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Patent Search

Invention Title	SCALABLE MACHINE LEARNING ARCHITECTURE FOR IOT DATA PROCESSING AND ANALYSIS
Publication Number	04/2025
Publication Date	24/01/2025
Publication Type	INA
Application Number	202541002708
Application Filing Date	12/01/2025
Priority Number	
Priority Country	
Priority Date	
Field Of Invention	COMPUTER SCIENCE
Classification (IPC)	G06N0020000000, H04L0067120000, G06F0016230000, G06N0003080000, H04W0004380000

Inventor

Name	Address	Country
Mr.C.R.VIJAY	Assistant Professor (SS) Department of Management Studies Dr.N.G.P.Institute of Technology, Coimbatore STATE: TAMILNADU PIN CODE:641048	India
Dr Chitra Ramaprakash	Assistant Professor Department of Mathematics Dayananda Sagar College of Engineering, Shavige Malleshwara hills, Kumara Swamy Layout, Bengaluru 560078, Karnataka, India.	India
Dr. Sajja Suneel	Assistant Professor, Department of CSE(Data Science), Institute of Aeronautical Engineering, Dundigal, Hyderabad, Telangana - 500043, India.	India
Kottala Sri Yogi.	Assistant Professor (Sr.Scale) Dept of Operations Symbiosis Institute of Business Management, Hyderabad Telangana; Symbiosis International University Pune. India.	India
Dr. Ch Shankar	DESIGNATION: Assistant professor DEPARTMENT: Finance and Business Analytics COLLEGE FULL NAME : GITAM (Deemed to be) University CITY: Hyderabad STATE: Telangana PIN CODE: 502329	India
Dr.Suganthi Neelagiri	Assistant Professor Electrical and Electronics Engineering Dayananda Sagar College of Engineering Bangalore Karnataka, India. 560078	India
Dr. P. Usha	Professor Electrical and Electronics Engineering Dayananda Sagar College of Engineering Bangalore Karnataka 560078	India
Dr. Aparna Pavani. S	Associate Professor MBA Alliance School of Business, Alliance University. Bangalore. Pincode: 562106, India.	India

Applicant

Name	Address	Country
Mr.C.R.VIJAY	Assistant Professor (SS) Department of Management Studies Dr.N.G.P.Institute of Technology, Coimbatore STATE: TAMILNADU PIN CODE:641048	India
Dr Chitra Ramaprakash	Assistant Professor Department of Mathematics Dayananda Sagar College of Engineering, Shavige Malleshwara hills, Kumara Swamy Layout, Bengaluru 560078, Karnataka, India.	India
Dr. Sajja Suneel	Assistant Professor, Department of CSE(Data Science), Institute of Aeronautical Engineering, Dundigal, Hyderabad, Telangana - 500043, India.	India
Kottala Sri Yogi.	Assistant Professor (Sr.Scale) Dept of Operations Symbiosis Institute of Business Management, Hyderabad Telangana; Symbiosis International University Pune. India.	India
Dr. Ch Shankar	DESIGNATION: Assistant professor DEPARTMENT: Finance and Business Analytics COLLEGE FULL NAME : GITAM (Deemed to be) University CITY: Hyderabad STATE: Telangana PIN CODE: 502329	India
Dr.Suganthi Neelagiri	Assistant Professor Electrical and Electronics Engineering Dayananda Sagar College of Engineering Bangalore Karnataka, India. 560078	India
Dr. P. Usha	Professor Electrical and Electronics Engineering Dayananda Sagar College of Engineering Bangalore Karnataka 560078	India
Dr. Aparna Pavani. S	Associate Professor MBA Alliance School of Business, Alliance University. Bangalore. Pincode: 562106, India.	India

Abstract:

Scalable Machine Learning Architecture for IoT Data Processing and Analysis ABSTRACT The present invention relates to a scalable machine learning architecture designed for efficient processing and analysis of large-scale data generated by Internet of Things (IoT) devices. The system addresses the challenges associated with the high volume and velocity of IoT data by integrating distributed data processing techniques with dynamic machine learning models. The architecture is modular and designed to scale horizontally, enabling seamless handling of increasing data streams from numerous IoT devices in real-time or near-real-time. Key components of the architecture include an Ingestion Layer for secure and reliable collection of IoT data using various communication protocols, a Data Processing and Pre-processing Layer that handles distributed processing, data cleaning, feature extraction, and anomaly detection, and a Machine Learning Model Management Layer that continuously trains, tests, and updates learning models for predictive analytics and anomaly detection. The system also leverages both edge and cloud computing resources to optimize latency and computational efficiency, offering flexibility in data processing and model deployment. This scalable machine learning system ensures low-latency performance, real-time adaptability, and high throughput, making it suitable for a wide range of IoT applications, including industrial monitoring, smart cities, healthcare, and connected devices. By enabling continuous learning and adaptation, the system enhances the accuracy and relevance of its analytical models, improving decision-making capabilities across various IoT ecosystems.

Complete Specification

Description: Scalable Machine Learning Architecture for IoT Data Processing and Analysis

FIELD OF THE INVENTION

The present invention relates to the field of machine learning and Internet of Things (IoT). More specifically, it pertains to a scalable machine learning architecture designed for processing and analyzing data generated by IoT devices. The invention addresses challenges associated with handling large-scale, heterogeneous IoT data, offering an efficient, modular, and adaptive framework that supports real-time processing, high-throughput analysis, and integration with various IoT systems across multiple industries.

BACKGROUND OF THE INVENTION

The rapid proliferation of the Internet of Things (IoT) has transformed the way devices interact, communicate, and generate data. IoT devices, ranging from simple sensors to complex industrial systems, are now integral to various domains, including healthcare, agriculture, transportation, manufacturing, and smart cities. These devices continuously generate vast amounts of data that hold the potential to drive informed decision-making, improve operational efficiency, and enable predictive analytics. However, harnessing this potential is contingent on the ability to process, analyze, and derive actionable insights from the data efficiently and effectively.

The heterogeneous nature of IoT data, coupled with its velocity, volume, and variability, poses significant challenges in its management and analysis. IoT-generated data is often unstructured, time-sensitive, and spans multiple formats, including numerical, categorical, textual, and multimedia. Traditional data processing frameworks and centralized architectures struggle to meet the demands of IoT ecosystems due to their limitations in scalability, latency, and adaptability. These shortcomings necessitate a more robust and flexible approach.

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Page last updated on: 26/06/2019