Class: X	Department: Computer Science	Date:03-05-2023
Worksheet No: 2	ARTIFICIAL INTELLIGENCE	

CHAPTER 2: INTRODUCTION TO AI: BASICS OF AI

One (01) Mark Questions

Fill in the blanks:

1. One of the major sources of data for many major companies is the device which all of us have in our hands all the time_____(Smartphone/ Mobile Phones)
2. The world of Artificial Intelligence revolves around_____(Data)

True/False:

3. All the apps collect some kind of data. (True)

Direct Questions:

4. **What do you understand by Machine Learning?**

    Machine Learning is a subset of Artificial Intelligence which enables machines to improve at tasks with experience (data). The intention of Machine Learning is to enable machines to learn by themselves using the provided data and make accurate Predictions/ Decisions.

    OR

    Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.

    OR

    Machine learning is a data analytics technique that teaches computers to do what comes naturally to humans and animals: learn from experience.

5. **What do you understand by Deep Learning?**

    Deep Learning is the most advanced form of Artificial Intelligence. In Deep Learning, the machine is trained with huge amounts of data which helps it in training itself around the data. Such machines are intelligent enough to develop algorithms for themselves.

    OR

    Deep learning is an artificial intelligence (AI) function that imitates the workings of the human brain in processing data and creating patterns for use in decision making.

    OR

    Deep learning is a subset of machine learning where artificial neural networks, algorithms inspired by the human brain, learn from large amounts of data.

6. **What are the three domains of AI?**
- Data Science/ Big Data
- Computer Vision
- Natural Language Processing (NLP)

7. **Name any two examples of Data science?**
(Any two out of the following)

Price Comparison Websites/ Website Recommendations/ Fraud and Risk detection/ Internet search/ Personalized healthcare recommendations / Optimizing Traffic routes in real-time / image tagging.

8. **Name any two examples of Computer vision?**
(Any two out of the following)

Self-Driving cars/ Autonomous vehicles Face Lock in Smartphones/ MedicalImaging/ Facial recognition /Security Systems / Waste Management / Satellite imaging.

9. **Name any two examples of Natural Language Processing?**
(Any two out of the following)

Email filters/Smart assistants/ Sentiment Analysis/Automatic Summarization/Search results / Language translation / Digital phone calls.

10. **Name any two examples of Machine Learning?**
(Any two out of the following)
Virtual Personal Assistants, Recommendation systems like Netflix, Face Apps, Online Fraud Detection

New Addition
MCQ (Correct answers are highlighted)

11. Snapchat filters use_____and_____to enhance your selfie with flowers, cat ears etc.
a) machine learning and deep learning
b) data and image processing
c) augmented reality and machine learning
d) NLP and computer vision

12. Based on the image below, choose the correct domain or domains of AI required for it:

a) Data

b) NLP

c) Computer Vision

d) Both (a) and (b)

13. Rock paper and scissors game is based on the following domain:

   a) Data for AI

   b) Natural Language Processing

   c) Computer Vision

   d) Image processing

14. Select a game which is based on Data Science domain of AI:

   a) **Rock Paper and Scissors**   b) Mystery Animal

   c) Emoji Scavenger Hunt   d) Pokémon

15. Identify the domain of AI in the following image:

   a) Data Science

   b) Natural Language Processing

   c) Computer Vision

   d) Rule Based

Two (02) Mark Questions

1. What is Data science? Give an example of it.

Data sciences is a domain of AI related to data systems and processes, in which the system collects numerous data, maintains data sets and derives meaning/sense out of them. The information extracted through data science can be used to make a decision about it.

OR

Data science is the field of study that combines domain expertise, programming skills, and knowledge of mathematics and statistics to extract meaningful insights from data.

OR

Data Sciences, it is a concept to unify statistics, data analysis, machine learning and their related methods in order to understand and analyses actual phenomena with data.

For example: a company that has petabytes of user data may use data science to develop effective ways to store, manage, and analyze the data.

2. **What is Computer Vision? Give an example of it.**

   Computer Vision, abbreviated as CV, is a domain of AI that depicts the capability of a machine to get and analyze visual information and afterwards predict some decisions about it. The entire process involves image acquiring, screening, analyzing, identifying and extracting information.

   <div align="center">OR</div>

   Computer vision is an interdisciplinary field that deals with how computers can be made to gain high-level understanding from digital images or videos.

   <div align="center">OR</div>

   The Computer Vision domain of Artificial Intelligence, enables machines to see through images or visual data, process and analyze them on the basis of algorithms and methods in order to analyze actual phenomena with images.

   For Example: - Self-Driving cars/ Automatic Cars, Face Lock in Smartphones

3. **What is Natural Language Processing? Give an example of it.**

   Natural Language Processing, abbreviated as NLP, is a branch of artificial intelligence that deals with the interaction between machine/computers and humans using the natural language. *Natural language* refers to language that is spoken and written by people, and natural language processing (NLP) attempts to extract information from the spoken and written word using algorithms.

   <div align="center">OR</div>

   Natural Language Processing, or NLP, is the sub-field of AI that is focused on enabling machine/computers to understand and process human languages. AI is a subfield of Linguistics, Computer Science, Information Engineering, and Artificial Intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data.

   <div align="center">OR</div>

   In NLP, we teach machines how to understand and communicate in human language. Natural language refers to speech analysis in both audible speeches, as well as text of a language. NLP systems capture meaning from an input of words (sentences, paragraphs, pages, etc.)

   For Example: Email filters, Smart assistants: - Apple's Siri and Amazon's Alexa

4. **Where do we collect data from?**

   Data can be collected from various sources like –
   - Surveys
   - Sensors
   - Observations
   - Web scrapping (Internet)
   - Interviews
   - Documents and records.
   - Oral histories

5. Why do we need to collect data?

Data to a machine is similar to food for human being to function. The world of Artificial Intelligence revolves around Data. Every company whether small or big is collecting data from as many sources as possible. Data is called the New Gold today. It is through data collection that a business or management has the quality information they need to make informed decisions from further analysis, study, and research. Data collection allows them to stay on top of trends, provide answers to problems, and analyze new insights to great effect.

6. What is data mining? Explain with example.

Data mining is the process of analyzing large data sets and extracting the useful information from it. Data mining is used by companies to turn raw data into useful information. It is an interdisciplinary subfield of computer science and statistics with an overall goal to extract information

OR

Data mining is an automatic or semi-automatic technical process that analyses large amounts of scattered information to make sense of it and turn it into knowledge. It looks for anomalies, patterns or correlations among millions of records to predict results, as indicated by the SAS institute, a world leader in business analytics.

Example:
Price Comparison websites- They collect data about a product from different sites and then analyze trends out of it and show up the most appropriate results.

Data mining is also known as Knowledge Discovery in Data (KDD)
To be moved to chapter no. 3

7. What do you understand by Data Privacy?

The world of Artificial Intelligence revolves around Data. Proper and ethical handling of own data or user data is called data privacy. It is all about the rights of individuals with respect to their personal information.

Data privacy or information privacy is a branch of data security concerned with the proper handling of data – consent, notice, and regulatory obligations. More specifically, practical data privacy concerns often revolve around: Whether or how data is shared with third parties

8. Is data which is collected by various applications ethical in nature? Justify your

Yes, most of the times, the data collected by various applications is ethical in nature as the users agree to it by clicking on allow when the application asks for various permissions. They ask for our data for various facilities like - to show us personalized recommendations and advertisements and to make their app more accurate and efficient.

OR

No, the data collected by various applications is not always ethical in nature. Sometimes, we just share our data to non – trusted third party applications without reading what happens to our data. This may lead to unethical use of our data. If one does not want to share his/her data with anyone, he/she can opt for alternative applications which are of similar usage and keep the data private. For example, an alternative to WhatsApp is the Telegram app which does not collect any data from us.

Note: This is an open-ended question, so both the answers yes/no will be considered right with correct justification.

Three (03) Mark Questions

1. **What do you understand by AI bias? Discuss in detail with some examples.**

   AI bias is the underlying prejudice in data that's used to create AI algorithms, which can ultimately result in discrimination and other social consequences.

   AI Bias can creep into algorithms in several ways. AI systems learn to make decisions based on training data, which can include biased human decisions or reflect historical or social inequities, even if sensitive variables such as gender, race, or sexual orientation are removed. Amazon stopped using a hiring algorithm after finding it favored applicants based on words like "executed" or "captured" that were more commonly found on men's resumes, for example. Another source of bias is flawed data sampling, in which groups are over- or underrepresented in the training data.

   For Example
   - Majorly, all the virtual assistants have a female voice. It is only now that some companies have understood this bias and have started giving options for male voices but since the virtual assistants came into practice, female voices are always preferred for them over any other voice. Can you think of some reasons for this?
   - If you search on Google for salons, the first few searches are mostly for female salons. This is based on the assumption that if a person is searching for a salon, in all probability it would be a female. Do you think this is a bias? If yes, then is it a Negative bias or Positive one?

2. **What do you understand by Data Privacy? Discuss in detail with some examples.**

   Data privacy, sometimes also referred to as information privacy, is an area of data protection that concerns the proper handling of sensitive data including, notably, personal data but also other confidential data, such as certain financial data and intellectual property data, to meet regulatory requirements as well as protecting the confidentiality and immutability of the data. It focuses on how to collect, process, share, archive, and delete the data in accordance with the law.

   Privacy, in the broadest sense, is the right of individuals, groups, or organizations to control who can access, observe, or use something they own, such as their bodies, property, ideas, data, or information.

   Control is established through physical, social, or informational boundaries that help prevent unwanted access, observation, or use. For example:
   - A physical boundary, such as a locked front door, helps prevent others from entering a building without explicit permission in the form of a key to unlock the door or a person inside opening the door.
   - A social boundary, such as a members-only club, only allows members to access and use club resources.
   - An informational boundary, such as a non-disclosure agreement, restricts what information can be disclosed to others.

   Privacy of information is extremely important in this digital age where everything is interconnected and can be accessed and used easily. The possibilities of our private information being extremely vulnerable are very real, which is why we require data privacy.

3. **What do you understand by AI, ML & DL? How are they different from each other?**
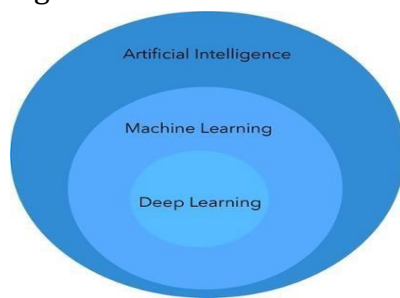
a) **Artificial Intelligence (AI)**

AI is incorporating human intelligence to machines. Whenever a machine completes tasks based on a set of rules that solve problems (algorithms), such an "intelligent" behavior is what is called artificial intelligence.

b) **Machine Learning (ML)**

ML is a subset of AI that uses statistical learning algorithms to build smart systems. The ML systems can automatically learn and improve without explicitly being programmed.

c) **Deep Learning (DL)**

In Deep Learning, the machine is trained with huge amounts of data which helps it in training itself around the data. Such machines are intelligent enough to develop algorithms for themselves.

How they differ?

- Deep Learning is the most advanced form of Artificial Intelligence out of these three. Then comes Machine Learning which is intermediately intelligent and Artificial intelligence covers all the concepts and algorithms which, in some way or the other mimic human intelligence.
- Therefore, AI is the umbrella term which covers ML and DL.

4. **Why do apps collect data in our phone?**

One of the major sources of data for many major companies is the device which all of us have in our hands all the time: Smartphones. Smartphones have nowadays become an integral part of our lives. Most of us use smartphones more than we interact with people around us.

For the facilities that smartphones provide us, Apps need a lot of data which is collected from the user like details about your face, browsing history, or your geographic location, contact list etc. This data is collected with user's consent which he/she gives at the time of installing an app by clicking on "yes" or "allow" options which clearly means that we ourselves are giving permissions to the Apps.

Permissions by themselves are harmless and even useful to provide users a good mobile experience.

This data is collected to provide us with a lot of facilities and features which have made our lives easier. Another reason to collect the data is to provide us with customized recommendations and notifications according to our choices.

One more reason to collect the data is to make their app more accurate and efficient.

5. **Should AI replace laborious jobs? Is there an alternative for major unemployment?**

   Yes, AI should replace laborious jobs.
   ● AI can replace laborious jobs like lifting of heavy items, working in mines etc.
   ● AI can indeed automate most repetitive and physical tasks.
   ● In future, AI would be a good option in the field of architecture and construction.

   <div align="center">OR</div>

   No, AI should not replace laborious jobs completely as if it replaces laborious jobs completely, then there will be no source of income for the daily wage workers due to unemployment. So, industry owners can use some machines but more of man power. Hence the production will not get affected as humans are smarter than machines since they were the ones who invented AI.

   Note: As this is an open-ended question so both the answers (yes/No) are correct but it must be with correct justification.

   Is there an alternative for major unemployment?
   ● AI taking over laborious jobs won't create unemployment. It is just a groundless fear. The standard view of technical change is that some jobs are displaced by the substitution of machines for labour, but that the fear of total displacement is misplaced because new jobs are created, largely due to the technology-fuelled increase in productivity. Humans have always shifted away from work suitable for machines and to other jobs.
   ● The basic fact is that technology eliminates jobs, not work. If this level of AI revolution will happen, lots of job opportunities will be created. For example: 20-30 years ago, being an accountant was a lucrative job, but AI took over this job but this created a lot of opportunities, it raised the demand of a software engineer, data scientist, etc.
   ● It will open doors to skillful jobs rather than doing laborious tasks.
   ● Thus, we will be able to cope with the level of major unemployment, if AI took over laborious jobs.

6. *As Artificially Intelligent machines become more and more powerful, their ability to accomplish tedious tasks is becoming better. Hence, it is now that AI machines have started replacing humans in factories. While people see it in a negative way and say AI has the power to bring mass unemployment and one day, machines would enslave humans, on the other hand, other people say that machines are meant to ease our lives. If machines over take monotonous and tedious tasks, humans should upgrade their skills to remain their masters always.*

   What according to you is a better approach towards this ethical concern? Justify your answer.
   ● AI taking over laborious jobs won't create unemployment. It is just a groundless fear. The standard view of technical change is that some jobs are displaced by the substitution of machines for labour, but that the fear of total displacement is misplaced because new jobs are created, largely due to the technology-fuelled increase in productivity. Humans have always shifted away from work suitable for machines and to other jobs.

- The basic fact is that technology eliminates jobs, not work. If this level of AI revolution will happen, lots of job opportunities will be created. For example: 20-30 years ago, being an accountant was a lucrative job, AI took over this job but this created a lot of opportunities, it raised the demand of a software engineer, data scientist, etc.
- It will open doors to skillful jobs rather than doing laborious tasks.
- Thus, we will be able to cope with the level of major unemployment, if AI took over laborious jobs.

7. **List down various sensors that are present in a smartphone. Also list down the type of data which gets collected through them.**
   - ACCELEROMETER [helps running AR applications and track steps]
   - GPS [Location Data]
   - Gyroscope [Orientation Data]
   - Magnetometer [Direction and Magnetic Field Data]
   - Biometric Sensors [Fingerprint ,Iris, Face data]

New Additions

1. **(Case Study) AI and robotics have raised some questions regarding liability. Take for example the scenario of an 'autonomous' or AI-driven robot moving through a factory. Another robot surprisingly crosses its way and our robot draws aside to prevent collision. However, by this manoeuvre the robot injures a person.**

   a) **Who can be held liable for damages caused by autonomous systems?**
   It is actually very difficult to blame anyone in such a scenario. Here is the situation where AI Ethics come in to the picture. Here, the choices might differ from person to person and one must understand that nobody is wrong in this case. Every person has a different perspective and hence he/she takes decisions according to their moralities. But still if someone is to be liable then it should be the programmer who has designed the algorithm of the autonomous vehicle as he/she should have considered all the exceptional conditions that could arise.

   b) **List two AI Ethics.**
   (Any two out of the following)
   AI Bias, AI Access, Data privacy, AI for kids.