Title :

Service Provision of Smart Education Environment using Fog based Data Streaming

Full name of Speaker :

Assoc. Prof. Myat Pwint Phyu,
Assoc. Prof. Aye Myat Myat Paing,
myatpwintphyu@uit.edu.mm, ayemyatmyatpaing@uit.edu.mm

Institution :

Faculty of Computer Science,
University of Information Technology, Yangon, Myanmar

Service Provision of Smart Education Environment using Fog based Data Streaming

Background :

Recently, most of the universities in Myanmar follow and use the traditional ways of management as follow.

- Teachers can give assignments, test tutorials and students can upload their assignment done using the learning management system (LMS) software such as Moodle.
- Teachers record and calculate the students' attendance on paper or using LMS.
- For student enrolment, the student affair department records the student data by using the application of student registration system and stores in the storage server of the university.
- In library, students can borrow books by using their student cards.
- There are security guards at the campus gates for security.
- The whole process flow is separate each other and the central management has to collect the information separately.

Targets:

- To use existing WiFi infrastructure effectively without other dedicated hardware
- To reduce latency and bandwidth of Cloud computing using Fog computing layer
- To approach the smarter education environment providing various context-aware services

Proposed Method: Fog based IoT Data Streams in Providing Services of Smart Education Environment

- In the proposed IoT based smart education environment, the campuses are managed by taking the advantages of Wi-Fi, access points (AP), IoT devices and the power of Cloud computing.
- If students move around the campus such as attending the lecture in the lecture room, reading in the library and sitting at canteen, their mobile devices connect the respective Wi-Fi access points where they reach and the time and places are recorded.
- These data are processed for visualizing the student attendance by each student, monitoring the students and security control system.
- Moreover, those data are stored and analysed in Cloud server for further processes like attendance management.
- Besides the administration departments of the university can get the enough information of the students by the report of Big Data analysis.

Proposed Method: Fog based IoT Data Streams in Providing Services of Smart Education Environment

- In smart education environment, some services need to be provided as soon as possible for continuous data generated by IoT devices.
- The Fog computing layer has to process IoT data streaming by lightweight protocol such as MQTT (Message Queuing Telemetry Transport) and CoAP (Constrained Application Protocol).
- Due to the limitations of Cloud infrastructure, Cloud based Big Data analytic is shifted to Fog infrastructure as shown in table and the data streams are analysed with machine learning and deep learning techniques.

Participants		**Description**
Devices	IoT Layer	smart phones, smart watches, laptops, etc
	Fog Layer	Wi-Fi access point, local server node, etc
Network		Wi-Fi
Place		classrooms, library, canteens, recreation center, auditorium
People		Students, Teachers/Faculties, Admin Staffs
Services	Fog based analytics	Localization, Attendance Visualization, Security Monitoring
	Cloud based analytics	Attendance Management, Student Information System

Impact:

- Since the location of the students can be determined from the time and place data of incoming data streaming and the real-time information of which student is at which location is important for decision making process, the data analytics is passed to the Fog layer as shown in Figure.
- In the Cloud layer, only the compute intensive and low responsive applications are processed.

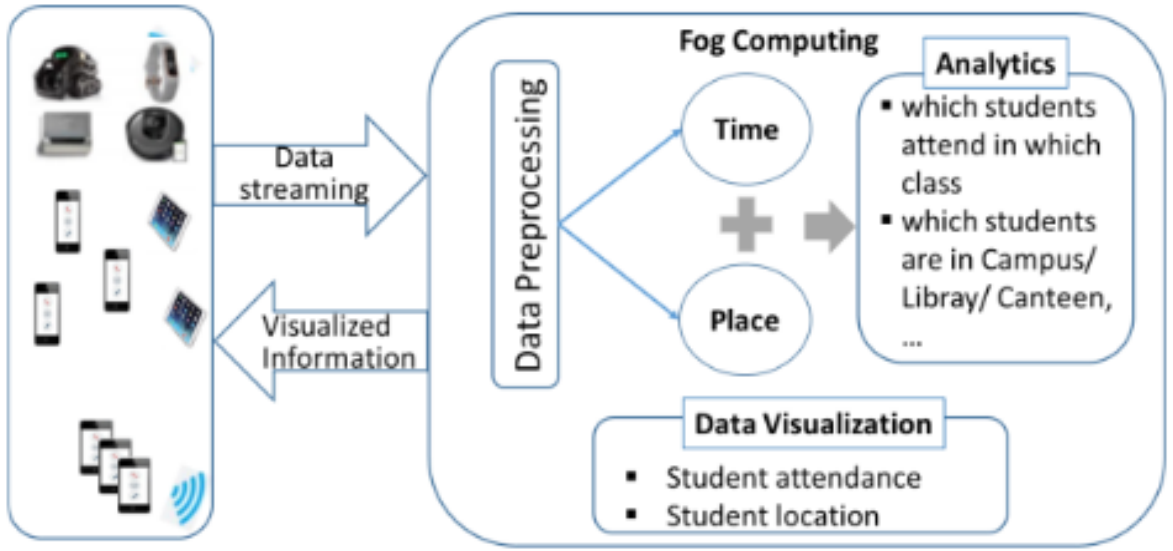

Figure. Fog based IoT data stream in higher education management

Output/Outcome:

- The expected outcomes of the concept of Fog based IoT data stream of smart campus are to get low latency and responsive information for students, teachers and the administration.
- By using the presented concept, more intelligent, efficient and accurate services can be provided for teaching, learning and management in higher education environment.

Conclusion:

- Today higher education institutions have widely used Internet based communication to make more engaging teaching, learning and management environment for students, teachers and administration.
- Due to the facilities of Wi-Fi in many campuses, various users such as staffs, teachers and students can use the Internet via the devices such as desktops, laptops and tablets and smartphones.
- In the trend of IoT, the devices like sensors can generate large amount of data and those data are handled and managed by Cloud computing.
- Because of the Cloud infrastructure consuming high latency and bandwidth, the proposed work presents the technological impact in higher education and a potential concept of how to process and analyse the IoT data streams using Fog computing layer to approach the smarter education environment.