate: 1Hz to 100kHz
- Compression ratio: 10:1 to 100:1
- Maximum latency: 50ms
- Error tolerance: 0.1%
- Memory utilization: <256MB

CLAIMS

A method for compressing sensor data streams comprising:

- a) Receiving real-time sensor data input
- b) Analyzing temporal patterns using neural networks
- c) Generating adaptive compression dictionaries
- d) Applying selective compression based on signal characteristics

The method of claim 1, wherein the neural network architecture comprises:

- a) Multiple convolutional layers
- b) Dynamic weight adjustment
- c) Pattern recognition modules
- d) Error correction mechanisms

A system for implementing the method of claim 1, comprising:

- a) Data ingestion interfaces
- b) Processing units
- c) Memory modules
- d) Network interfaces

DRAWINGS

[0006] Figure 1: System Architecture Diagram

[0007] Figure 2: Neural Network Layout

[0008] Figure 3: Compression Flow Diagram

[0009] Figure 4: Performance Metrics

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ASSIGNMENT

The inventors hereby assign all rights, title, and interest in this patent application to:

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DECLARATION

I hereby declare that:

I am the original inventor of the subject matter described

I have reviewed and understand the contents of this application

I acknowledge the duty to disclose all relevant prior art

All statements made herein are true and correct

SIGNATURES

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Date: March 15, 2023

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Date: March 15, 2023

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