15 March Assignment

May 19, 2023

[ ]: Q1- Explain the following `with` an example-?

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1.  Artificial Intelligence :
                          AI has already made a positive impact across a␣
  ↪broad range of industries. It can automate processes to free
employees of unnecessary labor, provide personalized learning options for␣
  ↪students, enable cybersecurity companies to deploy faster solutions
and help fashion companies design better-fitting clothing for their customers.␣
  ↪Even ChatGPT is applying deep learning to detect coding errors
and produce written answers to questions.

ARTIFICIAL INTELLIGENCE EXAMPLES

-Manufacturing robots
-Self-driving cars
-Smart assistants
-Healthcare management
-Automated financial investing
-Virtual travel booking agent
-Social media monitoring
-Marketing chatbots
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2. Machine Learning :
                    Machine learning is being applied in nearly every industry.
  ↪ Here are some examples of machine learning applications
and use cases:

-Recommendation Engines (Netflix)
-Sorting, tagging and categorizing photos (Yelp)
-Self-Driving Cars (Waymo)
-Education (Duolingo)
-Customer Lifetime Value (Asos)
-Patient Sickness Predictions (KenSci)
-Determining Credit Worthiness (Deserve)
-Targeted Emails (Optimail)
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3. Deep Learning :
            Deep learning falls under the umbrella of machine learning and
    AI, eliminating some of machine learnings data preprocessing
with algorithms. Learn more with this overview of deep learning.Deep learning
    is related to machine learning based on algorithms inspired by
the brains neural networks. Though it sounds almost like science fiction, it is
    an integral part of the rise in artificial intelligence (AI).
Machine learning uses data reprocessing driven by algorithms, but deep learning
    strives to mimic the human brain by clustering data to produce
startlingly accurate predictions.

-Virtual assistants
-Driverless vehicles
-Chatbots
-Facial recognition
-Medical science
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Q2- What is supervised learning? List some examples of supervised Learning.
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        Supervised learning is a type of machine learning where the algorithm
    learns from labeled data. In supervised learning, the
algorithm is trained on a labeled dataset, which means that each input data
    point has a corresponding output value. The goal of supervised
learning is to learn a function that can map inputs to outputs accurately.
   Some examples of supervised learning include image classification,speech
    recognition, spam detection, predicting house prices,
and sentiment analysis.
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Q3- What is unsupervised Learning? List some examples of unsupervised learning.
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     Unsupervised learning is a type of machine learning where the model is
    not provided with any labeled data. Instead, it is given a set of
data and asked to find patterns or relationships between the data points on its
    own. Some examples of unsupervised learning include clustering,
anomaly detection, and dimensionality reduction.
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    Clustering is the process of grouping similar data points together based on
    ↪their features. Anomaly detection is the process of identifying
data points that are significantly different from the rest of the data.
    ↪Dimensionality reduction is the process of reducing the number of
features in a dataset while retaining as much information as possible.
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[ ]: `Q4- What is the difference between  AI, ML, DL, and DS?`

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AI stands for Artificial Intelligence which is a broad science that studies
    ↪ways to build intelligent programs and machines.
ML stands for Machine Learning which is a subset of AI that uses algorithms to
    ↪learn from data and predict outputs without being explicitly
programmed.
DL stands for Deep Learning which is a subset of ML that uses complex neural
    ↪networks to detect patterns in large unstructured data sets,
inspired by how human brains work.
DS stands for Data Science which is a data-driven technique and each of DS, ML
    ↪and DL have processes that relate to data or big data.
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[ ]: `Q5- What are the main differences between supervised, unsupervised, and`
    ↪semi-supervised learning?

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    Supervised, unsupervised learning, semi-supervised and reinforced learning
    ↪are 4 fundamental approaches of machine learning:
Supervised LearningBuilds a model based labelled data.
Unsupervised LearningBuilds a model based on a unlabelled data.
Semi-Supervised LearningBuilds a model based on a mix of labelled and
    ↪unlabelled data.
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[ ]: Q6- What is train, test and validation split? Explain the importance of each
     term.
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[ ]: In machine learning, the train-test-validation split is a technique used to
     evaluate the performance of a model.
     The primary purpose of this technique is to evaluate the performance of a model.
      By splitting the data into training and testing datasets,
     we can train the model on one dataset and evaluate its performance on another
     dataset. This allows us to assess how well the model generalizes
     to new data, which is crucial in developing a model that can be used in the
     real world.

     The training set is used to train the model. The validation set is used to tune
     the hyperparameters of the model.
     The test set is used to evaluate the final performance of the model.

     The importance of each term is as follows:

     Train set: It is used to train the model.
     Validation set: It is used to tune the hyperparameters of the model.
     Test set: It is used to evaluate the final performance of the model12.
     The train-test-validation split is important because it allows us to assess how
     well our model generalizes to new data.
     It also helps us avoid overfitting by providing an independent dataset for
     testing.
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[ ]: Q7- How can unsupervised learningbK used in anomaly detection?
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[ ]: Unsupervised learning is a type of machine learning that does not rely on
     labeled data to find patterns or clusters in the data.
     One of the applications of unsupervised learning is anomaly detection, which is
     the task of identifying outliers or abnormal instances in
     the data.
     Unsupervised anomaly detection is the process of identifying unexpected items
     or events in unlabeled datasets, which differ from the norm.
     It involves modelling the normal data distribution and defining a measurement
     to classify samples as anomalous or normal.
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There are different functions and methods for unsupervised anomaly detection␣
  ↪for univariate and multivariate data.
Density Based Scan Clustering (DBSCAN) is one of the most common algorithms␣
  ↪used for unsupervised anomaly detection.
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Q8- List down some commonly used supervised learning algorithms and␣
  ↪unsupervised learning
algorithms.
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Some popular examples of supervised machine learning algorithms are: Linear␣
  ↪regression for regression problems.
Random forest for classification and regression problems. Support vector␣
  ↪machines for classification problems.
Unsupervised learning is where you only have input data (X) and no␣
  ↪corresponding output variables.
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