**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)?

A) Boosted Decision Trees B) Neural Networks

C) Kernel SVM D) All of the above

2. In which of the following domains we cannot use neural networks?

A) Image Processing B) Speech Processing

C) Fraud Detection D) None of the above

3. Rearrange the following steps of a gradient descent algorithm in correct order of their occurrence?

i. Initialize random weight and bias

ii. Repeat the process until you find the best weights of network

iii. Change weights and biases for each neuron to reduce the error

iv. Calculate error distances between the actual and the predicted value

v. 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

4. What is the full form of RNN?

A) Recurrent Neural Network B) Recursive Neural Network

C) Redundant Neural Network D) Resurrection Neural Network

5. What is plasticity in neural networks?

A) input pattern keeps on changing B) input pattern has become static

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

6. What is stability plasticity dilemma?

A) system can neither be stable nor plastic

B) static inputs & categorization can’t be handled

C) dynamic inputs & categorization can’t be handled

D) none of the above

7. 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?

A) Statement 1 is true while Statement 2 is false

B) Statement 2 is true while statement 1 is false

C) Both statements are true

D) Both statements are false

8. Which of the following architecture has feedback connections?

A) Recurrent Neural network B) Convolutional Neural Network

C) Restricted Boltzmann Machine D) simple Artificial Neural Network

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

9. In training a neural network, you notice that the loss does not decrease in the few starting epochs. The reason behind it could be

A) Learning Rate is low B) Regularisation parameter is high

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

10. Which of the following function(s) can be used to impart non – linearity in a neural network?

A) Stochastic Gradient Descent B) Rectified Linear Unit

C) Convolution Function D) Sigmoid Function

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

11. What is Deep Learning?

Deep learning is an [artificial intelligence (AI)](https://www.investopedia.com/terms/a/artificial-intelligence-ai.asp) function that imitates the workings of the human brain in processing data and creating patterns for use in decision making. Deep learning is a subset of [machine learning](https://www.investopedia.com/terms/m/machine-learning.asp) in artificial intelligence that has networks capable of learning unsupervised from data that is unstructured or unlabeled. Also known as deep neural learning or deep neural network.

Deep learning has evolved hand-in-hand with the digital era, which has brought about an explosion of data in all forms and from every region of the world. This data, known simply as [big data](https://www.investopedia.com/terms/b/big-data.asp), is drawn from sources like social media, internet search engines, [e-commerce](https://www.investopedia.com/terms/e/ecommerce.asp) platforms, and online cinemas, among others. This enormous amount of data is readily accessible and can be shared through [fintech](https://www.investopedia.com/tech/worlds-top-10-fintech-companies-baba/) applications like cloud computing.

However, the data, which normally is unstructured, is so vast that it could take decades for humans to comprehend it and extract relevant information. Companies realize the incredible potential that can result from unraveling this wealth of information and are increasingly adapting to AI systems for automated support.

12. What is reinforcement learning?

Reinforcement learning is the training of machine learning models to [make a sequence of decisions](https://blog.openai.com/openai-gym-beta/). The agent learns to achieve a goal in an uncertain, potentially complex environment. In reinforcement learning, an artificial intelligence faces a game-like situation. The computer employs trial and error to come up with a solution to the problem. To get the machine to do what the programmer wants, the artificial intelligence gets either rewards or penalties for the actions it performs. Its goal is to maximize the total reward.  
Although the designer sets the reward policy–that is, the rules of the game–he gives the model no hints or suggestions for how to solve the game. It’s up to the model to figure out how to perform the task to maximize the reward, starting from totally random trials and finishing with sophisticated tactics and superhuman skills. By leveraging the power of search and many trials, reinforcement learning is currently the most effective way to hint machine’s creativity. In contrast to human beings, artificial intelligence can gather experience from thousands of parallel gameplays if a reinforcement learning algorithm is run on a sufficiently powerful computer infrastructure.

Applications of reinforcement learning were in the past limited by weak computer infrastructure. However, as [Gerard Tesauro’s backgamon AI superplayer developed in 1990’s](https://en.wikipedia.org/wiki/TD-Gammon) shows, progress did happen. That early progress is now rapidly changing with powerful new computational technologies opening the way to completely new inspiring applications.  
Training the models that control autonomous cars is an excellent example of a potential application of reinforcement learning. In an ideal situation, the computer should get no instructions on driving the car. The programmer would avoid hard-wiring anything connected with the task and allow the machine to learn from its own errors. In a perfect situation, the only hard-wired element would be the reward function.

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

## Differences Between Machine Learning and Deep Learning

1. Human Intervention

Whereas with machine learning systems, a human needs to identify and hand-code the applied features based on the data type (for example, pixel value, shape, orientation), a deep learning system tries to learn those features without additional human intervention. Take the case of a facial recognition program. The program first learns to detect and recognize edges and lines of faces, then more significant parts of the faces, and then finally the overall representations of faces. The amount of data involved in doing this is enormous, and as time goes on and the program trains itself, the probability of correct answers (that is, accurately identifying faces) increases. And that training happens through the use of neural networks, similar to the way the human brain works, without the need for a human to recode the program.

2. Hardware

Due to the amount of data being processed and the complexity of the mathematical calculations involved in the algorithms used, deep learning systems require much more powerful hardware than simpler machine learning systems. One type of hardware used for deep learning is graphical processing units (GPUs). Machine learning programs can run on lower-end machines without as much computing power.

3. Time

As you might expect, due to the huge data sets a deep learning system requires, and because there are so many parameters and complicated mathematical formulas involved, a deep learning system can take a lot of time to train. Machine learning can take as little time as a few seconds to a few hours, whereas deep learning can take a few hours to a few weeks!

4. Approach

Algorithms used in machine learning tend to parse data in parts, then those parts are combined to come up with a result or solution. Deep learning systems look at an entire problem or scenario in one fell swoop. For instance, if you wanted a program to identify particular objects in an image (what they are and where they are located—license plates on cars in a parking lot, for example), you would have to go through two steps with machine learning: first object detection and then object recognition. With the deep learning program, on the other hand, you would input the image, and with training, the program would return both the identified objects and their location in the image in one result.

5. Applications

Given all the other differences mentioned above, you probably have already figured out that machine learning and deep learning systems are used for different applications. Where they are used: Basic machine learning applications include predictive programs (such as for forecasting prices in the stock market or where and when the next hurricane will hit), email spam identifiers, and programs that design evidence-based treatment plans for medical patients. In addition to the examples mentioned above of Netflix, music-streaming services and facial recognition, one highly publicized application of deep learning is self-driving cars—the programs use many layers of neural networks to do things like determine objects to avoid, recognize traffic lights and know when to speed up or slow down. To learn more about machine learning applications.

14. What is a perceptron?

A perceptron is a simple model of a biological neuron in an [artificial neural network](https://searchenterpriseai.techtarget.com/definition/neural-network). Perceptron is also the name of an early [algorithm](https://whatis.techtarget.com/definition/algorithm) for [supervised learning](https://searchenterpriseai.techtarget.com/definition/supervised-learning) of binary classifiers.

The perceptron algorithm was designed to classify visual inputs, categorizing subjects into one of two types and separating groups with a line. Classification is an important part of [machine learning](https://searchenterpriseai.techtarget.com/definition/machine-learning-ML) and image processing. Machine learning algorithms find and classify patterns by many different means. The perceptron algorithm classifies patterns and groups by finding the linear separation between different objects and patterns that are received through numeric or visual input.

The perceptron algorithm was developed at Cornell Aeronautical Laboratory in 1957, funded by the United States Office of Naval Research. The algorithm was the first step planned for a machine implementation for [image recognition](https://searchenterpriseai.techtarget.com/definition/image-recognition). The machine, called Mark 1 Perceptron, was physically made up of an array of 400 photocells connected to perceptrons whose weights were recorded in potentiometers, as adjusted by electric motors. The machine was one of the first artificial neural networks ever created.

At the time, the perceptron was expected to be very significant for the development of artificial intelligence ([AI](https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence)). While high hopes surrounded the initial perceptron, technical limitations were soon demonstrated. Single-layer perceptrons can only separate classes if they are linearly separable. Later on, it was discovered that by using multiple layers, perceptrons can classify groups that are not linearly separable, allowing them to solve problems single layer algorithms can’t solve.

15. What’s the difference between AI and ML?

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| AI | ML |
| Artificial intelligence is a technology which enables a machine to simulate human behavior. | Machine learning is a subset of AI which allows a machine to automatically learn from past data without programming explicitly |
| The goal of AI is to make a smart computer system like humans to solve complex problems. | The goal of ML is to allow machines to learn from data so that they can give accurate output. |
| In AI, we make intelligent systems to perform any task like a human. | In ML, we teach machines with data to perform a particular task and give an accurate result. |
| Machine learning and deep learning are the two main subsets of AI. | Deep learning is a main subset of machine learning. |
| AI has a very wide range of scope. | Machine learning has a limited scope. |
| AI is working to create an intelligent system which can perform various complex tasks. | Machine learning is working to create machines that can perform only those specific tasks for which they are trained. |
| AI system is concerned about maximizing the chances of success. | Machine learning is mainly concerned about accuracy and patterns |
| The main applications of AI are **Siri, customer support using catboats,** Expert System, Online game playing, intelligent humanoid robot, etc. | The main applications of machine learning are **Online recommender system, Google search algorithms, Facebook auto friend tagging suggestions,** etc. |
| On the basis of capabilities, AI can be divided into three types, which are, **Weak AI, General AI**, and**Strong AI.** | Machine learning can also be divided into mainly three types that are **Supervised learning, Unsupervised learning**, and**Reinforcement learning**. |
| It includes learning, reasoning, and self-correction. | It includes learning and self-correction when introduced with new data. |
| AI completely deals with Structured, semi-structured, and unstructured data. | Machine learning deals with Structured and semi-structured data. |