



IT EDUCATION
CENTRE

Artificial Intelligence



Artificial Intelligence

- An Introduction to Artificial Intelligence
- History of Artificial Intelligence
- Future and Market Trends in Artificial Intelligence
- Intelligent Agents – Perceive-Reason-Act Loop
- Search and Symbolic Search
- Constraint-based Reasoning
- Simple Adversarial Search (Game-Playing)
- Neural Networks and Perceptrons
- Understanding Feedforward Networks
- Boltzmann Machines and Autoencoders
- Exploring Backpropagation

Deep Networks and Structured Knowledge

- Deep Networks/Deep Learning
- Knowledge-based Reasoning
- First-order Logic and Theorem
- Rules and Rule-based Reasoning
- Studying Blackboard Systems
- Structured Knowledge: Frames, Cyc, Conceptual Dependency
- Description Logic
- Reasoning with Uncertainty

- **Probability & Certainty-Factors**
- **What are Bayesian Networks?**
- **Understanding Sensor Processing**
- **Natural Language Processing**
- **Studying Neural Elements**
- **Convolutional Networks**
- **Recurrent Networks**
- **Long Short-Term Memory (LSTM) Networks**

Machine Learning

- **Machine learning Introduction**
- **Machine Learning Categories**
- **Machine Learning Supervised**
- **Machine Learning Unsupervised**
- **Machine Learning Implementing**

Natural Language Processing

- **Natural Language Processing**
- **Natural Language Processing in Python**

Deep Learning

- ▶ Studying Deep Learning
- ▶ Artificial Neural Networks
- ▶ ANN Intuition
- ▶ Plan of Attack
- ▶ Studying the Neuron
- ▶ The Activation Function
- ▶ Working of Neural Networks
- ▶ Exploring Gradient Descent
- ▶ Stochastic Gradient Descent
- ▶ Exploring Backpropagation

Artificial and Conventional Neural Network

- ▶ Understanding Artificial Neural Network
- ▶ Building an ANN
- ▶ Building Problem Description
- ▶ Evaluation the ANN
- ▶ Improving the ANN
- ▶ Tuning the ANN
- ▶ Conventional Neural Networks
- ▶ CNN Intuition
- ▶ Convolution Operation

- **ReLU Layer**
- **Pooling and Flattening**
- **Full Connection**
- **Softmax and Cross-Entropy**
- **Building a CNN**
- **Evaluating the CNN**
- **Improving the CNN**

Recurrent Neural Network

- **Recurrent Neural Network**
- **RNN Intuition**
- **The Vanishing Gradient Problem**
- **LSTMs and LSTM Variations**
- **Practical Intuition**
- **Building an RNN**
- **Evaluating the RNN**
- **Improving the RNN**
- **Tuning the RNN**

Self-Organizing Maps

- Self-Organizing Maps
- SOMs Intuition
- Plan of Attack
- Working of Self-Organizing Maps
- Revisiting K-Means
- K-Means Clustering
- Reading an Advanced SOM
- Building an SOM

Boltzmann Machines

- Energy-Based Models (EBM)
- Restricted Boltzmann Machine
- Exploring Contrastive Divergence
- Deep Belief Networks
- Deep Boltzmann Machines
- Building a Boltzmann Machine
- Installing Ubuntu on Wind

Deep Learning

- Introduction
- Artificial Intelligence vs. Machine Learning vs. Deep Learning
- Objectives of Deep Learning
- Google Tensorflow
- What are Tensors?
- Introduction to Tensorflow
- Computational Graph
- Creating a graph
- Gradient Descent
- Tensorboard
- Introduction to Keras
- Keras datatypes
- Perceptron
- Introduction to Perceptron
- McCulloch–Pitts Model
- Rosenblatt's Perceptron Algorithm
- Artificial Neural Networks
- XOR Gat
- Activation Function
- Introduction to Activation Functions
- Sigmoid Function
- ReLU Function, Leaky ReLU
- Softmax Function
- Gradient Descent and Optimization

- **Stochastic Gradient Descent**
- **Backpropagation**
- **Drawbacks of ANN**
- **Optimization and Regularization**
- **Feature Selection**
- **Overfitting**
- **Regularization**
- **Hyperparameters**
- **Convolutional Neural Networks**
- **Introduction**
- **Steps to create a CNN**
- **Applications of CNN**
- **Recurrent Neural Networks**
- **Sequence to Sequence Networks**
- **LSTM**
- **Applications of RNN**
- **Applications of Deep Learning**

AutoEncoders

- AutoEncoders: An Overview
- AutoEncoders Intuition
- Plan of Attack
- Training an AutoEncoder
- Overcomplete hidden layers
- Sparse Autoencoders
- Denoising Autoencoders
- Contractive Autoencoders
- Stacked Autoencoders
- Deep Autoencoders

PCA, LDA, and Dimensionality Reduction

- Dimensionality Reduction
- Principal Component Analysis (PCA)
- PCA in Python
- PCA in R
- Linear Discriminant Analysis (LDA)
- LDA in Python
- LDA in R
- Kernel PCA
- Kernel PCA in Python
- Kernel PCA in R

Model Selection and Boosting

- K-Fold Cross Validation in Python
- Grid Search in Python
- K-Fold Cross Validation in R
- Grid Search in R
- XGBoost
- XGBoos

GitHub

- Creating a Git Account
- Cloning the repository
- Adding the file
- Committing the file
- Git push
- Removing the file