

Role of Artificial Intelligence in Power Business Intelligence

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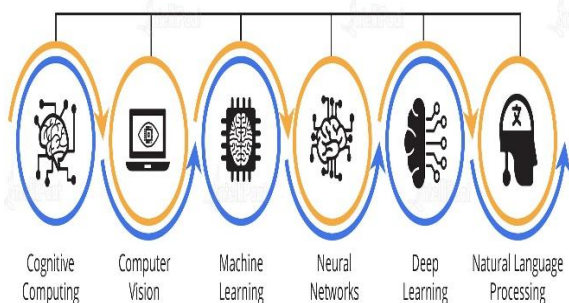
Abstract-- Artificial Intelligence (AI) has emerged as a transformative force reshaping various aspects of our society, from healthcare and finance to transportation and entertainment. This abstract provides an overview of the current state and the evolving landscape of AI, highlighting its significant impact on industries, challenges, and ethical considerations.

The exponential growth in computational power, coupled with the accumulation of vast datasets, has propelled AI to unprecedented levels of sophistication. Machine learning techniques, particularly deep learning, have enabled AI systems to excel in tasks such as image recognition, natural language processing, and recommendation systems. This has led to groundbreaking applications, including autonomous vehicles, medical diagnosis, and personalized content delivery.

AI's pervasive influence on industries is undeniable. In healthcare, AI-driven diagnostic tools enhance accuracy and speed in identifying diseases, while in finance, predictive algorithms optimize trading strategies and risk management. Autonomous vehicles, driven by AI, promise safer and more efficient transportation systems. Moreover, AI-powered chatbots and virtual assistants have transformed customer service and user experiences across various domains.

Keywords-- Artificial Intelligence, power BI, Machine Learning, Natural Language Processing, Deep Learning

I. WORKING OF ARTIFICIAL INTELLIGENCE



The working of Artificial Intelligence (AI) involves the use of computer systems and algorithms to simulate human-like intelligence, enabling machines to perform tasks that typically require human intelligence.

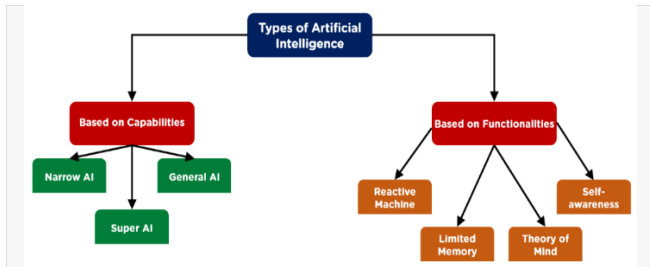
AI systems are designed to process information, learn from it, make decisions, and adapt to new situations. The core components of AI working include data input, processing, learning, reasoning, and output.

Here is a simplified overview of how AI works:

- 1. Learning:** AI systems often go through a training phase where they learn from the data. During training, the system adjusts its internal parameters to minimize errors or maximize performance on a specific task. The learning process varies depending on the AI model and can be supervised (with labeled data), unsupervised (without labels), or reinforcement-based (reward-based learning).
- 2. Reasoning and Decision-Making:** After learning, AI systems can make decisions, predictions, or classifications based on the knowledge gained during the training phase. They use logic, statistical methods, and pattern recognition to arrive at conclusions.
- 3. Output:** The AI system provides an output, which can take various forms depending on the application. It could be a recommendation, a classification, a generated response, or a control action. The output is then used to influence real-world actions or provide valuable information.
- 4. Feedback Loop:** Many AI systems incorporate a feedback loop where the system continuously learns and adapts based on new data and user interactions. This feedback loop helps AI systems improve their performance over time.
- 5. Deployment and Integration:** Finally, AI systems are deployed into real-world applications, integrated into software or hardware, and used to solve specific problems or enhance existing processes.

It's important to note that AI is a broad field, and the specific workings of AI systems can vary widely based on their applications, the data they use, and the algorithms they employ. AI continues to evolve with ongoing research and development, leading to more sophisticated and capable AI systems.

II. TYPES OF AI



Artificial Intelligence (AI) can be categorized into several types based on its capabilities and functionalities. These categories represent different levels of AI development, ranging from simple rule-based systems to highly advanced, self-learning machines. Here are the main types of AI:

1. *Narrow or Weak AI (ANI - Artificial Narrow Intelligence):*

- Narrow AI is designed for a specific task or a narrow range of tasks.
- It operates under a predefined set of rules and does not possess general intelligence or consciousness.
- Examples include virtual personal assistants like Siri and Alexa, recommendation algorithms on streaming platforms, and image recognition systems.

2. *General or Strong AI (AGI - Artificial General Intelligence):*

- General AI refers to machines that possess human-like intelligence and are capable of understanding, learning, and performing any intellectual task that a human can.
- AGI systems can adapt to a wide range of tasks without being specifically programmed for each one.
- Achieving AGI remains a long-term goal of AI research, and it has not been fully realized as of my last knowledge update in September 2021.

3. *Artificial Superintelligence (ASI):*

- This is a hypothetical level of AI that surpasses human intelligence and capabilities in every aspect.
- ASI would be capable of solving problems that are currently beyond human comprehension and performing tasks at an extremely advanced level.

- ASI is still a subject of speculation and is not yet achieved.

4. *Reactive Machines:*

- These are AI systems designed to perform specific tasks without learning or adapting.
- They follow predefined rules and are unable to improve their performance based on experience.
- Chess-playing
- computers like IBM's Deep Blue are examples of reactive machines.

5. *Limited Memory AI:*

- Limited memory AI systems can learn from historical data to some extent but have limitations in terms of their ability to generalize and adapt to new situations.
- They can make decisions based on past experiences and data.
- Self-driving cars often use limited memory AI to navigate and make decisions based on real-time data and past driving experiences.

6. *Theory of Mind AI:*

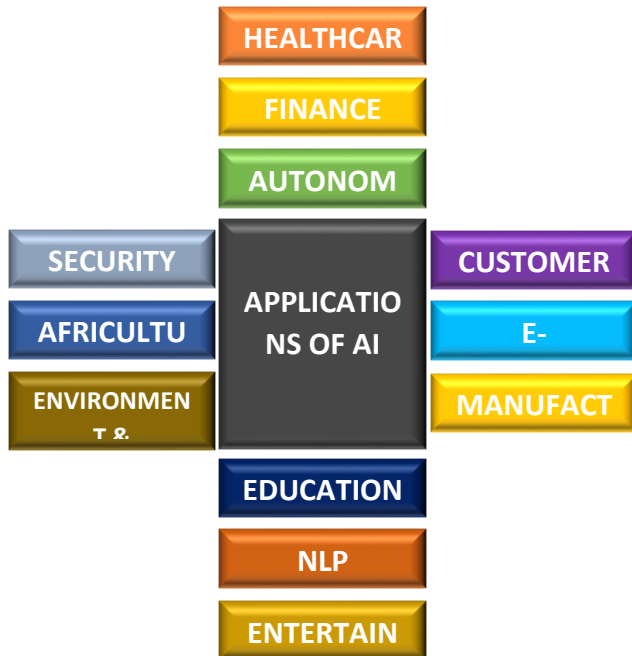
- This is a more advanced concept where AI systems would have an understanding of human emotions, beliefs, intentions, and mental states.
- It enables machines to interact with humans on a deeper emotional and social level.
- Theory of mind AI is still a concept under development and is not yet realized in practice.

7. *Self-aware AI:*

- This is the most advanced and speculative type of AI, where machines would have self-awareness, consciousness, and subjective experiences.
- Self-aware AI, if achievable, would possess a sense of self and an understanding of its own existence.
- This level of AI is purely theoretical and remains a subject of philosophical debate.

It's important to note that while there are various types of AI, the majority of AI applications in use today fall under the category of Narrow AI. AGI and beyond are still areas of active research and development, and their realization poses significant scientific and ethical challenges.

III. APPLICATIONS OF AI



Artificial Intelligence (AI) has a wide range of applications across various industries and sectors, and its potential continues to grow as technology advances. Here are some of the key applications of AI:

1. Healthcare:

- **Medical Diagnosis:** AI systems can analyze medical images (X-rays, MRIs, CT scans) and patient data to assist doctors in diagnosing diseases.
- **Drug Discovery:** AI accelerates drug discovery by analyzing chemical interactions and predicting potential drug candidates.
- **Personalized Medicine:** AI helps tailor treatment plans based on individual patient data and genetic information.

2. Finance:

- **Algorithmic Trading:** AI-powered algorithms execute high-frequency trading and make investment decisions.
- **Fraud Detection:** AI analyzes transactions and user behavior to identify fraudulent activities.
- **Credit Scoring:** AI assesses creditworthiness by analyzing credit histories and other relevant data.

3. Autonomous Vehicles:

- **Self-Driving Cars:** AI-driven systems use sensors and data processing to navigate and operate vehicles without human intervention.
- **Drones:** AI controls drones for tasks such as surveillance, delivery, and mapping.

4. Customer Service:

- **Chatbots:** AI chatbots provide automated customer support and answer inquiries through text or voice.
- **Virtual Assistants:** AI-powered virtual assistants like Siri and Alexa perform tasks and answer questions for users.

5. E-commerce:

- **Recommendation Systems:** AI algorithms analyze user preferences and behaviors to recommend products and content.
- **Supply Chain Optimization:** AI optimizes inventory management, demand forecasting, and logistics.

6. Manufacturing:

- **Predictive Maintenance:** AI monitors industrial equipment to predict maintenance needs, reducing downtime.
- **Quality Control:** AI systems inspect and detect defects in products during manufacturing processes.

7. Education:

- **Personalized Learning:** AI adapts educational content and assessments to individual student needs and progress.
- **Intelligent Tutoring Systems:** AI tutors provide guidance and support to learners.

8. Natural Language Processing (NLP):

- **Language Translation:** NLP algorithms translate text and speech between languages.
- **Sentiment Analysis:** AI analyzes text data to determine sentiment and opinions in reviews and social media.

9. Entertainment:

- **Content Generation:** AI generates music, art, and written content.
- **Video Game AI:** AI controls non-player characters (NPCs) in video games to make them more dynamic and challenging.

10. Security:

- **Cybersecurity:** AI helps detect and mitigate cybersecurity threats by monitoring network traffic and identifying anomalies.
- **Facial Recognition:** AI systems identify individuals in images and videos, used for access control and surveillance.

11. Agriculture:

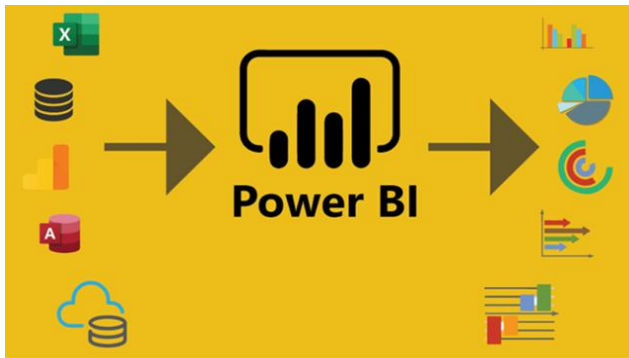
- **Precision Agriculture:** AI analyzes data from sensors and drones to optimize crop management, irrigation, and yield predictions.
- **Livestock Monitoring:** AI tracks the health and behavior of livestock for better management.

12. Environmental Conservation:

- **Wildlife Monitoring:** AI-powered cameras and sensors track and analyze wildlife movements for conservation efforts.
- **Climate Modeling:** AI assists in climate research and prediction.

These are just a few examples of AI applications, and the list continues to expand as AI technology matures and new possibilities are explored. AI is increasingly integrated into various aspects of modern life, offering opportunities for efficiency, automation, and innovation across diverse fields.

IV. STUDY ON POWER BI



Power BI is a powerful business analytics tool developed by Microsoft. It is widely used for data visualization, business intelligence, and reporting purposes. Power BI enables users to connect to various data sources, transform and model data, create interactive reports and dashboards, and share insights with others in an organization. Here are some key features and components of Power BI:

1. **Power BI Desktop:** Power BI Desktop is a Windows application used for creating and designing reports and dashboards. It allows users to connect to data sources, transform and shape data using a query editor, and create data models using Power Query and Power Pivot.
2. **Power BI Service (Power BI Online):** Power BI Service is a cloud-based platform that allows users to publish, share, collaborate, and access reports and dashboards created in Power BI Desktop. It also provides features for data governance, sharing with external users, and managing data refresh schedules.
3. **Power Query:** Power Query is a data transformation and shaping tool integrated into Power BI. It allows users to connect to various data sources, clean and transform data, and create reusable data queries.
4. **Power Pivot:** Power Pivot is an in-memory data modeling engine that allows users to create relationships between tables, define calculated columns and measures, and build complex data models within Power BI Desktop.
5. **Data Visualization:** Power BI offers a wide range of visualization options, including charts, graphs, maps, tables, and custom visuals. Users can create interactive and dynamic reports and dashboards by dragging and dropping visuals onto the canvas.
6. **DAX (Data Analysis Expressions):** DAX is a formula language used in Power BI to create custom calculations and measures. It allows users to perform advanced calculations and aggregations on data within Power Pivot models.
7. **Power BI Mobile:** Power BI Mobile apps are available for various platforms (iOS, Android, Windows) and allow users to access and interact with reports and dashboards on mobile devices.
8. **Data Connectivity:** Power BI can connect to a wide range of data sources, including databases, cloud services, Excel spreadsheets, web services, and more. It offers both built-in connectors and the ability to create custom connectors.
9. **Data Refresh:** Power BI allows users to schedule data refreshes to keep reports and dashboards up to date with the latest data from the source systems.
10. **Security and Governance:** Power BI offers features for data security and governance, including role-based access control, row-level security, and data encryption.



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11. Natural Language Q&A: Users can ask questions in plain language, and Power BI's natural language processing capabilities generate visualizations and answers based on the data.
12. Integration: Power BI integrates seamlessly with other Microsoft products, such as Azure, SharePoint, and Office 365, as well as with third-party applications and services through APIs and connectors.
8. Security and Governance: Power BI offers robust security features, including role-based access control, row-level security, and data encryption. It also provides auditing and monitoring capabilities.
9. Collaboration: Power BI allows users to share reports and dashboards with others within and outside the organization, facilitating collaboration and knowledge sharing.

Power BI is widely used by organizations of all sizes to gain insights from their data, make data-driven decisions, and share information across the organization. It has become a popular tool in the field of business intelligence and data analytics due to its user-friendly interface and robust capabilities.

Advantages of Power BI:

1. User-Friendly Interface: Power BI has a user-friendly, drag-and-drop interface that makes it accessible to users with varying levels of technical expertise. This ease of use allows non-technical users to create and interact with reports and dashboards.
2. Data Connectivity: Power BI offers a wide range of built-in connectors and the ability to create custom connectors, allowing users to connect to various data sources, including databases, cloud services, and online platforms.
3. Data Transformation: Power BI includes Power Query, a robust data transformation tool, which allows users to clean, reshape, and merge data from different sources.
4. Data Modeling: Power BI's Power Pivot data modeling engine enables users to create relationships between tables, define calculated columns and measures, and build complex data models.
5. Visualization: Power BI provides a rich set of data visualization options, making it easy to create interactive and informative reports and dashboards. Users can customize visuals and create custom visuals as well.
6. Real-Time Data Updates: Power BI allows users to set up data refresh schedules to keep reports and dashboards up to date with the latest data from source systems.
7. Integration: Power BI seamlessly integrates with other Microsoft products, such as Azure, SharePoint, and Office 365, as well as with third-party applications and services through connectors and APIs.

Disadvantages of Power BI:

1. Cost: While Power BI offers a free version (Power BI Desktop), advanced features and collaboration capabilities often require a paid subscription, which can be costly for larger organizations.
2. Data Volume Limitations: Power BI has limitations on the amount of data that can be loaded into a report, particularly in the free version. Large datasets may require premium licenses or other solutions.
3. Learning Curve: While Power BI's interface is user-friendly, mastering advanced features like DAX (Data Analysis Expressions) and complex data modeling can be challenging and require training.
4. Limited Customization: While Power BI provides customization options, some users may find that it has limitations when it comes to highly specialized or unique reporting requirements.
5. Offline Access: Power BI primarily relies on an internet connection to access reports and dashboards. Offline access to reports may be limited.
6. Resource Intensive: Complex reports and dashboards with a large number of visuals and calculations can be resource-intensive, impacting performance, especially in the Power BI Service.
7. Data Privacy and Compliance: Organizations with strict data privacy and compliance requirements may need to carefully configure Power BI to meet these standards.
8. Lack of Native ETL: While Power Query is a robust data transformation tool, it may not have all the features and capabilities of dedicated ETL (Extract, Transform, Load) tools for very complex data integration scenarios.



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V. CONCLUSION

In summary, Power BI is a versatile and powerful business intelligence tool that offers many advantages, particularly in terms of ease of use and data connectivity. However, organizations should also consider its limitations and potential costs when evaluating it for their business intelligence needs. In conclusion, AI stands as a revolutionary force that is reshaping the way we live and work. While its capabilities continue to expand, it is essential to navigate the challenges and ethical considerations that accompany this transformation, ensuring that AI remains a powerful tool for improving our world.

The future of AI holds promises and uncertainties. Continued research in AI ethics, interpretability, and explainability will contribute to building trustworthy AI systems.

Collaborations between governments, industries, and academia will be crucial in establishing regulations that strike a balance between innovation and ethics. As AI evolves, the integration of human judgment and oversight will remain vital to harness its potential for the benefit of humanity.

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