WORKSHEET-1

**DEEP LEARNING**

# Q1 to Q8 are MCQs with only one correct answer. Choose the correct option.

1. Which of the following can approximate any function universally (i.e. universal approximators)?
   1. Boosted Decision Trees B) Neural Networks

C) Kernel SVM D) All of the above

Answer:D)

1. In which of the following domains we cannot use neural networks?
   1. Image Processing B) Speech Processing

C) Fraud Detection D) None of the above

Answer: B)

1. Rearrange the following steps of a gradient descent algorithm in correct order of their occurrence?
2. Initialize random weight and bias
3. Repeat the process until you find the best weights of network
4. Change weights and biases for each neuron to reduce the error
5. Calculate error distances between the actual and the predicted value
6. Pass an input through the network and get values from output layer Choose the correct option:

A) iv – i – iii – v – ii B) v – i – iii – iv –ii

C) i – v – iv – iii – ii D) i – v – iii –iv –ii

1. What is the full form of RNN?
   1. Recurrent Neural Network B) Recursive Neural Network

C) Redundant Neural Network D) Resurrection Neural Network

Answer:A) Recurrent Neural Network

1. What is plasticity in neural networks?
   1. input pattern keeps on changing B) input pattern has become static

C) output pattern keeps on changing D) output is static

Answer:A) input pattern keeps on changing

1. What is stability plasticity dilemma?
   1. system can neither be stable nor plastic
   2. static inputs & categorization can’t be handled
   3. dynamic inputs & categorization can’t be handled
   4. none of the above
   5. Answer: C) dynamic inputs & categorization can’t be handled
2. Read the following statements:

**Statement 1**: It is possible to train a network well by initializing all the weights as 0

**Statement 2**: It is possible to train a network well by initializing biases as 0 Which of the statements given above is true, Choose the correct option?

* 1. Statement 1 is true while Statement 2 is false
  2. Statement 2 is true while statement 1 is false
  3. Both statements are true
  4. Both statements are false

Answer: B) Statement 2 is true while statement 1 is false

1. Which of the following architecture has feedback connections?
   1. Recurrent Neural network B) Convolutional Neural Network

C) Restricted Boltzmann Machine D) simple Artificial Neural Network

Answer: A) Recurrent Neural network

# Q9 and Q10 are MCQs with one or more correct answers. Choose all the correct options.

1. In training a neural network, you notice that the loss does not decrease in the few starting epochs. The reason behind it could be
   1. Learning Rate is low B) Regularisation parameter is high

C) Regularisation parameter is low D) Stuck at local minima

Answer:A),B),D)

1. Which of the following function(s) can be used to impart non – linearity in a neural network?
   1. Stochastic Gradient Descent B) Rectified Linear Unit

C) Convolution Function D) Sigmoid Function

Answer:A),B),C)

# Q11 to Q15 are subjective answer type question. Answer them briefly.

1. What is Deep Learning?

# What is Deep Learning?

**Deep Learning** is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called **artificial neural networks**

* Deep learning is an AI function that mimics the workings of the human brain in processing data for use in detecting objects, recognizing speech, translating languages, and making decisions.
* Deep learning AI is able to learn without human supervision, drawing from data that is both unstructured and unlabeled.
* Deep learning, a form of machine learning, can be used to help detect fraud or money laundering, among other functions.

1. What is reinforcement learning?

Reinforcement Learning is defined as a Machine Learning method that is concerned with how software agents should take actions in an environment. Reinforcement Learning is a part of the deep learning method that helps to maximize some portion of the cumulative reward.This neural network learning method helps to learn how to attain a complex objective or maximize a specific dimension over many steps.

1. What Are the Differences Between Machine Learning and Deep Learning?

Machine Learning (ML) is a way to implement artificial intelligence. Similar to AI, machine learning is a branch of computer science in which you devise or study the design of algorithms that can learn.  
There are various machine learning algorithms like

* Decision trees,
* Naive Bayes,
* Random forest
* Support vector machine
* K-nearest neighbor,
* K-means clustering,
* Gaussian mixture model,
* Hidden Markov model etc.

It is a sub-category of machine learning. Similar to machine learning, deep learning also has supervised, unsupervised, and reinforcement learning in it.

Some of the deep learning methods are:

* Convolutional Neural Network,
* Recurrent Neural Network,
* Long short-term memory,
* **Functioning**: Deep learning is a subset of machine learning that takes data as an input and makes intuitive and intelligent decisions using an artificial neural network stacked layer-wise. On the other hand, machine learning being a super-set of deep learning takes data as an input, parses that data, tries to make sense of it (decisions) based on what it has learned while being trained.
* **Feature Extractor**: Deep learning is considered to be a suitable method for extracting meaningful features from the raw data. On the other hand, machine learning is not a good method for extracting meaningful features from the data. It relies on hand-crafted features as an input to perform well.

**Data Dependency:**Machine learning algorithms often work well even if the dataset is small, but deep learning is *Data Hungry* the more data you have, the better it is likely to perform. It is often said that with more data the network depth (number of layers) also increase hence more computation

* **Computation Power**:. For the deep learning network training, you need a graphical processing unit (GPU) which have thousands of cores compared to a CPU that has very minimal cores.A traditional machine learning algorithm can be implemented on a CPU with fairly decent specifications.
* **Training and Inference Time:**The training time of a deep learning network can range from anywhere between a few hours to months.  
  Whereas traditional machine learning algorithms often train very fast ranging from few minutes to a couple of hours, but during the test time, some algorithms can also take quite a bit of time.
* **Industry Ready**: Machine learning algorithms are often easy to Decode how they worked. They are interpretable regarding what parameters it chose and why it chose those parameters, but on the other hand, deep learning algorithms are nothing but a black box. Even if the deep learning algorithms can surpass humans in performance, they are still not reliable when it comes to deploying them in the industry. Machine learning algorithms like linear regression, decision trees, random forest, etc., are widely used in industries like one of its use case is in bank sector for stock predictions.
* **Output**: The output of a traditional machine learning is usually a numerical value like a score or a classification. Whereas, the output of a deep learning method can be a score, an element, text, speech, etc.

### Applications of Machine Learning and Deep Learning!

Machine learning and deep learning are widely used in many domains to name a few:

* Medical: For cancer cell detection, brain MRI image restoration, gene printing, etc.
* Document: Super-resolving historical document images, segmenting text in document images.
* Banks: Stock prediction, financial decisions.
* Natural Language Processing: recommendation systems: Netflix uses recommendation system to suggest movies to users based on their interest, sentiment analysis, photo tagging.
* Information Retrieval: search engines, both text search, and image search like the one used by Google, Amazon, Facebook, Linkedin, etc.

1. What is a perceptron?
2. What’s the difference between AI and ML?