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## Section B

Ans 1)

1. Supervised learning technique deals with the labelled data where the output data patterns are known to the system. As against, the unsupervised learning works with unlabeled data in which the output is just based on the collection of perceptions.
2. When it comes to the complexity the supervised learning method is less complex while unsupervised learning method is more complicated.
3. The supervised learning can also conduct offline analysis whereas unsupervised learning employs real-time analysis.
4. The outcome of the supervised learning technique is more accurate and reliable. In contrast, unsupervised learning generates moderate but reliable results.
5. Classification and regression are the types of problems solved under the supervised learning method. Conversely, unsupervised learning includes clustering and associative rule mining problems.

## Conclusion

Supervised learning is the technique of accomplishing a task by providing training, input and output patterns to the systems whereas unsupervised learning is a self-learning technique in which system has to discover the features of the input population by its own and no prior set of categories are used.

Ans 2) Knowledge acquisition is the gathering or collecting knowledge from various sources. It is the process of adding new knowledge to a knowledge base and refining or improving knowledge that was previously acquired. Acquisition is the process of expanding the capabilities of a system or improving its

performance at some specified task. So it is the goal oriented creation and refinement of knowledge. Acquired knowledge may consist of facts, rules, concepts, procedures, heuristics, formulas, relationships, statistics or any other useful information. Source of these knowledges may be experts in the domain of interest, text books, technical papers, database reports, journals and the environments. The knowledge acquisition is a continuous process and is spread over entire lifetime. Example of knowledge acquisition is machine learning.

- a) Diagram Based Techniques
- b) Matrix Based Techniques
- c) Hierarchy-Generation Techniques
- d) Protocol Analysis Techniques
- e) Protocol Generation Techniques
- f) Sorting Techniques

Ans 4) “Any man could, if he were so inclined, be the sculptor of his own brain.” — Santiago Cajal

From using robots to identify objects; creating photo-realistic images of fake celebrities , or even converting thought to text, Neural networks are doing amazing things! As the name suggests, they are based on our understanding of the brain. This blogpost seeks to explain how neural networks, also called ANN (artificial neural network), mimic the physiology and functioning of the human brain.

Let’s start with a high-level physiology of the human brain. It has 3 key parts – hindbrain, midbrain and forebrain. Hindbrain and midbrain control the basic body processes like respiration, digestion, survival responses etc.; not very differently from the brain of other mammals. Our evolutionary difference with other species comes from the forebrain - a densely-packed, three-dimensional layer of neurons under the skull. Branches from these neurons form interconnections called synapses, where memory is stored. To put the complexity in perspective, a human brain has about 100 billion neurons, each connected to about 10,000 other neurons, cumulatively storing 1 – 1000 terabytes of data.

So, how does our brain think? When we receive an external stimulus like vision or sound, data travels as electrical signals through a path between neurons. The specific path is determined by the strength of inter-neuron connections, which itself is a cumulative result of all previous learning experiences. A neuron may get signals from many other neurons. If the sum of all input signals crosses its activation threshold, it transmits the signal to the next connection; otherwise the signal dies at that neuron. Thinking essentially involves taking the information from input neurons, progressively abstracting it through multiple connections among 'thinking neurons', finally leading to muscle instruction by output neurons. Our ability to abstract from raw information is a key attribute of intelligence and that's why many common tests of thinking ability – e.g. GMAT, GRE, SAT, check our 'if – then' or 'so – what' skills.

Ans 5) The theory of fuzzy logic is based on the notion of relative graded membership, as inspired by the processes of human perception and cognition. Lotfi A. Zadeh published his first famous research paper on fuzzy sets in 1965. Fuzzy logic can deal with information arising from computational perception and cognition, that is, uncertain, imprecise, vague, partially true, or without sharp boundaries. Fuzzy logic allows for the inclusion of vague human assessments in computing problems. Also, it provides an effective means for conflict resolution of multiple criteria and better assessment of options. New computing methods based on fuzzy logic can be used in the development of intelligent systems for decision making, identification, pattern recognition, optimization, and control.

Fuzzy logic is extremely useful for many people involved in research and development including engineers (electrical, mechanical, civil, chemical, aerospace, agricultural, biomedical, computer, environmental, geological, industrial, and mechatronics), mathematicians, computer software developers and researchers, natural scientists (biology, chemistry, earth science, and physics), medical researchers, social scientists (economics, management, political science, and psychology), public policy analysts, business analysts, and jurists.

Ans 3) “Artificial Intelligence (AI) is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.” “The capability of a machine to imitate the intelligent human behavior.”

### Types of Artificial Intelligence

**Reactive Machines AI:** Based on present actions, it cannot use previous experiences to form current decisions and simultaneously update their memory.  
Example: Deep Blue

**Limited Memory AI:** Used in self-driving cars. They detect the movement of vehicles around them constantly and add it to their memory.

**Theory of Mind AI:** Advanced AI that has the ability to understand emotions, people and other things in the real world.

**Self Aware AI:** AIs that possess human-like consciousness and reactions. Such machines have the ability to form self-driven actions.

**Artificial Narrow Intelligence (ANI):** General purpose AI, used in building virtual assistants like Siri.

**Artificial General Intelligence (AGI):** Also known as strong AI. An example is the Pillo robot that answers questions related to health.

**Artificial Superhuman Intelligence (ASI):** AI that possesses the ability to do everything that a human can do and more. An example is the Alpha 2 which is the first humanoid ASI robot.

### Section A

1)

d) None

2)

d) All the given

3)

b) Mean squared error

4)

a) Good for generalization

5)

False

6)

False

7)

Equal

8)

True

9)

All the given

10)

True

11)

b) 3

12)

True

13)

a) Aggregation

14)