1. Artificial Intelligence (AI)
   1. AI refers to human-like intelligence exhibited by machines.
   2. Includes narrow AI, where machines excel at specific tasks.
   3. General AI mimics human abilities across various tasks but is far from being achieved.

2. Machine Learning (ML)
   1. ML is a subset of AI focused on systems learning from data to improve performance.
   2. Stanford defines ML as getting computers to act without explicit programming.
   3. ML achieves AI by finding patterns in data.

3. Deep Learning
   1. Deep Learning is a technique within ML.
   2. Utilizes deep neural networks.
   3. Acts as a type of algorithm for complex pattern recognition.

4. Data Science
   1. Involves analyzing and deriving insights from data.
   2. Often has business goals.
   3. Overlaps with ML; understanding data is crucial in both fields.

5. Relationship between ML and Data Science
   1. Many roles overlap, requiring skills in both areas.
   2. ML experts need data science skills, and vice versa.

6. Course Focus
   1. Emphasizes practical ML and data science applications.
   2. Focuses on job readiness and productivity.
   3. Integrates ML within the broader scope of data science.

7. Data Engineering
   1. Mentioned as another term but not detailed in this context.
   2. Will be covered later in the course.

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1. Machine Learning Overview
   1. Machine learning is about predicting results based on incoming data.
   2. Various subcategories of machine learning aim to accomplish this goal.

2. Supervised Learning
   1. Subset of machine learning where data is labeled.
   2. Data comes with categories (e.g., CSV files with labeled rows and columns).

3. Includes labeled training data and labeled test data to verify accuracy.

a. Classification
1. Used to decide categories, e.g., identifying apples vs. pears.
2. The model draws a line to distinguish between categories.

b. Regression
1. Predicts continuous outcomes based on inputs, e.g., stock prices.
2. Uses labeled data to make predictions.

c. Example Application
1. Hiring engineers based on inputs like years of experience, age, location, type of computer.
2. Uses labeled data to decide whether to hire an engineer.

3. Unsupervised Learning
1. Involves data without labels.
2. Data might lack column names or predefined categories.

a. Clustering
1. Groups data points into clusters without predefined labels.
2. The machine identifies and creates groups based on data patterns.

b. Association Rule Learning
1. Identifies associations between data points to predict future behaviors.
2. Used for predicting customer purchases when groups don't exist.

4. Reinforcement Learning
1. Teaches machines through trial and error, using rewards and punishments.
2. The program learns by playing a game repeatedly to maximize the score.
3. Useful for skill acquisition and real-time learning, such as in video games.

5. Algorithms and Techniques
1. Various algorithms are used within these subfields to make predictions.
2. Examples include neural networks, decision trees, support vector machines, and k-nearest neighbors.
3. All aim to learn from the data and predict outcomes.

6. Key Takeaway
1. All machine learning methods aim to learn from data and make predictions.

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1. Introduction to Machine Learning
   1. Machine learning involves using algorithms or computer programs to identify patterns in data.
   2. The goal is to make predictions about the future using similar data.
   3. Machine learning algorithms are also called models.

2. Difference Between Machine Learning Algorithms and Normal Algorithms
   1. Normal algorithms follow a set of instructions to achieve a result (e.g., a recipe).
   2. Machine learning algorithms start with inputs and desired outputs and learn the instructions to achieve the result.
   3. Example: Ingredients as inputs and a favorite chicken dish as the output.
   4. The algorithm learns from multiple examples to identify the correct set of instructions.

3. Machine Learning Process
   1. Initially, results may not be accurate.
   2. With more examples (hundreds or thousands), the algorithm improves.
   3. The goal is to find patterns in data for future use.

4. Machine Learning in a Nutshell
   1. Identifies patterns in collected data.
   2. Uses patterns to solve future problems.
   3. Example: Suggesting a dish based on available ingredients.

5. Difference Between Data Analysis, Data Science, and Machine Learning
   1. Data Analysis:
      1. Examine data to gain understanding.
      2. Compares examples and features, creates visualizations.
   2. Data Science:
      1. Runs experiments on data to find actionable insights.
      2. May involve building machine learning models.
   3. Machine Learning within Data Science:
      1. Model looks at large datasets to predict outcomes based on new data.
      2. Machine learning and data analysis are parts of data science.
