Shaina Mehta
7CSE 4Y
A2305219268

Assignment 1.1

Q1)

What is Artificial Intelligence (or Machine Learning)?

Artificial Intelligence is a broad area of computer science that makes machine seem that they havehuman intelligence. AI is present in today's world when we interact with Alexa to order Pizza or when we see recommended movies as suggested by Netflix etc.

AI is not a new technology. This term was coined by Dartmouth Professor John Mc Cathy in 1956. Hecalled a group of computer scientists and mathematicians to see if machine could learn like a young child does using trial and error to develop formal reasoning.

The project proposal say they will figure out how to make machines use language, form abstractionsand concepts, solve some kinds of problems now reserved for humans and improve themselves.

Initially AI was restricted to universities and super-secret labs but as the time changes, the amount of data generated by computers and computers' processing speed increases, industries and big techgiants start to use AI to make their work easier and helps them to gain more profit in short period oftime. Very soon AI will become less artificial and lot more intelligent!!!

There are various fields of AI:

1. Natural Language Processing
2. Machine Learning
3. Robotics
4. Problem Solving, etc.

How will AI will affect your job? Just like industrial revolution, it is not human versus machine it ishuman v/s machine v/s problem. The point is AI helps you to accomplish more in less time, takingrepetitive tasks of your jobs while you make the strategy and relationship.

Q2)

(a) Applications of Machine Learning:

1. Image Recognition
2. Speech Recognition
3. Traffic prediction
4. Product recommendations
5. Self-driving cars
6. Email Spam and Malware Filtering
7. Virtual Personal Assistant
8. Online Fraud Detection
9. Stock Market trading
10. Medical Diagnosis

Shaina Mehta
7CSE 4Y
A2305219268

11. Automatic Language

Translation

Machine Learning is used in almost all modern technologies and this is only going to increase in the future. In fact, there are applications of Machine Learning in various fields ranging from smartphone technology to healthcare to social media, and so on. Smartphones use **personal voice assistants** like Siri, Alexa, Cortana, etc. These personal assistants are an example of ML-based speech recognition that uses Natural Language Processing to interact with the users and formulate a response accordingly. Machine Learning is also used in social media. Let's take Facebook's **'People you may know'** as an example. It is mind-boggling how social media platforms can guess the people you might be familiar with in real life. And they are right most of the time!!! This is done by using Machine Learning algorithms that analyze your profile, your interests, your current friends, and also their friends, and various other factors to calculate the people you might potentially know. Machine Learning is also very important in **healthcare diagnosis** as it can be used to diagnose a variety of problems in the medical field. For example, Machine Learning is used in oncology to train algorithms that can identify cancerous tissue at the microscopic level with the same accuracy as trained physicians. Another famous application of Machine Learning is **Google Maps**. The Google Maps algorithm automatically picks the best route from one point to another by relying on the projections of different timeframes and keeping in mind various factors like traffic jams, roadblocks, etc. In this way, you can see that the applications of Machine Learning are limitless. If anything, they are only increasing and Machine Learning may one day be used in almost all fields of study!

(b) Fields of AI:

1) Machine Learning

2) Deep learning

3) Neural Networks

4) Cognitive Computing

5) Natural Language Processing

6) Computer Vision

1) Machine Learning

Machine learning is a feature of artificial intelligence that provides the computer with the capability to automatically gather data and learn from the experience of the problems or cases they have encountered rather than specially programmed to perform the given task or work. The machine learning emphasizes the growth of the algorithms which can scrutinize the data and make predictions of it. The main use of this is in the healthcare industry where it is used for diagnosis of the disease, medical scan interpretation, etc.

2) Deep learning

It is the process of learning by processing and analyzing the input data by several methods until the machine discovers the single desirable output. It is also known as the self-learning of the machines. The machine runs various random programs and algorithms to map the input raw sequence of input data to output. By deploying the various algorithms like neuroevolution and other approaches like gradient descend on a neural topology the output y is raised finally from the unknown input function f(x), assuming that x and y are correlated.

Here interestingly, the job of neural networks is to find out the correct f function. **Deep learning will witness all possible human characteristics and behavioral databases and will perform supervised learning. This process includes:**

- Detection of different kinds of human emotions and signs.
- Identify the human and animals by the images like by particular signs, marks, or features.
- Voice recognition of different speakers and memorize them.
- Conversion of video and voice into text data.
- Identification of right or wrong gestures, classify spam things, and fraud cases (like fraud claims).

All other characteristics including the ones mentioned above are used to prepare the artificial neural networks by deep learning.

3) Neural Networks

The neural networks are the brain of artificial intelligence. They are the computer systems which are the replica of the neural connections in the human brain. **The artificial corresponding neurons of the brain are known as the perceptron.**

The stack of various perceptron joining together makes the artificial neural networks in the machines. Before giving a desirable output, the neural networks gain knowledge by processing various training examples. With the use of different learning models, this process of analyzing data will also give a solution for many associated queries that were unanswered previously. Deep learning in association with the neural networks can unfold the multiple layers of hidden data including the output layer of complex problems and is an aide for the subfields like speech recognition, natural language processing, and computer vision, etc. The earlier kinds of neural networks were composed of one input and one output and upmost only one hidden layer or a single layer of perceptron only. The deep neural networks are composed of more than one hidden layer between the input and output layers. Therefore, a deep learning process is required to unfold the hidden layers of the data unit. In deep-learning of neural networks, each layer is skilled on the unique set of attributes, based on the output features of the previous layers. The more you get into the neural network, the node gains the ability to recognize more complex attributes as they predict and recombine the outputs of all the previous layers to produce the more clear final output. **This whole process is called a feature hierarchy** and also known as the hierarchy of the complex and intangible data sets. It enhances the capability of the deep neural networks to handle very huge and wide dimensional data units having billions of the constraint will go through the linear and non-linear functions. The main issue which the machine intelligence is struggling with to solve is to handle and manage the unlabeled and unstructured data in the world which is spread all over in all fields and countries. Now the neural nets are having the capability of handling the latency and complex features of these data subsets. The deep learning in association with artificial neural networks has classified and characterized the unnamed and raw data which were in the form of pictures, text, audio, etc. into an organized relational database with proper labeling. Handwriting recognition, face and digital signature recognition, missing pattern identification are some of the real-time examples of neural networks.

4) Cognitive Computing

The purpose of this component of artificial intelligence is to initiate and accelerates the interaction for complex task completion and problem-solving between humans and machines. While working on various kinds of tasks with humans, the machines learn and understand human behavior, and sentiments in various distinctive conditions and recreate the thinking process of humans in a computer model. By practicing this, the machine acquires the ability to understand human language and image reflections. Thus, cognitive thinking along with artificial intelligence can make a product that will be having human-like actions and can also have data handling capabilities. Cognitive computing is capable of taking accurate decisions in case of complex

problems. Thus, it is applied in the area which needs to improve solutions with optimum costs and is acquired by analyzing natural language and evidence-based learning. **For Example,** Google Assistant is a very big example of cognitive computing.

5) Natural Language Processing

With this feature of artificial intelligence, computers can interpret, identify, locate, and process human language and speech. The concept behind introducing this component is to make the interaction between the machines and the human language seamless and the computers will become capable of delivering logical responses towards human speech or query. The natural language processing focus on both the verbal and written section of human languages means both active and passive modes of using algorithms. The Natural Language Generation (NLG) will process and decode the sentences and words that humans used to speak (verbal communication) while the NaturalLanguage Understanding (NLU) will emphasize the written vocabulary to translate the language in the text or pixels which can be understood by machines. The Graphical User Interfaces (GUI) based applications of the machines are the best example of natural language processing. The various types of translators that convert one language into another are examples of the natural language processing system. The Google feature of voice assistant and voice search engine is also an example of this.

6) Computer Vision

The computer vision is a very vital part of artificial intelligence as it facilitates the computer to automatically recognize, analyze, and interpret the visual data from the real world images and visuals by capturing and intercepting them. It incorporates the skills of deep learning and pattern recognition to extract the content of images from any data given, including images or video files within PDF document, Word document, PPT document, XL file, graphs, and pictures, etc. Suppose we have a complex image of a bundle of things then only seeing the image and memorizing it is not easily possible for everyone. The computer vision can incorporate a series of transformations to the image to extract the bit and byte detail about it like the sharp edges of the objects, unusual design or color used, etc. This is done by using various algorithms by applying mathematical expressions and statistics. The robots make use of computer vision technology to see the world and act in real-time situations. The application of this component is very vastly used in the healthcare industry to analyze the health condition of the patient by using an MRI scan, X-ray, etc. Also used in the automobile industry to deal with computer-controlled vehicles and drones.