FOUNDATION OF CLOUD IOT EDGE ML

PROF. RAJIV MISRA
Department of Computer Science & Engineering
IIT Patna

PRE-REQUISITES : Basics of Computer Architecture and Organization, Networking

INTENDED AUDIENCE : CSE, ECE, EE

INDUSTRY SUPPORT : IT industries

COURSE OUTLINE :

The disrupted conventional computing models for internet of things(IoT), cloud computing, machine learning and embedded technologies have emerging computing paradigms called as Edge Computing . Computing has taken many shapes from edge to cloud. This course has been designed with an objective to provide a comprehensive understanding of relevant technologies (IoT, ML and Cloud) for various emerging computing paradigms of Edge Computing. Emerging applications of Internet of Things (IoT) such as augmented reality, self-driving cars, and many more are delay sensitive and computation intensive involve computing with large amount of data generated from massively distributed end users require real-time processing. Although the success of cloud computing for supporting high performance computing has been witnessed in recent years, its inefficiency in quality of service (QoS) provisioning for delay sensitive applications as well as high energy consumption has been the bottleneck for the development of delay-sensitive IoT applications. Edge computing has recently emerged as an extension to cloud computing for QoS provisioning for delay-sensitive applications. It supports cloud-like computing in the network edge by deploying computing and network resources along the path between data source and cloud datacenters. This course provides an in-depth understanding of terminologies and the core concepts behind Cloud-IoT-Edge problems, applications, systems and the techniques, that underlie today's cutting-edge technologies. It provides an introduction to some of the start-of-the-art IoT and wireless networks, edge and virtualization technologies, recent trends in computer hardware for artificial intelligence, spatial localization and detection, tensor processing unit for fast and affordable artificial intelligence (AI). And while discussing the concepts and techniques, we will also look at various applications of Cloud-IoT-Edge using Machine Learning, Deep Learning, and many others. The course is suitable for all UG/PG students and practicing engineers/ scientists from the diverse fields and interested in learning about the novel cutting edge techniques and applications of Cloud-IoT-Edge.

ABOUT INSTRUCTOR :

Prof. Rajiv Misra is working in Department of Computer Science and Engineering at Indian Institute of Technology Patna, India. He obtained his Ph.D degree from IIT Kharagpur, M.Tech degree in Computer Science and Engineering from the Indian Institute of Technology (IIT) Bombay, and Bachelor's of engineering degree in Computer Science from MNIT Allahabad. His research interests spanned a design of distributed algorithms for Mobile, Adhoc and Sensor Networks, Cloud Computing and Wireless Networks. He has contributed significantly to these areas and published more than 70 papers in high quality journals and conferences, and 2 book chapters. His h-index is 10 with more than 590 citations. He has authored papers in IEEE Transactions on Mobile Computing, IEEE Transaction on Parallel and Distributed Systems, IEEE Systems Journal, Adhoc Networks, Computer Network, Journal of Parallel and Distributed Computing. He has edited a book titled as "Smart Techniques for a Smarter Planet: Towards Smarter Algorithms" for the "Studies in Fuzziness and Soft Computing" book series, Springer (2018). He has supervised four Phd students and currently four Phd students working under his supervision in the area of big data, cloud computing, distributed computing, and sensor networks. He is a senior member of the IEEE and fellow of IETE. He has completed as the Principal Investigator of R&D Project Sponsored by DeiTY entitled as "Vehicular Sensor and Mesh Networks based Future ITS". He has mentored the online courses on Cloud Computing, Advanced Graph Theory and Distributed Systems in the platform of NPTEL.

COURSE PLAN :
Week 1: Introduction to Cloud, Internet of Things (IoT), and Edge Computing Paradigms
Week 2: Integrating Cloud+ IoT + Edge Infrastructures: System Modeling and Research Challengesin Federating Edge Resources
Week 3: Management and Orchestration of Network Slices in 5G, Edge, and Clouds
Week 4: Introduction to Lightweight Container Middleware for Edge Cloud Architectures
Week 5: Data Management and Predictive Analysis to Support Edge Application Deployment
Week 6: Edge Computing Realization for Big Data Analytics
Week 7: Introduction to Machine Learning Services at Public Cloud (AWS Sage Maker)
Week 8: Use Cases for Machine Learning and Deep Learning at the Edge: Smart Surveillance Video Stream Processing, AR/VR, Health Monitoring and Self-driving cars