AIML@School

An Introductory Program

for Class XI Students of all Subject Streams

by

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LMP Education Trust

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Motivation & Purpose of this Program

@mmpant

I, **Professor MM Pant,** am closely associated with the IIT system. I have received a **Ph.D. in Computational Physics** from IIT Roorkee (formerly Roorkee University) and have taught as a faculty at **IIT Kanpur** from 1972 to 1980. Have been a member of the Board of Management of **IIT Delhi** for 6 years.

I have been Professor of Computer Science at **IGNOU** for about 15 years and Pro Vice-Chancellor very briefly.

My mission therefore is to deliver a leading world class education but made available to a large number of the young learners.

It is now almost forgotten, but in the early years of IIT, a student was admitted after having studied class XI. He had to study at IIT for 5 years to graduate as a B.Tech. We now have admission after passing class XII with 4 years at IIT. Both add up to 16 years of Schooling.

The reason for this reference is that I am attempting to introduce the latest technology to class XI students, to orient them to the new ways of self-directed learning . By the time they complete a Bachelor's degree they will be well equipped to face the emerging workplace with AI everywhere.

Lord McCauley felt in the 1830s, a need to produce - by English-language higher education -" a class of persons, Indian in blood and colour, but English in taste, in opinions, in morals and in intellect", in other words clerks and low level bureaucrats. This was similar to the establishment of the Thompson College of Engineering in 1847 ....

But almost a hundred years ago in 1919, our Bharat Ratna Pandit Madan Mohan Malaviya had the thoughts on starting technical education at an early stage.

"Even if we begin tomorrow the Technical Education of all the youth of twelve years of age who have received sound elementary education, will take seven years before these young men can commence the practical business of life, and then they will form but an insignificant minority among the uneducated mass."

Around the Independence Day, 71 years after achieving our Independence, we are creating a movement for empowering the youth to liberate themselves from the stranglehold of the education regulators to become prosperous and flourish in the 4th Industrial Age.

This model has several innovative features: the first being to become future ready in knowledge and skills, learning at their place and time, in short chunks of content (nano-learning) on their mobiles following personalised pathways. This is also an example of 'consensual education' where learners join courses that they want to pursue in the sequence that best suits them, rather than an authority driven bundle of mandatory courses. The age of Intelligent Machines will need ingenious humans to fully benefit from them, and this program leads them to that path.

Overview

AIML@School is an **innovative program** (conceptualised, designed and developed by Prof. MM Pant) to prepare a new generation of youth, who while still in school are initiated to the knowledge, skills, and growth mindset needed to flourish in the emerging **4th Industrial Age** driven by **Artificial Intelligence** and **Machine Learning**. It builds on the experience of and the soul of an "IIT education", and inspired by **Mahamana Madan Mohan Malaviya**'s views on introducing technical education at an early stage while seeking to undo the immense damage inflicted by McCaulay's influence of creating a nation of clerks. This is elaborated in the previous paragraphs.

This course will prepare the participants for a future of disruptive technologies driven by Artificial Intelligence by making them aware of the vocabulary of the field, rudimentary appreciations of the key concepts, knowledge of the tools and technologies. realistic understanding of the challenges that remain and become aware of a number of instances of applications of AI/ML in diverse industries.

We pilot with an introductory 10-hour program for learners at class XI in Schools. The program is not limited to only Science stream students, but is desirable for all students, because AI is going to impact all areas of human activities.

The course is structured as 12 sessions of about 50 minutes each, and can therefore be delivered flexibly from an intensive 2 weeks course to a relaxed 3 months course, depending upon the learner needs.

My default model is to run it as a **Whatsapp course** that can be accessed from a mobile phone (Android or iOS) anywhere. The course will run for 2 weeks (Monday to Saturday) with 5 posts per day of content that can each post be transacted in about 10 minutes. This is **nano-learning,** but quite intense. The participants will learn from the regular posts, suggested readings, videos and discussions with other participants as well as the faculty.

The time at which the posts will be made on scheduled day is spread after school hours at 4:30pm, 5:00pm, 5:30pm, 6:00pm and 6:30pm.

Two batches will run every month. One beginning on the first Monday and the other beginning on the third Monday of the month. This is a tentative plan, and may be tweaked during the delivery for better effectiveness. The program has been conceived of, designed by and will be primarily delivered by me. I may draw upon the help and support of some other team members as and when needed.

Further, a suitably modified version of this program for children in class IX may be introduced by the summer of 2019. A very relaxed version of this program that could be pursued by all students would be to stretch the program over 3 months (12 weeks), with one post per day for each of the 5 days of the week. This could be tailored for those students who are more comfortable with Hindi by providing a **Hindi version** of the English post of the day. And schedules of different vigour can be followed to take care of motivation and perseverance level of different categories of learners. For example a schedule of 3 days a week for 4 weeks (one month).

10-Hour Learning - spread across 2 weeks, 12 Topics, 60 Message Posts

Session 1: What's the excitement about AI?

Brief : Although it may not be apparent, we are already using AI in many of our routine tasks. The e-mail spam filter, predictive text, Siri, Alexa or face recognition to unlock our iPhones are all AI applications. With big hopes, the term was proposed in 1956 but was followed by disillusionment. Today Andrew Ng says " **AI is the new electricity**". This session posts cover the evolution of AI, what can AI do today, and its implications.

> 1.1@4:30pm: The early years, the winter of AI and its resurgence
> 1.2@5:00pm: What can AI do today? The disappearing jobs and the new job opportunities
> 1.3@5:30pm: The Gig Economy
> 1.4@6:00pm: The Ethics of AI
> 1.5@6:30pm: Learning more about AI

Session 2: Why School students should learn about AI,ML and CT?

Brief: Most of the educational programs in the field are at Masters level and a few at the Undergraduate level. But we think that an appreciation and understanding of the field should be created at the School level itself. We have chosen Grade 11 as the stage at which we begin this initiative. All children at this stage have been born in the 21st Century and are immersed in a world of AI technology. Another important effect is raising questions about being a human?

> 2.1@4:30pm: What International political leaders are saying?
> 2.2@5:00pm: What Technology and business leaders are saying?
> 2.3@5:30pm: Why learning early matters?
> 2.4@6:00pm: Overcoming learning resistance
> 2.5@6:30pm: How it helps in making better choice for further education?

Session 3: Computational Thinking: Meaning, definition and importance in the context of AI

Brief : Jeanette Wing describes Computational Thinking as automation of abstraction. We consider this and other views as well. Then explain the elements of Computational Thinking: decomposition, pattern recognition, abstraction, algorithms and evaluation.

While the first conceptualisation of Computational Thinking was available before the significant development of AI, but the extension was natural as pattern recognition is a common feature. Also understanding of algorithms that learn. We also introduce heuristic and genetic algorithms.

> 3.1@4:30pm: Computational Thinking: Meaning and definition
> 3.2@5:00pm: Computational Thinking : in the context of Artificial Intelligence and Machine Learning
> 3.3@5:30pm: Algorithms
> 3.4@6:00pm: Learning Algorithms
> 3.5@6:30pm: Heuristic & Genetic Algorithms

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Session 4: The Basics of Neuroscience:

Brief: The human brain has been the main inspiration for the field of artificial intelligence(AI). It seems that the ultimate goal of AI is to emulate the brain. That is an incredibly daunting task considering the fact that neuroscientists are still struggling with trying to understand the cognitive mechanism that power our brains.
Many foundational concepts in AI such as neural networks have been inspired by the architecture of the human brain. Hence this introduction to neuroscience.

4.1@4:30pm: Basic Brain Facts: The central and peripheral nervous system
4.2@5:00pm: The anatomy and physiology of neurons
4.3@5:30pm: Neurons communicate using both electrical and chemical signals.
4.4@6:00pm: Mirror Neurons
4.5@6:30pm: Recent advances in neuroscience

Session 5: Relationship between Artificial Intelligence, Machine Learning and Deep Learning
Brief: These three terms are used almost synonymously, but there are distinctions among these terms. In this session we explain that Machine Learning is a subset of Artificial Intelligence and Deep Learning is a subset of Machine Learning. We also share information about programming languages that are used in this field.

5.1@4:30pm: The Landscape of Artificial Intelligence
5.2@5:00pm: Machine Learning
5.3@5:30pm: Deep Learning
5.4@6:00pm: What are Artificial Neural Networks? And where are they used?
5.5@6:30pm: Programming languages for AI and ML

Session 6: Artificial Neural Networks

Brief: A big breakthrough in Machine Learning was achieved when the analogy to neural networks was adopted to solve complex problems. Using suitable mathematical functions to represent the nodes(neurons) in the network with weighting factors give a generalised model for solving many problems.

6.1@4:30pm: Feed Forward Neural Networks
6.2@5:00pm: Recursive Neural Networks
6.3@5:30pm: Recurrent Neural Networks
6.4@6:00pm: Convolutional Neural Networks
6.5@6:30 pm: An overview of other ANNs.

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Session 7: Mathematics for AI and Machine Learning

Brief : Many concepts learnt in School Mathematics when extended and generalised find wide use in Machine Learning. Linear Algebra, Statistics and Calculus all find applications in implementing Machine Learning models.

    7.1@4:30 pm: Where is Mathematics used?
    7.2@5:00 pm: Linear Algebra
    7.3@5:30 pm: Calculus
    7.4@6:00 pm: Probability and Statistics
    7.5@6:30 pm: Optimisation Techniques

Session 8: Object Recognition and Computer Vision

Brief: The most well-known problem in computer vision consists of classifying an image into one of many different categories. In recent years classification models have surpassed human performance and it has been considered practically solved. However, there are still plenty of challenges to image classification. Automated object recognition and more generally scene analysis from photographs and videos is the grand challenge of computer vision. This course presents the image, object, and scene models, as well as the methods and algorithms, used today to address this challenge.

    8.1@4:30pm: Basic Principles of Computer Vision: The Foundations
    8.2@5:00pm: What does it mean to have vision? Object tracking and localisation
    8.3@5:30pm: How do Machines recognise objects? Possible approaches
    8.4@6:00pm: Stages of an Image Classifier
    8.5@6:30 pm: Convolutional Neural Networks for Visual Recognition

Session 9: Speech Recognition and conversational interfaces; Chatbots and Machine Translation

Brief : The earliest user interface was a command line. It moved to GUIs in the recent past. The closer we get to a natural human interface, the more comfortable we will be solving problems. And the human natural interface is spoken language. It's one of the first interfaces we ever came up with. And it has always been our favorite kind of interface.
Chatbots are algorithmic conversational agents which companies are coming up with to interact with their customers. The first stage in a chatbot is parsing the "utterance" and derive the "intention". After generating the response using deep neural networks, it then again converts to human language.

    9.1@4:30pm: What is a Conversational Interface?
    9.2@5:00pm: The Challenges in Speech Recognition?
    9.3@5:30pm: Natural Language Processing
    9.4@6:00pm: Chatbots
    9.5@6:30pm: Machine Translation

10-Hour Learning - spread across 2 weeks, 12 Topics, 60 Message Posts

Session 10: Autonomous Transportation: How does it work?

Brief : Self-driving technologies have been developed by Google, Uber, Tesla, Nissan, and others. Most self-driving systems create and maintain an internal map of their surroundings, based on a wide array of sensors. Software then processes those inputs, plots a path, and sends instructions to the vehicle's "actuators," which control acceleration, braking, and steering.
Obstacle avoidance algorithms, predictive modeling, and "smart" object discrimination help the software follow traffic rules and navigate obstacles.

    10.1@4:30pm: The technical challenges to driverless cars
    10.2@5:00pm: How they work? The technology leaders
    10.3@5:30pm: The Six Levels of Driving Automation
    10.4@6:00pm: Machine Learning applied to Autonomous Transportation
    10.5@6:30 pm: Impact that autonomous transportation will have

Session 11: Robots, Drones and Humanoids

Brief: Robots can be autonomous or semi-autonomous and range from humanoids to industrial robots, medical operating robots, patient assist robots, dog therapy robots, collectively programmed swarm robots and even microscopic nano robots. Robots traditionally were designed for performing specific tasks. Drones are robots that fly. But AI empowered robots can learn from experience.

    11.1@4:30pm: Traditional Robots
    11.2@5:00pm: AI and Robotics
    11.3@5:30pm: Drones
    11.4@6:00pm: Swarm Robotics
    11.5@6:30 pm: Humanoids

Session 12: The Technologies from IBM Watson, Google Tensorflow, Amazon and Apple

Brief: IBM has Watson that has established itself with many applications. Google has Tensorflow, Duo and AlphaGo. Amazon has Alexa, Sagemaker and Deeplens. Microsoft has its suite of tools. And Apple has its neural engine in its mobile phones that make them capable of face recognition.

    12.1@4:30pm: IBM Watson
    12.2@5:00pm: Google Tensorflow
    12.3@5:30pm: Microsoft
    12.4@6:00pm: Apple
    12.5@6:30pm: Amazon

Program Fee

Fee structure :

Fee for the 2 week program : Rs 5000+ GST Rs 900= Rs 5900
Fees can be easily paid by **Paytm** to mobile number :+919810073724

For those who would rather pay by Bank Transfer, here are the details:
For NEFT / RTGS

    Beneficiary Name   MADAN MOHAN PANT
    Bank Name   HDFC BANK
    Branch   Unit No.05 A & B, Ground Floor, Tower A, Unitech Cyber Park, Sec 39,Gurgaon – 122002 Haryana
    Account Number   2645100000301
    IFSC code   HDFC0002645 (first four digits are alphabets and remaining 7 are numbers)

For International remittance

    Beneficiary Name   MADAN MOHAN PANT
    Bank Name   HDFC BANK
    Branch   Unit No.05 A & B, Ground Floor, Tower A, Unitech Cyber Park, Sec 39,Gurgaon – 122002 Haryana
    Account Number   2645100000301
    Swift   HDFCINBB

Customising the program:
At the request of educational Institutions (Schools), this program can be customised for blended delivery with face to face sessions and Whatsapp based social learning.

For registration and any further queries on this program, please contact us by:
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