



MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE (UGC-AUTONOMOUS)

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Report on A Guest Lecture “Neural Network and Deep Learning “ Organized by Department of Computer Science & Engineering in Association with ISTE Student Chapter

Date: 16.11.2023

Time: 2pm to 4pm

Venue: Seminar Hall A

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE
(UGC-AUTONOMOUS INSTITUTION)
Madanapalle-517325, Annamaya Dist., Andhra Pradesh

In Association with ISTE Student Chapter

Organized by Department of Computer Science & Engineering

One Day Guest Lecture on
Neural Network and Deep Learning

Resource Person
Dr. D. Pavithra
Assistant Professor (SG),
Dr. N. G. P Institute of Technology, Coimbatore.

Date: 16th November 2023 Time: 2.00 p.m to 4.00 p.m Venue: Seminar Hall A

Chief Patron: Dr. N. Vijaya Bhaskara Choudary, Ph.D., Secretary & Correspondent
Patron: Mrs. Keerthi Nadella, Executive Director
Program Chair: Dr. C. Yuvaraj, Principal
Co-Chair: Prof. Goutam Chakraborty, Ph.D., Dean, School of Computing
Convener: Dr. R. Kalpana, Ph.D., Professor & Head, Dept. of CSE
Coordinators: Dr. D. J. Ashpin Pabi, Assistant Professor, CSE; Dr. R. Nidhya, Professor, CSE

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Submitted by: Dr. D. J. Ashpin Pabi, Assistant Professor, Department of Computer Science & Engineering, MITS, Madanapalle.

Participants: 110 Students from II CSE

The programme was started at 2:00 PM with a welcome address to all the audience by Dr. R. Kalpana, HoD, CSE, MITS, Madanapalle. Dr. R. Nidhya, Professor, Department of Computer Science & Engineering addressed the gathering. The resource person Dr. D. Pavithra, Assistant Professor (S.G) Department of Information Technology, Dr. N. G. P Institute of Technology, Coimbatore was introduced by Dr. D. J. Ashpin Pabi, Assistant Professor Department of Computer Science & Engineering, MITS, Madanapalle.

The resource person started the session by extending her hearty thanks to Our HoD, organizers, participants and Management of MITS, Madanapalle for giving her the opportunity to share her knowledge and experience in – Neural Network and Deep Learning.

The following topics were discussed in the session

- Introduction on AI
She addressed AI as a field of Computer Science which develops and studies intelligent machines. Such machines are called as AIs.
- Evolution of Neural Network
The history of artificial neurons dates back to the 1940s, when Warren McCulloch (a neuroscientist) and Walter Pitts (a logician) modelled the biological working of an organic neuron in a first artificial neuron to show how simple units could replicate logical functions. In 1950 Frank Rosenblatt worked on the Perceptron: a single layer of

neurons able to classify pictures of a few hundred pixels. This can be seen as the first ancestor of modern neural networks. She has thoroughly explained its development from 1940 to till date.

- Biological and Artificial Neuron Models

McCulloch and Pitts presented a simplified computational model of how biological neurons might work together in animal brains to perform complex computations using propositional logic. This is the first artificial neural network architecture. The resource person has nicely delivered the correlation between the biological neuron system and the Artificial neural models.

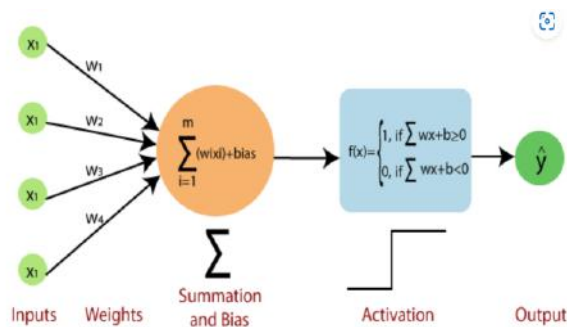
- Model for Implementing logical AND gate

It could also possible to apply neural networks for logic gates such as OR, NOR, AND, NAND and XOR.

- Single layer perceptron

The first simple neuron was proposed in 1958 was single layer perceptron, which is used to classify its input into one or two categories. The resource person also addressed that A perceptron is a neural network unit that does a precise computation to detect features in the input data. Perceptron is mainly used to classify the data into two parts. Therefore, it is also known as Linear Binary Classifier. Perceptron uses the step function that returns +1 if the weighted sum of its input 0 and -1. The activation function is used to map the input between the required value like (0, 1) or (-1, 1).

A regular neural network looks like this:



- A Multilayer Neural Network

A fully connected multi-layer neural network is called a Multilayer Perceptron (MLP). It has 3 layers including one hidden layer. If it has more than 1 hidden layer, it is called a deep ANN. An MLP is a typical example of a feedforward artificial neural network. The number of layers and the number of neurons are referred to as hyperparameters of a neural network, and these need tuning. Cross-validation techniques must be used to find ideal values for these.

- Deep Neural Network

DNNs have been used widely for data-driven modeling. A DNN consists of layers, including nodes and edges, that contain mathematical relationships. During data training, these relationships are updated by backpropagation. After training, the updated relationships are used as the equations for predicting the output variables based on the input variables. Therefore, a significant advantage of DNNs is that they can express the relationships that exist in a system regardless of the nonlinearity and complexity of the system.

- Convolutional Neural Network



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Convolutional neural networks are distinguished from other neural networks by their superior performance with image, speech, or audio signal inputs. The convolutional layer is the core building block of a CNN, and it is where the majority of computation occurs. It requires a few components, which are input data, a filter, and a feature map. Another convolution layer can follow the initial convolution layer. When this happens, the structure of the CNN can become hierarchical as the later layers can see the pixels within the receptive fields of prior layers. Pooling layers, also known as downsampling, conducts dimensionality reduction, reducing the number of parameters in the input. Similar to the convolutional layer, the pooling operation sweeps a filter across the entire input, but the difference is that this filter does not have any weights. Instead, the kernel applies an aggregation function to the values within the receptive field, populating the output array. The fully connected layer performs the task of classification based on the features extracted through the previous layers and their different filters. In the fully-connected layer, each node in the output layer connects directly to a node in the previous layer.

- Recurrent Neural Network

The resource person said Recurrent Neural Network(RNN) is a type of Neural Network where the output from the previous step is fed as input to the current step. In traditional neural networks, all the inputs and outputs are independent of each other. Still, in cases when it is required to predict the next word of a sentence, the previous words are required and hence there is a need to remember the previous words. Thus RNN came into existence, which solved this issue with the help of a Hidden Layer.

- Applications of AI

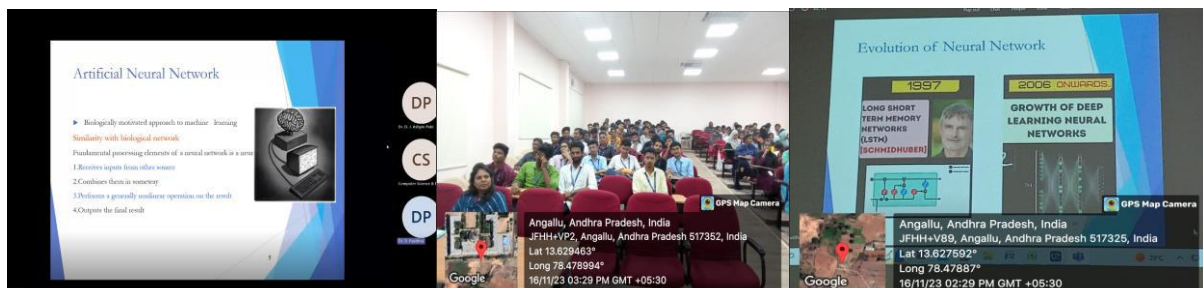
The lecture was concluded with a note on the various applications of AI such as Product Recommendation, Language Translation, Healthcare, Agriculture, Robotics etc.

The session was concluded at 4:00 PM followed by vote of thanks, given by the coordinator of the event Dr. D. J. Ashpin Pabi, Assistant Professor (ISTE Coordinator), Department of CSE, MITS, Madanapalle. She extended her thanks to the Management, Principal, HoD, the faculty members and the student participants.

Outcome of the event:

The participants got an idea on creating neural network model for logical AND and OR gates. The topic was new for more than 90% of the participants. After the session they got clear insights on neural network and deep learning. The resource person also explained the importance of the artificial intelligence for various applications.

Event Photos:





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