



KESHAV MEMORIAL INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTE)

Accredited by NBA & NAAC, Approved by AICTE, Affiliated to JNTUH, Hyderabad



B. Tech. in COMPUTER SCIENCE AND ENGINEERING

III Year I Semester Syllabus (KR23)

ARTIFICIAL INTELLIGENCE (23CS511PE)

(Professional Elective-I)

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Pre-requisites/ Co-requisites:

23CC404PC - Machine Learning

Course Objectives: The course will help to

1. To Understand the Basics of Deep Learning and also provides students with a foundational understanding of neural network concepts and architectures.
2. To implement Neural network algorithms using popular frameworks such as TensorFlow.
3. To implement Artificial Neural network algorithms with Keras.
4. To understand Image processing and analysis with CNN.
5. To understand sequence learning with RNN.

Course Outcomes: After learning the concepts of this course, the student is able to

1. Develop Neural network models using Deep Learning.
2. Evaluate and compare different neural network architectures based on their performance in specific tasks using TensorFlow and Keras.
3. Develop Neural network algorithms and implement deep learning models with multiple layers using Keras.
4. Develop Image classification model using CNN.
5. Develop models for sequence learning and implement RNNs and LSTMs to process sequential data.

Unit-I:

Introduction to Deep Learning: Fundamentals of Neural Networks and Deep Learning, Deep Learning Applications, Deep Learning Framework

Regression: Neuron Model, Optimization Method, Linear Model in Action.

Classification: Hand Written Digital Picture Dataset, Build a model, Error Calculation, Non-Linear model, model complexity, Optimization Method, Hands-On Hand-Written Digital Image Recognition.

Unit – II:

TensorFlow: Data Types, Numerical Precision, Tensors to Be Optimized, Create Tensors, Typical Applications of Tensors, Indexing and Slicing, Dimensional Transformation, Broadcasting, Mathematical Operations, Merge and Split, Common Statistics, Tensor Comparison, Fill and Copy, Data Limiting, Advanced Operations, Load Classic Datasets.

Artificial Neural Networks: Perceptron, Fully Connected Layer, Neural Network, Activation function, Design of Output Layer, Error Calculation, Types of Neural Networks, Hands-On of Automobile Fuel Consumption Prediction.

UNIT-III:

Backward Propagation Algorithm: Derivatives and Gradients, Common Properties of Derivatives, Derivative of Activation Function, Gradient of Loss Function, Gradient of Fully Connected Layer, Chain Rule, Back Propagation Algorithm. Hands-On Handwritten Digital Image Recognition.

Keras Advanced API: Common Functional Modules, Model Configuration, Training, and Testing, Model Configuration, Model Saving and Loading, Custom Network, Model Zoo, Metrics, Hands-On Accuracy Metric, Visualization.

Overfitting: Model Capacity, Overfitting and Underfitting, Dataset Division, Model Design, Regularization, Dropout, Data Augmentation, Hands-On Overfitting.

Unit-IV:

Convolutional Neural Networks: Problems with Fully Connected, Convolutional Neural Network, Convolutional Layer Implementation, Hands-On LeNet-5, Representation Learning, Gradient Propagation, Pooling Layer, Batch Norm Layer, Classical Convolutional Network, Hands-On CIFAR10 and VGG13. Convolutional Layer Variants, Deep Residual Network, DenseNet, Hands-On CIFAR10 and ResNet.

Unit-V:

Recurrent Neural Networks: Sequence Representation Method, Recurrent Neural Network, Gradient Propagation, How to Use RNN Layers, Hands-On RNN Sentiment Classification, Gradient Vanishing and Gradient Exploding, RNN Short-Term Memory, LSTM Principle, How to Use the LSTM Layer, GRU, Hands-On LSTM/GRU Sentiment Classification.

TEXT BOOKS:

1. Beginning Deep Learning with TensorFlow: Work with Keras, MNIST DataSets, and Advanced Neural Networks by Liangqu Long, Xiangming Zeng, A Press, 2022.
2. Deep Learning from the Basics, Koki Saitoh, Packt Publishing, 2021.

REFERENCE BOOKS:

1. Deep Learning Methods and Applications by Li Deng, Dong Yu, Now Publishers Inc, 2014.