

**One Week On-line
Faculty Development Programme**

On

**QUANTUM COMPUTING AND
MACHINE LEARNING**

30th November — 05th December, 2020

Sponsored by Faculty Development Cell, AICTE
(Under Technical Teachers Training Scheme of AICTE)

Quantum machine learning is an emerging interdisciplinary research area at the intersection of quantum physics and machine learning. The most common use of the term refers to machine learning algorithms for the analysis of classical data executed on a quantum computer, i.e. quantum-enhanced machine learning. While machine learning algorithms are used to compute immense quantities of data, quantum machine learning increases such capabilities intelligently, by creating opportunities to conduct analysis on quantum states and systems. This includes hybrid methods that involve both classical and quantum processing, where computationally difficult subroutines are outsourced to a quantum device. These routines can be more complex in nature and executed faster with the assistance of quantum devices. Furthermore, quantum algorithms can be used to analyze quantum states instead of classical data. Beyond quantum computing, the term "quantum machine learning" is often associated with classical machine learning methods applied to data generated from quantum experiments (i.e. machine learning of quantum systems), such as learning quantum phase transitions or creating new quantum experiments. Quantum machine learning also extends to a branch of research that explores methodological and structural similarities between certain physical systems and learning systems, in particular neural networks. Finally, researchers investigate more abstract notions of learning theory with respect to quantum information, sometimes referred to as "quantum learning theory".

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Organized by

**Department of
Computer Science and Engineering
JNTUA COLLEGE OF ENGINEERING
(Autonomous): : PULIVENDULA
Pulivendula-516390, Y.S.R.Kadapa (Dist)**

&

**Directorate of Faculty Development & IQAC,
JNTUA, Anantapuramu, Andhra Pradesh.**

www.jntua.ac.in
www.jntuacep.ac.in

About the Institution



The foundation stone of the college was laid on 25th December 2005 by late Dr. Y. S. Raja Sekhara Reddy, former Chief Minister of A.P. The college started functioning with six branches from the academic year 2006—07, as the constituent college of the erstwhile JNTU, Hyderabad. After quadrification of JNTU in 2008, it became the constituent college of JNTUA, Ananthapuramu. Ever since, the college has been striving hard to emerge as a premier institution of excellence in the field of Science and Technology. The campus is spread over a sprawling 185 acres in a calm, serene and pollution free environment. At present, the college has got academic autonomy from the academic year 2013-14. Recently college has nominated for QEEE program by MHRD, New Delhi.

About the Department

The Department of Computer Science and Engineering was established in the year 2006. Since its inception, the department is under dynamic progress and is able to establish the reputation for imparting quality education both at undergraduate (B.Tech) and post graduate (M.Tech) programmes. The department has well equipped modern research oriented Computer laboratories. The department has “Learn-by-Practice” environment and department concentrates on the overall development of the students. The department is provided with 4 Mbps Leased Line Internet connection and also Video

Conferencing facility. The Mission of the department is to do exemplary Research work which advances the body of the knowledge in the field of Computer Science and Engineering. The Vision of the department is exploring innovative approaches to enhance learning and to provide world-class learning and research environment through the integration of technology.

Objective of the Workshop

The pace of development in quantum computing mirrors the rapid advances made in machine learning and artificial intelligence. It is natural to ask whether quantum technologies could boost learning algorithms: this field of inquiry is called quantum-enhanced machine learning. Machine learning has fundamentally changed the way humans interact with and relate to data, and achieved remarkable successes in many application areas. However, this revolution faces increasing challenges due to limited computational power and the growing size of datasets. Information is fundamentally governed by the laws of physics, and quantum mechanics can enhance our information-processing abilities. Unprecedented quantum advantages have been identified, such as Shor’s polynomial-time quantum algorithm for factorization, which compromises the widely-used RSA cryptosystem. Motivated by this and other possible applications of quantum information, the study of the impact of quantum mechanics on information processing has become a major research area over the past two decades.

Topics

1. Fundamentals of Quantum Computing.
2. Introduction to Quantum Machine Learning.
3. Classical Machine Learning algorithms
4. Quantum Machine Learning algorithms
5. Basics of machine learning with Tensor flow
6. Applications of Quantum Machine Learning
7. Implementation of Quantum Machine Learning Algorithms on Quantum Computers

Speakers

Subject experts will be drawn from premier institutions like IITs, NITs and Industry experts.

FDP Outcomes

Participants can develop the solutions for machine learning tasks using quantum computing better than the classical machine learning approaches.

Participants can develop real world applications using quantum machine learning approaches.

Venue

Each participant is expected to access the online platform using a PC or Laptop at home or office on the particular FDP schedule dates. Each participant has to spend 6 to 8 hours of efforts during this FDP

Eligibility

The faculty members from Computer Science & Engineering and related disciplines from AICTE approved institutions.

Registration

Only online registration is available, candidates can register using link :

<https://forms.ele/m3vAnVAHvf8NT57e7>.

The last date for registration is **26-11-2020**.

The selected participants will be intimated through mail.

No Registration Fee.

Contact Persons

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