

DATA PROCESSING PIPELINE PATENT APPLICATION

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TITLE OF INVENTION

System and Method for Intelligent Data Processing Pipeline Optimization Using Machine Learning

APPLICANT

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TECHNICAL FIELD

[001] The present invention relates generally to data processing systems, and more particularly to machine learning-enabled optimization of enterprise data processing pipelines incorporating IoT sensor inputs and real-time analytics.

BACKGROUND

[002] Modern enterprise environments generate massive quantities of operational data from diverse sources including IoT sensors, business applications, and user interactions. Traditional data processing pipelines lack the capability to dynamically optimize processing paths based on real-time conditions and historical performance patterns.

[003] Existing solutions fail to adequately address the challenges of:

- Dynamic resource allocation across distributed processing nodes
- Real-time pipeline reconfiguration based on data characteristics
- Automated error detection and recovery

- Predictive scaling based on historical patterns

SUMMARY OF INVENTION

[004] The present invention provides a system and method for intelligent optimization of data processing pipelines using machine learning algorithms to analyze historical performance patterns and real-time operational metrics.

[005] In one aspect, the invention comprises:

- A sensor data ingestion layer supporting multiple IoT protocols
- A machine learning engine for pipeline performance analysis
- Dynamic routing algorithms for optimal data path selection
- Predictive scaling mechanisms based on historical patterns
- Automated error detection and recovery protocols

DETAILED DESCRIPTION

[006] The system architecture comprises:

[007] A. Data Ingestion Layer

- Protocol adapters for MQTT, AMQP, and custom protocols
- Data validation and normalization components
- Buffer management system with configurable thresholds

[008] B. Processing Engine

- Distributed processing nodes with dynamic resource allocation
- Machine learning models for performance optimization
- Real-time monitoring and analytics components

[009] C. Output Layer

- Configurable data transformation modules
- Multiple destination support with format conversion
- Quality assurance and validation checks

CLAIMS

[010] What is claimed is:

A system for intelligent data pipeline optimization, comprising:

- A plurality of data ingestion nodes
- A machine learning engine for performance analysis
- Dynamic routing algorithms
- Predictive scaling mechanisms

The system of claim 1, wherein the machine learning engine:

- Analyzes historical performance patterns
- Generates optimization recommendations
- Implements automated adjustments

A method for optimizing data processing pipelines, comprising:

- Collecting performance metrics
- Analyzing processing patterns
- Implementing dynamic optimizations

ABSTRACT

[011] A system and method for intelligent optimization of enterprise data processing pipelines using machine learning algorithms. The invention provides dynamic resource allocation, automated error recovery, and predictive scaling based on historical patterns and real-time metrics.

DRAWINGS

[012] The application includes the following drawings:

- FIG. 1: System Architecture Overview
- FIG. 2: Data Flow Diagram
- FIG. 3: Machine Learning Component Detail
- FIG. 4: Optimization Algorithm Flowchart

DECLARATION AND POWER OF ATTORNEY

[013] I hereby declare that:

- I am the original inventor of the subject matter claimed
- I authorize Summit Digital Solutions, Inc. to file this application
- I appoint Patent Counsel Firm LLP to prosecute this application

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