Unit 1

Artificial Intelligence & Big Data Analytics – An Introduction

AI - Business Intelligence Analyst

Table of Content

✓Explain the relevance of AI & Big Data Analytics for the society

✓Explain the various use-cases of AI & Big Data in the industry

✓Define "general" and "narrow" AI

✓Describe the fields of AI such as image processing, computer vision, robotics, NLP, etc.

Individuals at this job are responsible for performing different aspects of Business Analysis. S/he will be responsible for importing and preprocessing data and perform exploratory analysis to derive actionable insights. A BI analyst needs to have strong analytical skills and problem solving ability. S/he needs to have good communication skills to work with stakeholders across multiple teams such as marketing, sales, product development, etc.

Introduction to AI & Big Data Analytics

Subtitle: Transforming Society through Data Insights

Defining Artificial Intelligence (AI):
- AI is the simulation of human intelligence in machines, enabling them to perform tasks that typically require human intelligence, such as problem-solving, learning, and decision-making.
- In the context of Business Intelligence Analysis, AI plays a pivotal role in automating processes and extracting meaningful insights from vast datasets.

The Power of Big Data Analytics:
- Big Data Analytics involves examining large and diverse datasets to uncover hidden patterns, correlations, and other insights.
- As a Business Intelligence Analyst, proficiency in Big Data Analytics is crucial for extracting actionable information from the ever-growing volume of data generated in business operations.

Intersection of AI and Big Data Analytics:
- The synergy between AI and Big Data is transformative, as AI algorithms can efficiently process and analyze massive datasets to reveal valuable trends and predictions.
- This chapter will explore the symbiotic relationship between AI and Big Data Analytics and its implications for the role of a Business Intelligence Analyst.

Relevance to Society - "AI & Big Data Analytics Impact"

Subtitle: Enhancing Decision-Making and Driving Innovation

Improved Decision-Making:
- AI and Big Data Analytics empower businesses and governments to make informed decisions based on data-driven insights.
- Business Intelligence Analysts leverage these technologies to enhance decision-making processes, leading to more effective strategies and outcomes.

Enhancing Efficiency and Productivity:
- The integration of AI and Big Data Analytics optimizes operations by automating routine tasks and identifying areas for efficiency improvements.
- Businesses can streamline processes, reduce costs, and allocate resources more effectively with the insights derived from these technologies.

Innovation and Competitive Advantage:
- The ability to harness AI and Big Data Analytics provides a competitive edge in today's dynamic markets.
- Business Intelligence Analysts equipped with these skills contribute to innovation by uncovering trends, predicting market shifts, and identifying new opportunities for growth.
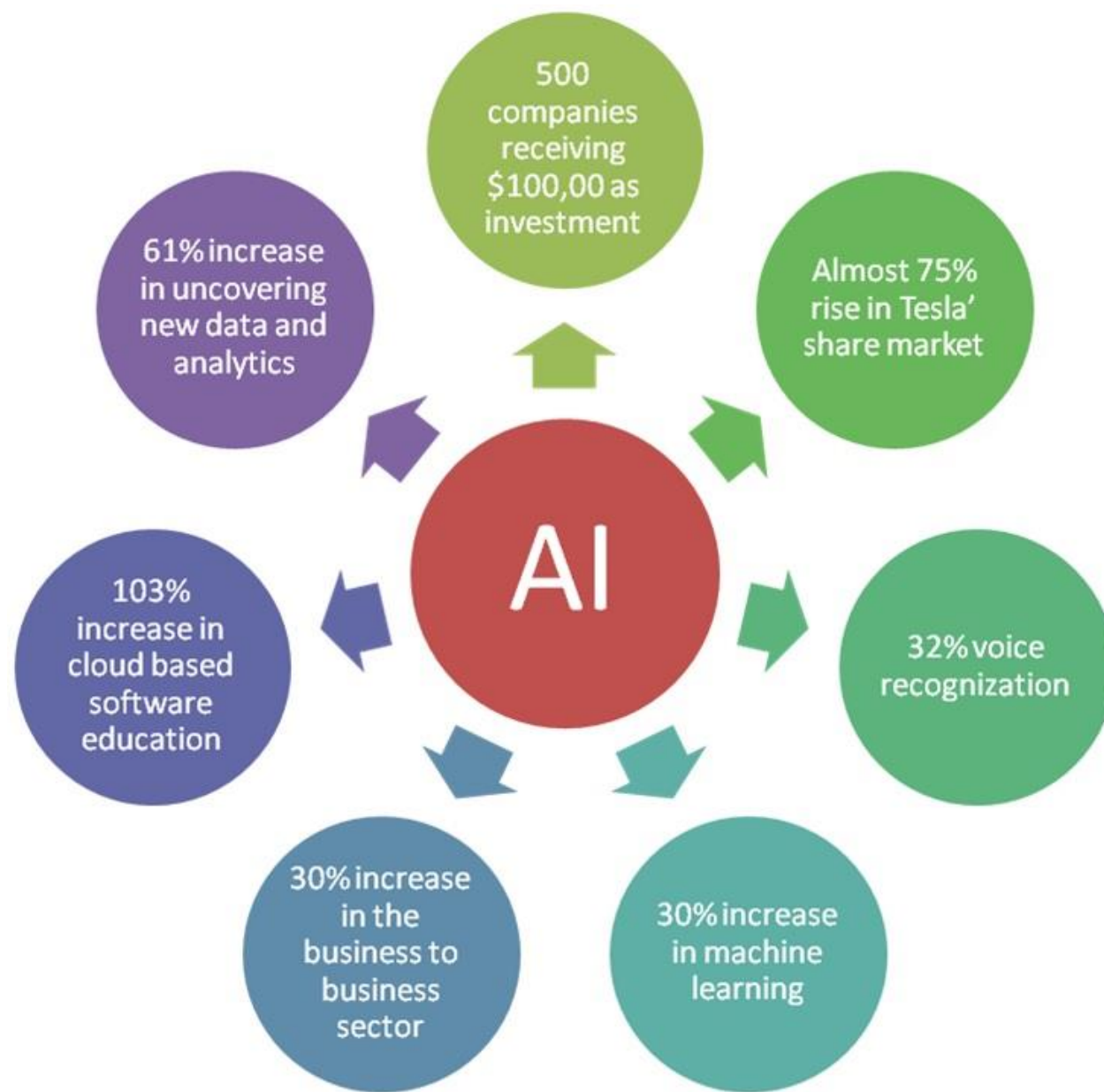
Relevance to Society - "AI & Big Data Analytics Impact"

Subtitle: Enhancing Decision-Making and Driving Innovation

Addressing Societal Challenges:
- Beyond business applications, AI and Big Data Analytics contribute to solving societal challenges such as healthcare management, climate change analysis, and urban planning.
- As future Business Intelligence Analysts, understanding the societal impact of these technologies is essential for creating positive change.

Ethical Considerations:
- The chapter will also touch upon the ethical considerations surrounding AI and Big Data Analytics, emphasizing the responsibility of Business Intelligence Analysts to ensure the ethical use of data for societal benefit.

AI in Business Intelligence Analysis - "Unlocking Strategic Insights"

**Subtitle: Transforming Industries through AI Integration**

Predictive Analytics:
- AI facilitates predictive analytics by analyzing historical data to predict future trends, allowing businesses to proactively adjust strategies.
- Business Intelligence Analysts leverage predictive analytics for forecasting sales, market trends, and customer behavior.

Customer Segmentation:
- AI algorithms analyze large datasets to identify patterns and preferences, enabling precise customer segmentation.
- Business Intelligence Analysts utilize this capability to tailor marketing strategies, enhance customer experiences, and optimize product offerings.

Automated Reporting and Dashboards:
- AI automates the generation of reports and dashboards, saving time and resources.
- Business Intelligence Analysts can focus on interpreting insights rather than manual data preparation, leading to more efficient decision-making processes.
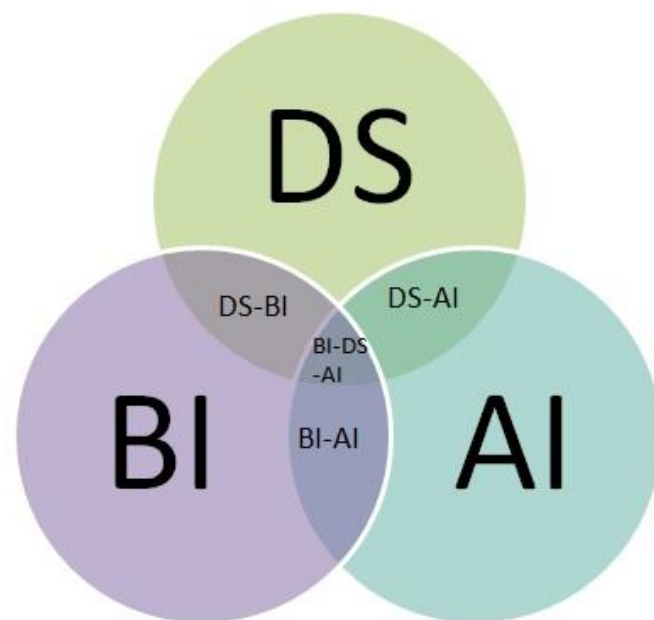
Methods	Discipline
Unsupervised Machine Learning	AI
Reinformation Learning	AI
Reporting Support	BI
Multidimensional Analysis	BI
Natural Language	BI-AI
Data Management	BI-DS-AI
Big data Management	BI-DS-AI
Predictive Modelling	DS
Descriptive Statistics	DS -BI
Data Visualization	DS -BI
Data Discovery	DS -BI

AI in Business Intelligence Analysis - "Unlocking Strategic Insights"

Subtitle: Transforming Industries through AI Integration

Anomaly Detection:
- AI identifies anomalies or irregularities in data, helping detect potential fraud or operational issues.
- Business Intelligence Analysts employ anomaly detection to ensure data integrity and identify areas requiring immediate attention.

Natural Language Processing (NLP):
- NLP enables machines to understand and generate human-like language.
- Business Intelligence Analysts leverage NLP for sentiment analysis in customer feedback, facilitating a deeper understanding of market perception.

Big Data Analytics Use-Cases - "Harnessing the Power of Data"

Subtitle: Driving Business Excellence through Big Data Analytics
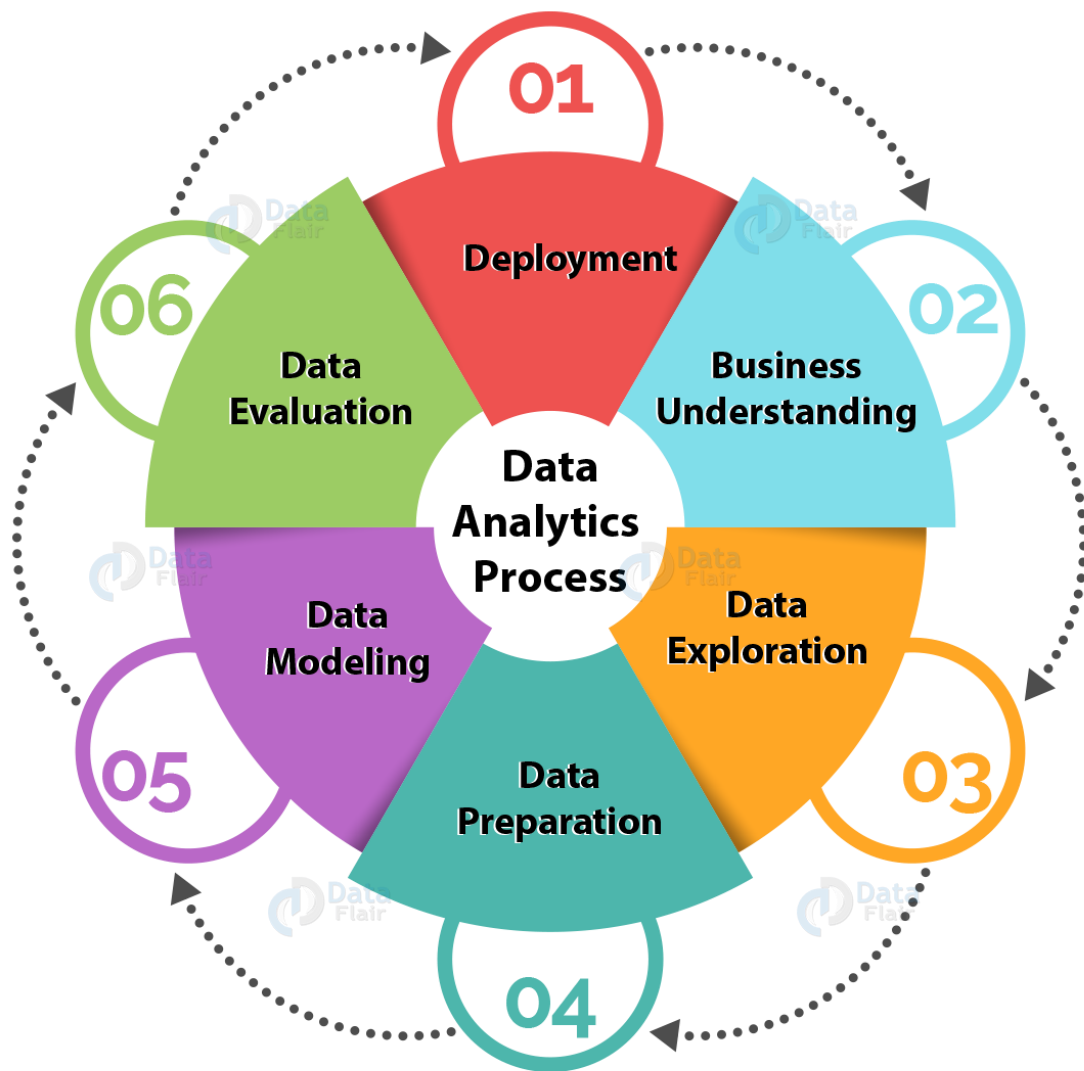
Market Trend Analysis:
- Big Data Analytics enables the analysis of vast datasets to identify market trends, emerging patterns, and consumer behavior.
- Business Intelligence Analysts use this information to advise on market strategies and product development.

Supply Chain Optimization:
- Big Data Analytics optimizes supply chain operations by providing real-time insights into inventory levels, demand fluctuations, and logistics.
- Business Intelligence Analysts play a key role in ensuring seamless and efficient supply chain management.

Personalized Marketing Campaigns:
- Big Data enables the creation of personalized marketing campaigns based on individual preferences and behavior.
- Business Intelligence Analysts use these insights to design targeted campaigns that resonate with specific customer segments.

Data Analytics Process

01 Deployment
02 Business Understanding
03 Data Exploration
04 Data Preparation
05 Data Modeling
06 Data Evaluation

Medical Data Analytics

Financial and banking Data Analytics

Agriculture Data Analytics

Business Data Analytics

Big Data Analytics Use-Cases - "Harnessing the Power of Data"

Subtitle: Driving Business Excellence through Big Data Analytics

Healthcare Analytics:
- Big Data Analytics is instrumental in healthcare for patient data analysis, drug discovery, and predictive modeling for disease outbreaks.
- Business Intelligence Analysts contribute to improving healthcare outcomes by interpreting data for informed decision-making.

Financial Fraud Detection:
- Big Data Analytics is crucial in identifying patterns indicative of fraudulent activities in financial transactions.
- Business Intelligence Analysts use advanced analytics to detect anomalies and protect organizations from financial threats.

Understanding AI - "Distinguishing General and Narrow AI"

Subtitle: Navigating the Spectrum of Artificial Intelligence

Definition of Artificial Intelligence (AI):
- AI refers to the capability of machines to imitate intelligent human behavior, enabling them to learn, reason, and solve problems autonomously.
- As Business Intelligence Analysts, understanding the nuances of AI is crucial for harnessing its potential in data-driven decision-making.

General AI (Artificial General Intelligence - AGI):
- General AI refers to machines with the ability to understand, learn, and apply knowledge across a broad range of tasks at a human-like level.
- AGI possesses the cognitive capabilities to excel in various domains, adapting to new challenges without specific programming.

Characteristics of General AI:
- Flexibility: Adapts to diverse tasks without specialized programming.
- Learning: Acquires knowledge from various sources and experiences.
- Problem-Solving: Demonstrates human-like reasoning in unfamiliar scenarios.

Understanding AI - "Distinguishing General and Narrow AI"

Subtitle: Navigating the Spectrum of Artificial Intelligence

Current State of General AI:

- General AI remains theoretical and is yet to be achieved. Most existing AI systems are designed for specific tasks and lack the versatility of AGI.
- Business Intelligence Analysts should stay informed about advancements in AI, considering potential impacts on their analytical processes.

Data science vs. AI vs. ML

Data Science

- based on strict analytical evidence
- deals with structured & unstructured data
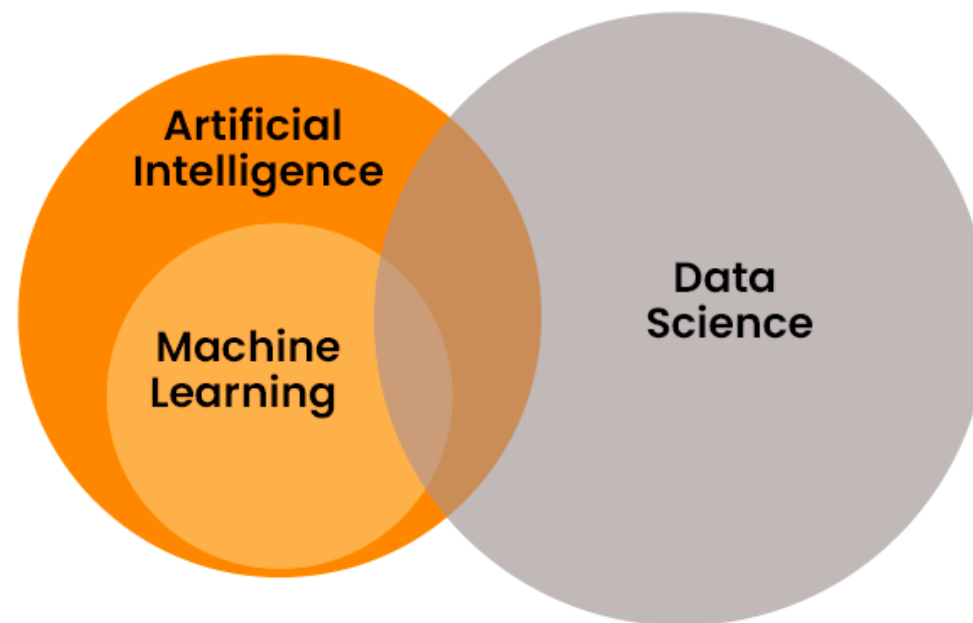- includes various data operations

Artificial Intelligence

- imparts human intellect to machines
- uses logic and decision trees
- includes machine learning

Machine Learning

- subset of AI
- uses statistical models
- machines improve with experience

Narrow AI (Artificial Narrow Intelligence - ANI)

Subtitle: Specialized Intelligence for Targeted Solutions

Definition of Narrow AI (ANI):
- Narrow AI refers to AI systems designed and trained for specific tasks, demonstrating high proficiency in a limited domain.
- Business Intelligence Analysts commonly encounter ANI in tools and applications tailored for specific data analysis tasks.

Characteristics of Narrow AI:
- Specialization: Excelling in a predefined set of tasks or domains.
- Limited Scope: Effective within a specific context or problem-solving scenario.
- Lack of Generalization: Does not possess the adaptability and broad understanding of General AI.

Applications of Narrow AI:
- Natural Language Processing (NLP) tools for sentiment analysis.
- Machine learning models for predictive analytics in specific industries.
- Image recognition systems for automated data categorization.

Narrow AI (Artificial Narrow Intelligence - ANI)

Subtitle: Specialized Intelligence for Targeted Solutions

Business Intelligence and Narrow AI:

- Business Intelligence Analysts often leverage Narrow AI tools for specific analytical tasks, enhancing efficiency in data processing and interpretation.
- Integrating Narrow AI into BI processes allows for targeted and effective data analysis within a given context.
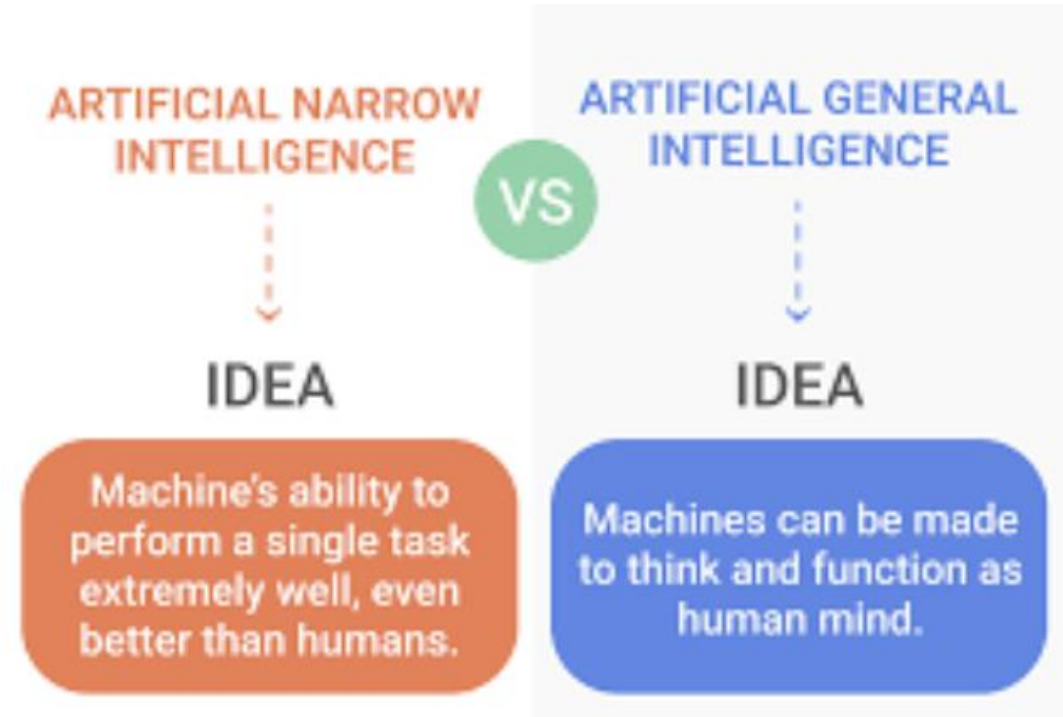
Exploring AI Fields - "Diverse Applications in Artificial Intelligence"

Subtitle: Unveiling the Multifaceted Landscape of AI

Image Processing and Computer Vision:

- Image Processing: Involves manipulation and analysis of images to enhance or extract information. AI applications include facial recognition, image editing, and medical image analysis.
- Computer Vision: Encompasses AI systems interpreting and understanding visual information, enabling machines to recognize objects, people, and scenes. Applications range from autonomous vehicles to quality control in manufacturing.

Natural Language Processing (NLP):

- NLP focuses on the interaction between computers and human language. AI applications include language translation, sentiment analysis, and chatbots. In Business Intelligence, NLP is employed for analyzing textual data, customer feedback, and social media sentiments.

Robotics:

- Robotics involves the design, construction, and operation of robots. AI enhances robotics by providing machines with learning and decision-making capabilities. Applications include industrial automation, healthcare assistance, and autonomous drones.

Machine Learning:

- A subset of AI, Machine Learning involves algorithms that enable systems to learn from data and improve their performance over time. In Business Intelligence, Machine Learning is utilized for predictive analytics, pattern recognition, and anomaly detection.

Applications of AI in Business Intelligence - "Strategic Integration for Data Analysis"

Subtitle: Leveraging AI Technologies for Enhanced Business Insights

Predictive Analytics:
- AI-driven predictive analytics utilizes historical data to forecast future trends and outcomes. Business Intelligence Analysts leverage predictive models for sales forecasting, demand planning, and risk assessment.

Text Analytics:
- NLP-based text analytics enables the extraction of insights from unstructured textual data. Business Intelligence Analysts utilize this in sentiment analysis, customer feedback analysis, and extracting valuable information from documents.

Data Visualization and BI Tools:
- AI-enhanced data visualization tools utilize algorithms for intelligent insights and automated report generation. Business Intelligence Analysts can create visually compelling dashboards that highlight key trends and patterns for decision-makers.

Speech Analytics:
- AI-powered speech analytics transcribes and analyzes spoken words in audio data. Business Intelligence Analysts may use this for customer service analysis, call center optimization, and extracting actionable insights from recorded conversations.

Applications of AI in Business Intelligence - "Strategic Integration for Data Analysis"

Subtitle: Leveraging AI Technologies for Enhanced Business Insights

Automated Data Processing:

- AI streamlines data preprocessing tasks, automating data cleansing, normalization, and transformation. Business Intelligence Analysts benefit from reduced manual effort, allowing more focus on analysis and interpretation.
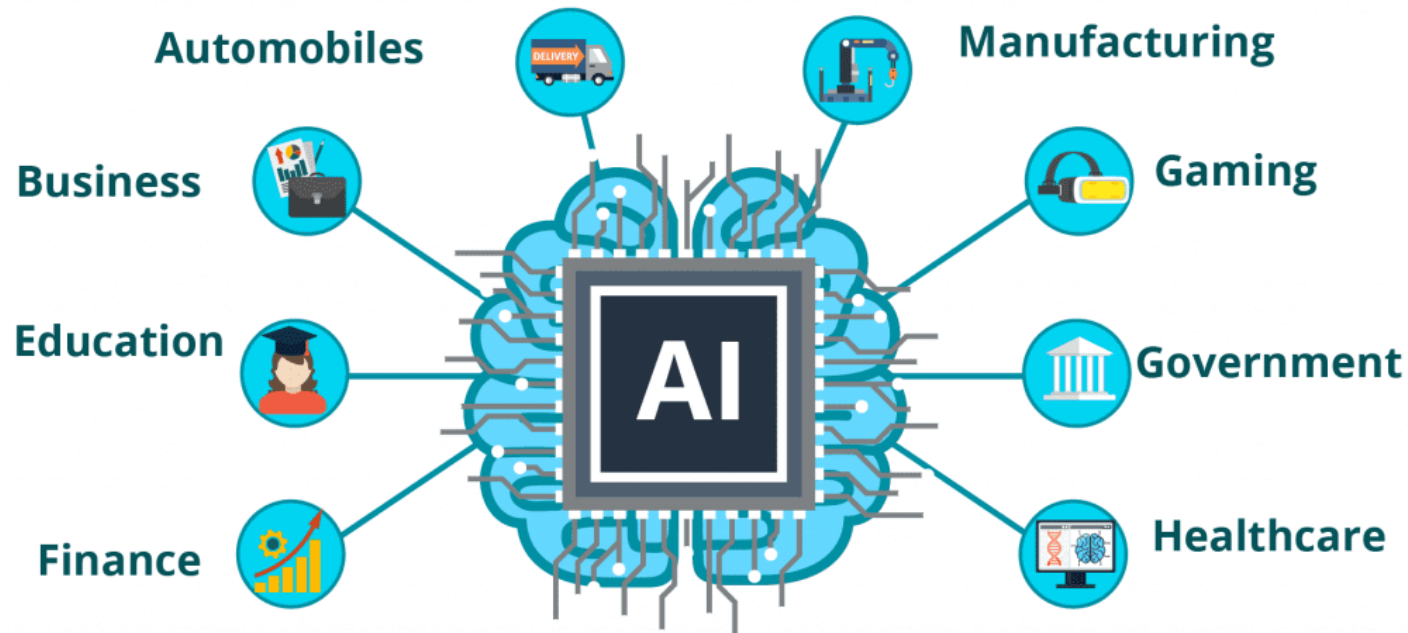
Understanding Learning Paradigms - "Supervised vs. Unsupervised Learning"

Subtitle: Decoding the Foundations of AI Learning

Supervised Learning:
- Supervised learning involves training an AI model using a labeled dataset, where each input is paired with its corresponding output.
- The model learns to map inputs to outputs, making predictions or classifications when presented with new, unseen data.
- Common applications include regression (predicting continuous values) and classification (categorizing data into predefined classes).

Unsupervised Learning:
- Unsupervised learning operates on unlabeled data, aiming to discover inherent patterns, structures, or relationships within the dataset.
- The model explores the data without predefined categories, making it suitable for tasks such as clustering and dimensionality reduction.
- Key applications include clustering similar data points and uncovering hidden structures within datasets.

# Understanding Learning Paradigms - "Supervised vs. Unsupervised Learning"

Subtitle: Decoding the Foundations of AI Learning

Differences:

- Supervised Learning: Requires labeled training data with input-output pairs. Models are trained to predict or classify based on these pairs.
- Unsupervised Learning: Works with unlabeled data, focusing on identifying patterns or grouping similar data points without predefined categories.

Supervised vs. Unsupervised Learning
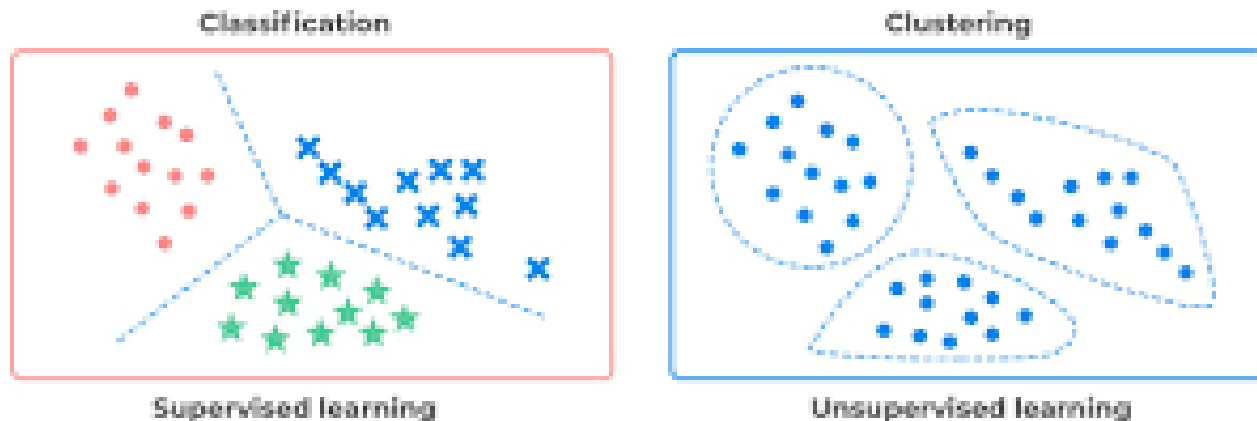
Classification / Clustering

Supervised learning / Unsupervised learning

Delving Deeper - "Understanding Deep Learning"

Subtitle: Navigating the Depths of Neural Networks

Deep Learning:
- Deep Learning is a subset of machine learning where artificial neural networks, inspired by the human brain's structure, are employed for complex tasks.
- Neural networks consist of layers of interconnected nodes (neurons) that learn hierarchical representations of data.
- Applications range from image and speech recognition to natural language processing.

Key Characteristics:
- Neural Networks: Deep Learning relies on neural networks with multiple hidden layers, allowing the model to learn intricate representations of data.
- Feature Learning: Automatically extracts relevant features from data, eliminating the need for manual feature engineering.
- Representation Learning: Learns hierarchical representations, capturing complex relationships within the data.

Delving Deeper - "Understanding Deep Learning"

Subtitle: Navigating the Depths of Neural Networks

Differences from Traditional Machine Learning:

- Feature Extraction: Deep Learning automates feature extraction, learning intricate patterns directly from the data.
- Model Complexity: Deep Learning models, with their multiple layers, handle intricate tasks that may be challenging for traditional machine learning algorithms.

What are AI and big data?

https://www.youtube.com/watch?v=uD8Dbozzod4

Artificial General Intelligence vs Artificial Narrow Intelligence

https://www.youtube.com/watch?v=7CFzZyMhnrc

Big Data Analytics For Beginners

https://www.youtube.com/watch?v=bY6ZzQmtOzk

Types of Artificial Intelligence

https://www.youtube.com/watch?v=ytw7ntwJbqI
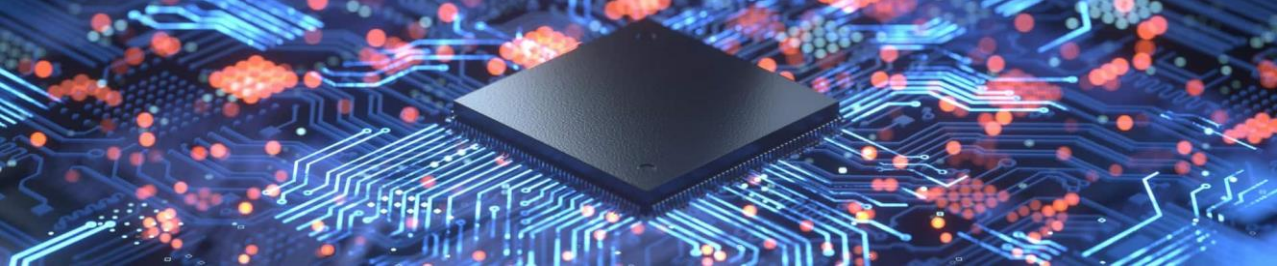
Thank You

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