ARTIFICIAL INTELLIGENCE BASED EDGE COMPUTING PLATFORM FOR INDUSTRIAL APPLICATIONS

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Abstract : Cloud computing has limitations such as computational complexity and delay. Edge computing is efficient and has fair resource allocation such as power and battery lifetime in internet of things based industrial applications. Co-ordination of AI at the edge will remarkably improve the range and computational speed of IoT based devices in industries. To solve the problem of short battery lifetime, and delay, intolerant portable devices we propose in this paper a forward central dynamic and available approach (FCDAA) by adapting running time of sensing and transmission processes in IoT based portable devices. A system level battery model by evaluating energy dissipiation. A data reliability model for edge artificial intelligence based IoT devices.

***IndexTerms* - Industrial IoT, Edge Computing, AI, FCDAA, Battery Model.**

I. INTRODUCTION

Due to industrial revolution, IoT enabled smart world came in focus. Nowadays AI driven edge computing mechanism is very necessary for industrial applications to solve relevant issues at global level. Main problem is resource–constrained nature of IoT enabled portable devices in the integrated platform. There are problems of high energy drain, shorter battery lifetime and complex, computational process. To solve this problem, this paper proposes FCDAA a forward central dynamic approach, system level battery model and data reliability model.

II. LITERATURE SURVEY

[1].There is a need to save energy when communicating data to a fog or cloud back end system. System proposes the distributed learning model on the sensor. It simulates the data stream in the fog, instead of transmitting all raw sensor values to the back-end cloud. The updated parameters of learned model at sensor device are communicated in longer time intervals to a fog computing device, to save energy and to communicate as few packets as possible.

[2].Computationally intensive Artificial Intelligence tasks are well suited to offload with cloud server. But there is a lack of energy delay optimization models designed for edge AI platform. System proposes multiple algorithm service model MASM with computation complexities to reduce energy and delay cost .It also proposes tide ebb algorithm to solve MASM optimization model. It reduces the energy and delay cost by optimizing the workload assignment weights and computing capacities of virtual machines, and guarantees the quality of the results.

[3].Digital Signal Processing are an important system components in industrial AI applications. System proposes FIR filters that could be used for industrial AI applications are designed from the Spline Biorthogonal 1.5 (SB1.5) mother wavelet using a real-time, low cost, generic industrial IoT (IIoT) hardware: the C28x DSP and low-level, Embedded C system software. This approach is able to repurpose low-cost, readily available hardware for distributed AI applications. This approach supports low-cost and fast single-stage FIR implementation suitable for use in real-time, distributed AI application at network edges, because, successive recursion of FIR filters leading to a full implementation of Pyramid Algorithm is not implemented.

[4].To guarantee the Quality of Service (QoS) of smart manufacturing systems, fog servers are deployed at network edge to provide fog computing services. 4] Proposes a design of Software-Defined Network (SDN) framework in a smart factory based on an Industrial Internet of Things (IIoT) system. A method based on Computing Mode Selection (CMS) and execution sequences based on the task priority (ASTP) is proposed. The fog computing service is obtained earlier on the basis of highest task priority.

[5].To overcome the defects of the traditional cloud computing model in the era of big data, system proposes a new AI enabled smart edge with heterogeneous IoT architecture which combines edge computing, caching, and communication. It proposes the Smart-Edge-CoCaCo algorithm. To minimize total delay and confirm the computation offloading decision, Smart-Edge-CoCaCo uses joint optimization of the wireless communication model, the collaborative filter caching model in edge cloud, and the computation offloading model.

[6]. Due to the power-constrained nature of portable devices, it is challenging to adopt medical media technologies during critical medical operations and diagnoses. Maximizing energy efficiency and extending the battery life is vital. It first proposes a transmission power control (TPC)-based energy efficient algorithm (EEA) for when a subject is in different postures, i.e., standing, walking, and running, in wireless body sensor networks. Second, a hardware platform was developed on the Intel Galileo board to test and compare the proposed EEA and conventional adaptive TPC (ATPC) in terms of energy and channel reliability or packet loss ratio (PLR).

III. PROPOSED WORK

AI driven edge computing mechanism is very necessary for IoT based industrial applications. To solve the problem of high energy drain, shorter battery lifetime this paper proposes the following three parts:

A. FCDAA: The main purpose of FCDAA is to extend the battery lifetime and save the power in AI based edge computing platforms for industrial application. The transmission power control and duty cycle entities of the IoT based portable devices are optimized by following energy neutral operation during sensing, processing and transmission of industrial data.

B. System level battery model : System level battery model is proposed by verifying the duty cycle and energy optimization in edge AI-enabled IoT devices for industrial applications. In duty cycle analysis harvesting energy from access point to nodes plays important role to examine overall network performance.

C. Data Reliability model: Data reliability model for the AI-based industrial applications over hybrid transmission power control (TPC) and duty cycle network is proposed. Received signal strength indicator (RSSI) and packet loss ratio (PLR) are the main factors to examine the entire system.

IV. PROPOSED MODEL

Following Fig. shows the proposed AI-enabled framework for industrial applications. It comprises four sections such as, adaptive edge node, adaptive network node, adaptive application node and service node. First, Edge node collects data, stores in cloud, process, analysis and monitors with the help of edge intelligence which is based on cognitive knowledge of the entire industrial mechanism. Second, Adaptive network node gets information from adaptive node and manages that data with router, repeater, satellite system, access point, router and wireless local area networks. Third, adaptive application node gets information from upper layers by handling the fault diagnosis and monitoring of the entire platform to the last service node. Fourth, service node deals with the duty-cycle and energy optimization in the overall industrial system.

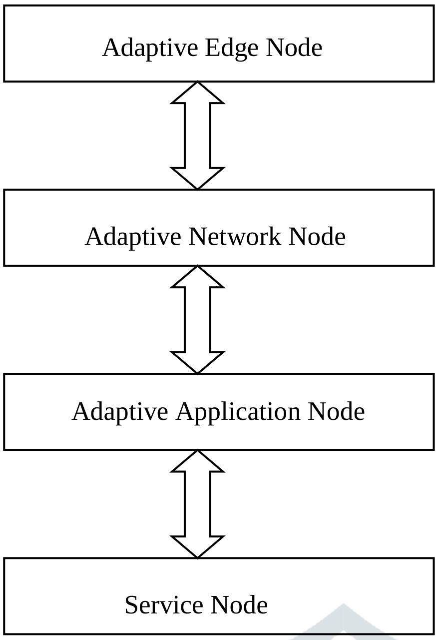

Fig: Proposed Architecture of AI based Edge Computing platform for Industrial Application

V. REQUIREMENTS

software requirements:

1. Eclipse
2. Apache Tomcat
3. My-SQL
4. JDK7.0

hardware requirements:

1. Ram : 4 GB
2. HDD: 500 GB
3. Processor : i3

VI. CONCLUSION

It is very important to establish power saving and battery-aware communication for IoT based devices industrial applications. Proposed FCDAA saves high energy. FCDAA fulfils the main requirement of received signal strength indicator RSSI and packet loss ratio PLR by adopting AI driven edge computing platform for industrial applications. It is the potential candidate for energy saving in AI driven edge computing mechanism for industrial applications.

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