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Assignment 1

1. Define Artificial Intelligence (AI) and Provide examples of its applications.

A.) Artificial intelligence (AI) refers to the simulation of human intelligence in machines that are Programmed to think and act like humans. AI involves the development of algorithms that enable computers to Perform tasks that typically require human intelligence, such as visual Perception, Speech recognition, decision-making and language translation.

Examples of AI applications include:

1. Virtual Personal Assistants: AI-Provides AI-Powered assistants like Siri, Alexa, and Google assistant use NLP to unstand and respond to user commands, manage calendars, and Provide information.

2. Recommendation Systems: AI is used extensively in recommendation engines employed by platforms like Netflix, Amazon or music based on user Preferences and behavior.

3. Autonomous vehicles: Self-driving Cars use AI technologies such as Computer vision, Sensor fusion, and machine learning to navigate and make decisions on the road.

5. Gaming: AI Used in gaming for Creating intelligent opponents and Optimizing gameplay experiences.

6. Healthcare: AI is transforming healthcare with applications like medical imaging analysis, Personalized treatement plans.

7. fraud detection: AI algorithms are used in finance and banking sectors to detect Patterns of fraudulent activities by analyzing transactions and user behavior.

8. language translation: AI-Powered language translation Services like Google translate use ML to translate text between different languages.

2.) Differentiate between Supervised & unsupervised learning techniques in machine learning.

Aspect	Supervised learning	Unsupervised learning
1. Input data	labeled data with input-output Pairs	Unlabled data without explicit output labels
2 Objective	learn to Predict Output based input	Discover Patterns, relationships in data
3. Training Process	learn from labeled examples to minimize errors	learn from data structure without explicit targets.
4. Types of Problems	classifications, regressions	clustering, dimensionality reduction, dections.

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5. Data requirements	Requires labeled data from training and testing	Can work with raw, unlabeled data.
6. Examples of Algorithms	linear regression, SVM, neural networks	K-means clustering, PCA, autoencoders.
7. Complexity	Task formulation is Straightforward	Goal ambiguity can make tasks more complex
8. Outcome interpretation	Outputs are Predictions or classifications	Outputs represent discovered Pattern or Clusters

3.) What is Python? discuss it's main features & advantages

A.) Python is a versatile and widely-used Programming language known for its simplicity, readability and extensive libraries. It's favored across various domains including web development, data analysis, artifical intelligence, Scientific Computing, and more.

features:

1.) Simple & readable Syntax
2.) interpreted and interactive
3.) Extensive Standard library
4.) Dynamic Typing
5.) Cross-Platform

6. Object-oriented
7. large Community & ecosystem
8. integration capabilities.

Advantages

1) Easy to learn & use
2) Versatile and scalable
3) Extensive libraries & frameworks
4) Community support
5) Readability & Maintainability
6) integration & interoperability
7) Carrer opportunities.

4.) Advantages of using Python as a Programming language in ML & AI.

i) easy of learning & use
ii) Rich Ecosystem of libraries
iii) Support for data Analysis & visualization
iv) Strong community & Active Development.
v) flexibility & scability
vi) integration capabilities
vii) Availability of Pre-trained models & Tools
viii) Support for deep learning
ix) Cross-Platform Compatibility
x) Educational Resources.

5.) Discuss importance of ~~ide~~ indention in Python Code,

Indentation plays a Crucial role in Python code because It is used to define the Structure & hierarcy of the Code blocks. Unlike many other Programming languges that use Curly braces or keywords to denote blocks of Code, Python uses Indentation to signify where blocks of Code begin and end. Here's why Indentation is important in Python:

1.) Readability
2.) Enforcement of Code Blocks
3.) Syntax Requirement
4.) Consistency
5.) Semantic Meaning
6.) No Ambiguity
7.) Pythonic Style.

6.) Define a Variable in Python Provide example of Valid Variable names.

A.) In Python, a variable is a named reference to a value stored in memory. Variables are used to store data that can be accessed and manipulated throughout the Program Here's how you define a variable in Python and examples of valid Variable name:

Syntax:- Variable-name = Value.

Variable-name is the name of the variable.
Value is the data that the variable holds.

Ex:- name = "john"
age = 30
average_score = 85.5
is_student = True
_underscore_variable = "valid"
my_variable_123 = "hello"

Q) Explain the different between keyword and identifier in Python.

A) Keywords:- It as reserved words, are Predefined words in Python. that have special meanings and Purposes. These words are reserved by the language and cannot be used as identifiers.

Ex:- import keyword
Print(keyword.kwlist)

Ex:- if, else, elif : Conditional Statement
for, while : used for loop iterations
for, while : ~~loop~~ defining functions & Classes.

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Identifiers :- User-defined names used to identify variables, functions, classes, modules or any other objects in Python. It objects and help in referencing and manipulating them in the code.

Ex :-
- MY_Variable
- Count
- Employee
- Calculate_Salary

→ must start with a letter (a-z, A-Z) or underscore (_).
→ Can contain letters, digits (0-9), or underscores.

8.) List the basic data types available in Python.

A.) Python supports several basic data types that are commonly used to represent different kinds of data in Programs.

1.) interger (int): Represents whole numbers
Ex :- x = 10

2.) float (float): Represents with a decimal Points.
Ex : y = 13.5

3) string (str): Represent sequences of characters enclosed with single quotes (' ') or double quotes (" ")
Ex :- name = "John"

4.) Boolean (bool): Represents a boolean value which can be either True or false.
Ex :- is_student = True

5. List (list): Represents an ordered collection of elements enclosed in square brackets ([])

Ex:- numbers = [1, 2, 3, 4, 5]

6. Tuple (tuple): Represents an ordered collection of elements enclosed in Parentheses (())

Ex:- Coordinates = (10, 20)

7) dictionary (dict): Represents a collection of key-value pairs enclosed by curly braces ({})

Ex- Person = {'name': 'John', 'age': 30}

9.) Describe the syntax for an if statement in Python

A) if statement is used to conditionally execute a block of code based on the evaluation of a specified condition. The syntax for an if statement in Python is straightforward and follows a specific structure.

```
if condition:
    # indented block of code to
execute if condition is True
    Statement1
    Statement2
    # more statements...
```

Ex:-

```
# Example of an if statement
x = 10
if x > 5;
    Print ("x is greater than 5")
    Print ("this statement is also executed")
```

10.) Elif Statement Purpose in Python?

Ans) Short for "else if" is used along with if statements to handle multiple conditions in a structured & efficiency way. The elif statement allows you to check additional conditions if the preceding if condition evaluates to false.

Ex:-

```
x = 10
if x > 100;
    Print ("x is greather than 100")
elif x > 50:
    Print ("x is greater than 50 but less
    than or equal to 100")
elif x > 20:
    Print ("x is greater than 20 but less than
    or equal to 50")
else: Print ("x is less than or equal to 20")
```

Purpose of elif.

i) Handling multiple Conditions.

ii) efficiency: more efficient and readable.