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Article

ANALYSIS OF ARTIFICIAL INTELLIGENCE'S VARIOUS DOMAIN

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Abstract: Artificial Intelligence (AI) has become a game-changer technology with potential applications in many sectors including healthcare, finance, education, manufacturing, transportation, agriculture, cyber security, retail, energy, and smart cities. The study examines key AI techniques and how they are applied in various fields, focusing on their advantages, drawbacks, and feasibility. The study covers supervised and unsupervised learning, semi-supervised learning, neural networks, deep learning, natural language processing, ensemble methods, fuzzy logic, expert systems and robotics. Literature review was done to gain insight into the development and cross-domain applications of AI, and comparative analysis was performed on the capabilities and challenges of various AI techniques. The results show that AI can enhance efficiency, automation, prediction, pattern recognition, and decision-making processes in various industries, but there are concerns and challenges associated with its use, such as data quality, privacy and security, ethics, transparency, cost, computational demand, and human involvement. The study also indicates that the appropriateness of the AI technique is dependent on the problem type, data properties and special application requirements. The study suggests that fostering a cross-domain perspective of AI can help in selecting the most suitable technique and promote responsible, effective, and human-centred AI adoption in various fields.
Keywords: Artificial Intelligence, Machine Learning, Deep Learning, Neural Networks, Natural Language Processing

1. INTRODUCTION

Artificial Intelligence (AI) is the technology behind computer systems that can process and execute tasks that are typically human actions, such as learning, reasoning, prediction, problem-solving, language processing and decision-making. AI has evolved quickly, with the help of machine learning, deep learning, neural networks, natural language processing, fuzzy logic, expert systems, and robotics. The methods allow for a computer system to be able to learn from data, to recognise patterns, to make predictions and to carry out tasks with little human assistance. The volume and complexity of available data will continue to grow, and AI has become a crucial technology for data analysis and decision making in various fields. [1]

In today's digital and data-driven age, AI has grown significantly in value as companies and sectors embrace digital technologies. AI can enhance the efficiency of operations, automate routine tasks, aid in quicker decision-making, and offer solutions to intricate challenges. Its applications can be observed in healthcare, finance, education,

manufacturing, transportation, agriculture, cybersecurity, retail, energy, entertainment, and smart-city development.[2] The growing use of AI also creates opportunities for innovation and improved services, although challenges related to privacy, security, cost, employment, ethics, transparency, and excessive technological dependence require careful consideration.

Each of the various AI technologies has its own set of capabilities based on the problem and the type of data at hand. The supervised learning methods are used for classification and prediction, and unsupervised learning methods are used to discover hidden patterns in unlabeled data. Deep learning and neural networks are especially effective for complex and large-scale data, such as images, text, speech, and other unstructured data. Natural language processing can be used for the analysis and generation of human language, and fuzzy logic can be used to handle uncertainty and imprecision. AI's capabilities are further expanded through expert systems and robotics via intelligent physical systems and decision support. Thus, it is crucial to have an understanding of the merits and drawbacks of each AI technique to decide on a suitable technique for a specific application. [3]

It is clear that there is a need for an AI across domain analysis of the uses of AI, as there are many different applications. While there are a number of studies relating to AI in individual sectors or techniques, this comparison across domains will give a general idea of its real-world benefits and challenges. The need for accuracy, interpretability, computational resources, data availability, security and human involvement varies between sectors. So, a cross-domain analysis can be useful in determining the application of various AI techniques, benefits they offer, any challenges they pose, and which one is more appropriate for specific tasks. In this context, the current research study examines key considerations of AI techniques and their use in various fields, and also contrasts their advantages, difficulties, and practicality in boosting efficiency and decision making.

2. LITERATURE REVIEW

Shah et,al (2025) In this study, we briefly review various popular artificial intelligence methods with their benefits, drawbacks and compare their applications in financial domain, medical domain Energy industry, Engineering and construction sector. Our research objective is based on existing literature which assist researchers in selecting and developing AI based on meta-analysis. A systematic study of articles investigating a topic of interest is necessary to do a meta-analysis. A wide range of AI techniques can complicate the process of choosing the best algorithm for specific systems. The results are encouraging and shows that, when it comes to solving financial problems, the aforementioned artificial intelligence approaches perform and are more accurate than traditional statistical techniques, especially when it comes to nonlinear models.[4]

Idemudia, et,al (2025) Artificial intelligence (AI) has a significant impact on various disciplines, fields, sectors, and industries. Companies, firms, sectors, and enterprises are investing billions of US dollars in AI to make better decisions and for competitive advantages. To date, few studies have provided a comprehensive, holistic insight into how AI impacts a wide range of disciplines and sectors simultaneously. To address this limitation, we conducted a study that draws on stakeholder theory. Our research models and frameworks offer insights into how various disciplines and sectors - including healthcare, finance, education, business, retail, and law - can effectively implement a wide range of AI systems and platforms to improve decision-making and gain a competitive advantage. Our study provides insights into how various disciplines, fields, sectors, and industries should adapt to the rapid, constant changes in AI. In addition, our study has numerous implications for both research and management.[5]

Vannuccini et,al (2024) In this paper, we offer an original framework to study Artificial Intelligence (AI). The perspective we propose is based on the idea that AI is a system technology, and that a useful description of AI cannot abstain from mapping the components of the system, their interdependence, and how the synergies they create shape at the roots the directions of AI development. We adopt the concept of Large technical systems (LTS) to give substance and structure to our idea. Using LTS, we are able to scaffold AI and the forces at work steering its production, deployment, and evolution. We find that AI as a system shares essential features with infrastructural technologies such as the Internet. The LTS framework proves very useful to capture important nuances of the technology, and it allows us to trace the connections and cross–influences among its constituting domains—algorithms (software), compute

(hardware), and data. We compare our proposed framework with other concepts usually associated with radical innovations, and suggest in which respects AI differs from these ideal–types. We consider ours a timely exercise, as we witness the formation of an AI industry. While in the making, this industry is rapidly ossifying, together with its specific problems, power imbalances, and development scenarios; the focus on the system–ness of AI allows uncovering the deeper structure of this technological breakthrough.[6]

Thayyib et,al (2023) Academicians and practitioners have recently begun to accord Artificial Intelligence (AI) and Big Data Analytics (BDA) significant consideration when exploring emerging research trends in different fields. The technique of bibliometric review has been extensively applied to the AI and BDA literature to map out existing scholarships. We summarise 711 bibliometric articles on AI & its sub-sets and BDA published in multiple fields to identify academic disciplines with significant research contributions. We pulled bibliometric review papers from the Scopus Q1 and Q2 journal database published between 2012 and 2022. The Scopus database returned 711 documents published in journals of different disciplines from 59 countries, averaging 17.9 citations per year. Multiple software and Database Analysers were used to investigate the data and illustrate the most active scientific bibliometric indicators such as authors and co-authors, citations, co-citations, countries, institutions, journal sources, and subject areas. The USA was the most influential nation (101 documents; 5405 citations), while China was the most productive nation (204 documents; 2371 citations). The most productive institution was Symbiosis International University, India (32 documents; 4.5%). The results reveal a substantial increase in bibliometric reviews in five clusters of disciplines: (a) Business & Management, (b) Engineering and Construction, (c) Healthcare, (d) Sustainable Operations & I4.0, and (e) Tourism and Hospitality Studies, the majority of which investigate the applications and use cases of AI and BDA to address real-world problems in the field. The keyword co-occurrence in the past bibliometric analyses indicates that BDA, AI, Machine Learning, Deep Learning, NLP, Fuzzy Logic, and Expert Systems will remain conspicuous research areas in these five diverse clusters of domain areas. Therefore, this paper summarises the bibliometric reviews on AI and BDA in the fields of Business, Engineering, Healthcare, Sustainable Operations, and Hospitality Tourism and serves as a starting point for novice and experienced researchers interested in these topics.[7]

Islam et,al (2022) Artificial intelligence (AI) and machine learning (ML) have recently been radically improved and are now being employed in almost every application domain to develop automated or semi-automated systems. To facilitate greater human acceptability of these systems, explainable artificial intelligence (XAI) has experienced significant growth over the last couple of years with the development of highly accurate models but with a paucity of explainability and interpretability. The literature shows evidence from numerous studies on the philosophy and methodologies of XAI. Nonetheless, there is an evident scarcity of secondary studies in connection with the application domains and tasks, let alone review studies following prescribed guidelines, that can enable researchers' understanding of the current trends in XAI, which could lead to future research for domain- and application-specific method development. Therefore, this paper presents a systematic literature review (SLR) on the recent developments of XAI methods and evaluation metrics concerning different application domains and tasks. This study considers 137 articles published in recent years and identified through the prominent bibliographic databases. This systematic synthesis of research articles resulted in several analytical findings: XAI methods are mostly developed for safety-critical domains worldwide, deep learning and ensemble models are being exploited more than other types of AI/ML models, visual explanations are more acceptable to end-users and robust evaluation metrics are being developed to assess the quality of explanations. Research studies have been performed on the addition of explanations to widely used AI/ML models for expert users. However, more attention is required to generate explanations for general users from sensitive domains such as finance and the judicial system.[8]

Zhao et,al (2022) The application of Big Data Analytics is identified through the Cyber Research Alliance for cybersecurity as the foremost preference for future studies and advancement in the field of cybersecurity. In this study, we develop a repeatable procedure for detecting cyber-attacks in an accurate, scalable, and timely manner. An in-depth learning algorithm is utilized for training a neural network for detecting suspicious user activities. The proposed system architecture was implemented with the help of Splunk Enterprise Edition 6.42. A data set of average feature counts has been executed through a Splunk search command in 1-min intervals. All the data sets consisted of a minute

trait total derived from a sparkling file. The attack patterns that were not anonymized or were indicative of the vulnerability of cyber-attack were denoted with yellow. The rule-based method dispensed a low quantity of irregular illustrations in contrast with the Partitioning Around Medoids method. The results in this study demonstrated that using a proportional collection of instances trained with the deep learning algorithm, a classified data set can accurately detect suspicious behavior. This method permits for the allocation of multiple log source types through a sliding time window and provides a scalable solution, which is a much-needed function.[9]

Research gap: Although existing studies have examined artificial intelligence from different perspectives, important gaps remain in the literature. Thayyib et al. (2023) identified key research areas in the field of AI and Big Data Analytics and emphasized on bibliometric trends and not just on comparing the individual AI techniques. Vannuccini and Prytkova (2024) studied AI as a large technical system, and Shah et al. (2025) covered the potential applications of AI in finance, healthcare, energy, and engineering sectors, but a more comprehensive overview of the techniques and their relevance to various problems is still required. While Islam et al. (2022) highlighted the importance of increased explainability especially in sensitive areas, Idemudia et al. (2025) concentrated on the organisational impact of AI. Zhao et al. (2022) showed that deep learning can be applied to the field of Cyber Security, but in a limited application. As such, an integrated comparison of the key AI techniques, their benefits, drawbacks, applications, and practical feasibility in various fields is a missing component. This research gap is addressed in the present study, which reviews a variety of AI methods and considers their applicability to various industries, including healthcare, financial, education, cybersecurity, energy, engineering, and others.

3. OBJECTIVES OF THE STUDY

1. To analyze the applications of Artificial Intelligence across various domains.
2. To identify the major Artificial Intelligence techniques used in different industries.
3. To compare the benefits and challenges of Artificial Intelligence in various domains.
4. To examine the impact of Artificial Intelligence on improving efficiency and decision-making across different sectors.

4. ARTIFICIAL INTELLIGENCE TECHNIQUES

Machine learning (ML) is a type of artificial intelligence that enables computers to learn from data and improve their performance without explicit programming.

Supervised Learning: In supervised learning, the model is trained using examples with known results and improves by comparing its predictions with the expected outcomes. It mainly includes classification and regression. Classification assigns data to predefined categories, whereas regression predicts continuous values based on available features. Common supervised learning techniques include Decision Trees, Naive Bayes, and Support Vector Machines (SVM). Decision Trees use attributes and decision rules to divide data into branches until a suitable class or result is obtained. Naive Bayes is a simple supervised technique based on probability and assumes conditional independence among features. SVM is used for classification and regression by identifying an optimal boundary between classes and maximizing the margin between them. These methods are widely applied in prediction, classification, medical diagnosis, text recognition, and analysis of large datasets.[10]

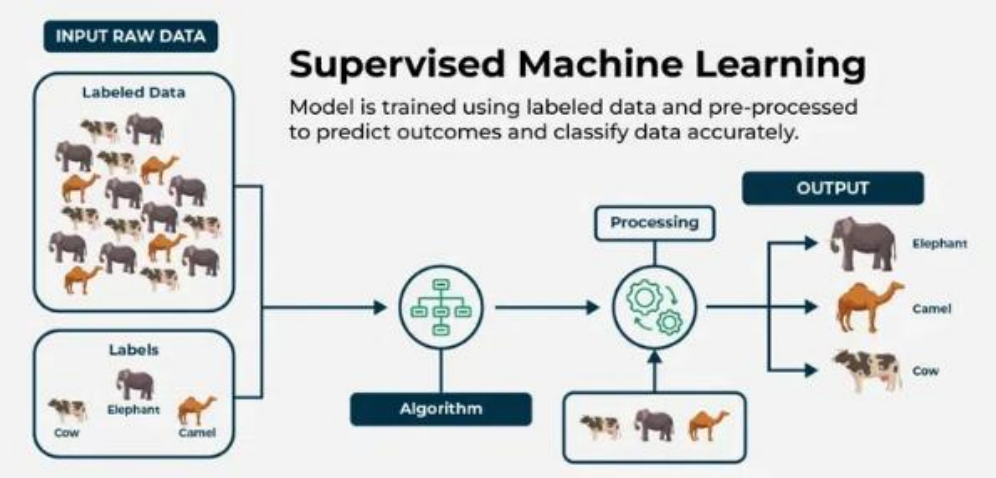

Fig 1: Supervised Learning

Unsupervised Learning: Machine learning (ML) allows the computer to learn from the data and enhance its performance without being explicitly programmed to do so. Supervised learning involves providing the model with examples that have known outputs and adjusting the model in order to match the outputs; this process is known as learning from examples (also called supervised learning). Primarily consists of classification and regression. Classification is used to put data into pre-defined categories, while regression is used to predict continuous values with features that are available. Popular supervised learning methods are Decision Trees, Naive Bayes and Support Vector Machines (SVM). Decision Trees take attributes and decision rules and split the data into branches until a suitable class or result is achieved. Naive Bayes is a simple supervised method that assumes conditional independence of features and is based on the notion of probability. The SVM classifier is used for classification and regression that finds the optimal boundary between classes and maximizes the margin between classes. These methods are widely applied in prediction, classification, medical diagnosis, text recognition, and analysis of large datasets.[11]

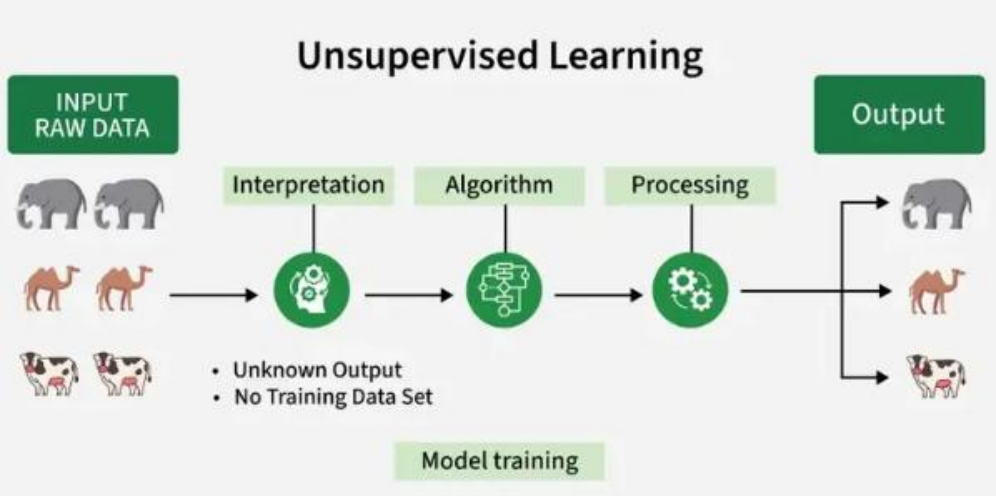

Fig 2: Unsupervised Learning

Semi-Supervised Learning: Semi-supervised learning is used when only a limited amount of labelled data is available along with a larger amount of unlabelled data. It combines the advantages of supervised and unsupervised learning by using labelled instances to guide the learning process while extracting additional information from unlabelled data.[12] Transductive SVM is one approach used for partially labelled datasets, although obtaining its exact solution can be computationally difficult. Another approach is ensemble learning, which combines multiple base

models to improve prediction and classification performance. Boosting generally reduces bias by improving weak learners, whereas bagging mainly reduces variance. Combining different learning models can therefore provide better performance than using a single model.

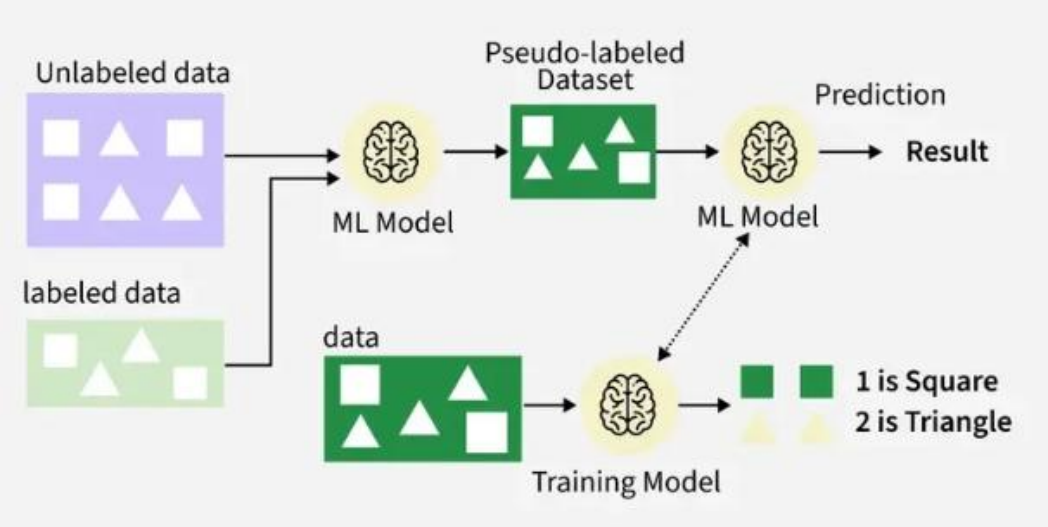

Fig 3: Semi-Supervised Learning

Deep Learning: Deep learning is a branch of machine learning that uses neural networks with multiple layers to identify complex patterns in data. Artificial Neural Networks (ANNs) provide an important framework for data analysis and are capable of handling complex and heterogeneous information [13]. Deep neural networks contain several layers that progressively learn useful representations from input data and have demonstrated strong performance, particularly in image-related applications. In supervised neural networks, predicted outputs are compared with actual results and the resulting error is used to update the model. In unsupervised neural networks, the system works with unlabelled data and identifies underlying patterns without a predefined teacher.[14] Deep learning is particularly useful for large datasets, image recognition, and natural language processing, although it generally requires high computational resources and substantial training data.

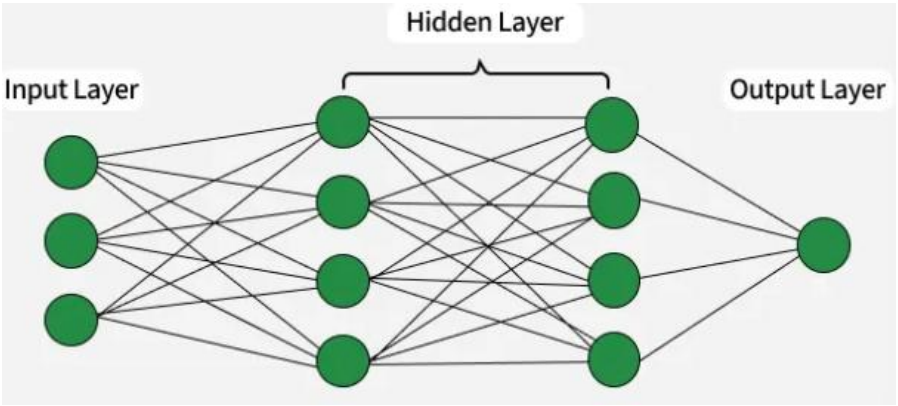

Fig 4: Neural Networks

Natural Language Processing (NLP): Natural Language Processing (NLP) enables computers to analyse, understand, and process human language. It provides an efficient way of extracting useful information from large volumes of textual data and is widely used in translation, chatbots, text analysis, and other AI applications.[15] Recent developments such as BERT and GPT have significantly improved NLP capabilities. However, understanding context, ambiguity, sarcasm, and subtle variations in human language remains challenging.

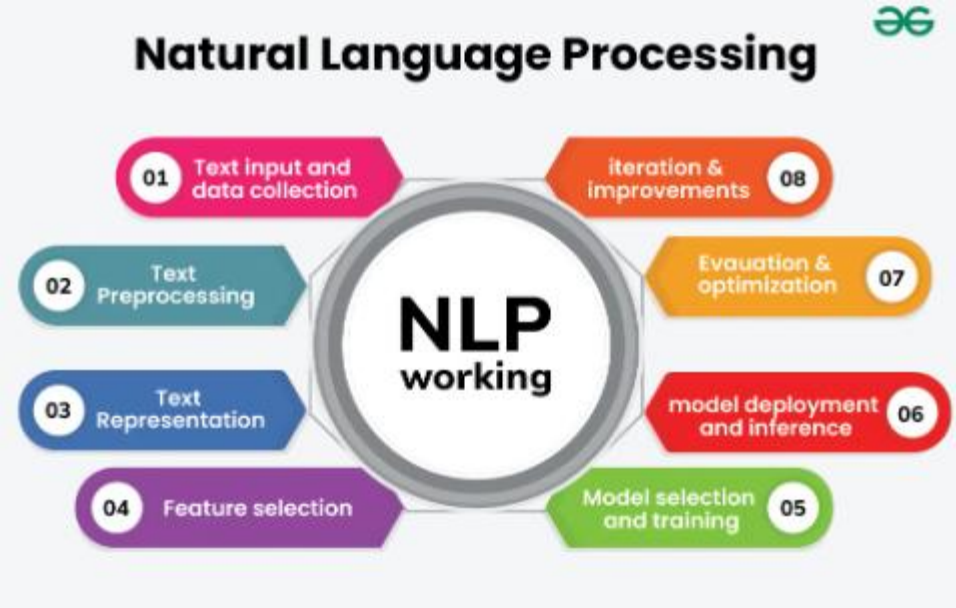

Fig 5: Natural Language Processing (NLP)

Metaverse: The Metaverse refers to an artificial digital environment that connects virtual experiences with aspects of the real world. AI techniques such as image classification, object detection, and object tracking support the development of interactive virtual environments. Its applications have expanded across areas such as retail, business integration, partnerships, and investment, particularly following the increased adoption of digital technologies during and after the COVID-19 period [16].

Expert System: An expert system uses stored knowledge and rules to simulate the decision-making abilities of a human expert. Its knowledge base contains rules and experiences related to a particular domain, while an inference engine uses this information to generate conclusions or recommendations. Rule-based systems commonly use if-then rules, whereas inference engines apply the available knowledge to reach decisions. Expert systems are useful because their decisions can be explained and they have applications in areas such as financial forecasting and medical diagnosis. However, they can become rigid and outdated when their knowledge base and rules are not regularly updated.

Fuzzy Logic: Fuzzy logic is a mathematical approach that allows reasoning with ambiguity and imprecision. Unlike conventional systems that generally represent information as true or false, fuzzy logic allows intermediate levels of truth. It is useful for handling uncertainty and can be incorporated into practical systems such as washing machines and climate-control systems. However, its accuracy depends on appropriately defined membership functions and may be less suitable where highly precise decisions are required.

Robotics: Robotics focuses on the design, development, manufacture, and application of robots to perform tasks intelligently and efficiently. Robots are increasingly used in different fields, including healthcare. Medical robotics has advanced rapidly, with robotic systems being applied to numerous surgical procedures and clinical applications worldwide [17].

5. APPLICATIONS OF ARTIFICIAL INTELLIGENCE

AI in Healthcare: AI is used for analysing retinal images, skin lesions, ECGs, and white-cell counts to support medical diagnosis and image processing. It can also help analyse patient subpopulations and predict potential adverse events. AI-driven robots and brain-computer interfaces support interaction and control of external devices, while AI-based gene-expression analysis can assist in cancer classification and diagnosis [18].

AI in Finance: AI and machine learning are used in computational finance to identify patterns in stock-price movements and support the prediction of future market changes. Intelligent computational agents can monitor market conditions and assist in financial analysis and forecasting.

AI in Education: AI and machine learning support personalised learning by providing information according to users' preferences. Mobile learning through portable devices allows learners to access information anytime and anywhere, making learning more flexible and personalised.[19]

AI in Manufacturing: AI and machine learning are applied to machinery-related applications and the classification and analysis of industrial and software engineering data. They can help identify patterns and anomalies and support the optimisation of manufacturing-related processes.[20]

AI in Transportation: AI is applied to traffic forecasting, navigation, and intelligent vehicles. GPS-based navigation and modern vehicle sensors demonstrate the use of intelligent technologies in transportation, while AI and ML can support traffic forecasting and related applications.

AI in Agriculture: AI and machine learning can assist in analysing and classifying large volumes of agricultural and environmental information. Their ability to identify patterns and anomalies can support data-based decision-making, although the provided literature contains limited specific examples of agricultural applications.

AI in Cybersecurity: AI and ML are used for intrusion detection, anomaly detection, spam filtering, email classification, information retrieval, and text filtering. These technologies can analyse large volumes of information and identify unusual patterns to support automated security processes [21].

AI in Retail and E-commerce: AI-based recommender systems provide personalised suggestions using ratings, preferences, and filtering techniques, thereby improving user experience.[22] AI is also applied in e-commerce and computational advertising for classifying and organising information.

AI in Energy: AI is becoming an important part of the digital transformation of the energy sector. It can support energy supply, commerce, and consumption while helping analyse complex energy-related information and identify useful patterns [23].

AI in Smart Cities: AI and ML support smart-city applications such as traffic forecasting, intelligent services, mapping, anomaly detection, and information management. Their ability to process large amounts of data helps develop automated and efficient urban services.

AI in Entertainment: AI agents can act as opponents or teammates in computer games, while machine learning can support music classification and analysis of complex audio data. AI-based scene classification can also categorise images into groups such as parties, beaches, and sunsets.[24]

AI in Social Media: AI helps manage and organise the large volumes of information generated by social media platforms. Sentiment and opinion analysis can identify emotions and opinions from textual data, while AI is also used for text categorisation, document organisation, face recognition, handwriting recognition, and information processing.

AI and ML are additionally applied in DNA classification and genomics, Acoustic Environment Identification (AEI), audio forensics, speaker verification, medical records, and other pattern-recognition applications. These applications demonstrate the broad role of AI in classification, pattern identification, automation, and decision-making.

6. ADVANTAGES OF AI TECHNIQUES

1. Advantages AI Techniques

Moodle is an AI-powered platform that allows teachers to set up online classes, provide instructional materials, assign tasks, and communicate with students through text, phone, and video chat from a distance.[25] AI can also support personalised learning by allowing students to read instructional content, answer questions, and follow different

learning paths according to their understanding. AI performs particularly well in intellectual activities such as computer games and theorem proving.

The usefulness of commonly used AI applications was assessed among 60 respondents. Respondents indicated whether they considered each application useful or not. The results are presented below.

Useful applications of AI

Useful Applications of AI	Yes – Frequency	Yes – %	No – Frequency	No – %	Total Frequency	Total %
Chatbots	54	90.0	6	10.0	60	100
Voice Assistants	29	48.3	31	51.7	60	100
Authentication and Biometrics	39	65.0	21	35.0	60	100
Fraud Detection and Prevention	56	93.3	4	6.7	60	100
KYC/AML	58	96.7	2	3.3	60	100
Smart Wallet	41	68.3	19	31.7	60	100
Maps and Navigation	52	86.7	8	13.3	60	100
Personalized Recommendations	50	83.3	10	16.7	60	100
Facial Recognition / Face Unlock	47	78.3	13	21.7	60	100

Table: 1 Multiple Response Analysis

The results indicate that KYC/AML (96.7%) and fraud detection and prevention (93.3%) were considered the most useful AI applications, followed by chatbots (90.0%) and maps and navigation (86.7%). Personalized recommendations (83.3%) and facial recognition/face unlock (78.3%) were also considered useful by a large proportion of respondents. Voice assistants received the lowest proportion of positive responses (48.3%). Since respondents could select more than one application, the percentages across applications do not add up to 100%.

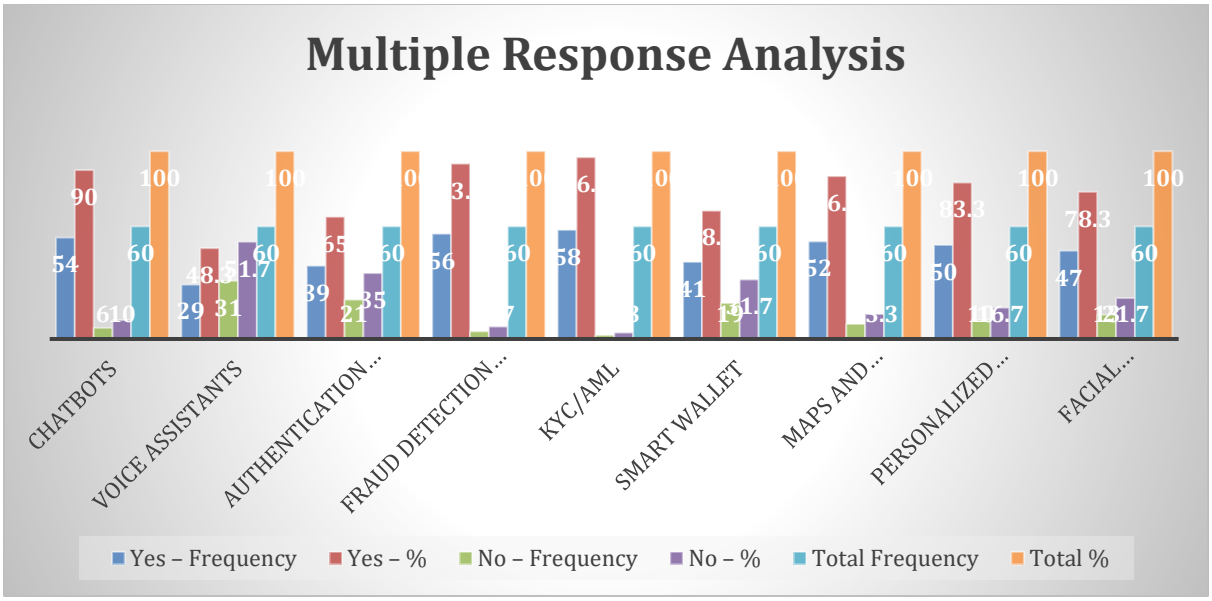

Fig 6: Multiple Response Analysis

7. DISADVANTAGES AND CHALLENGES IN AI

Despite the benefits of AI, its increasing use also creates several challenges. AI systems may produce program mismatches or incorrect outputs, while excessive dependence on automated systems can increase the risk of system failure and reduce human involvement. The adoption of AI may also affect employment opportunities and contribute to unemployment in some occupations. Excessive dependence on technology may reduce creativity and independent thinking, particularly among younger users. AI systems also lack human emotions, empathy, and personal interaction, which can be important in areas such as healthcare and customer service.

Other major challenges include privacy and data-security risks, ethical concerns, high implementation and maintenance costs, and the lack of transparency in complex AI algorithms. The large computational and energy requirements of advanced AI models may also contribute to environmental concerns. Therefore, although AI provides faster and more efficient solutions, its responsible implementation requires attention to human involvement, privacy, security, transparency, cost, employment, and environmental impact.

8. DISCUSSION

Artificial intelligence techniques provide significant advantages in classification, prediction, automation, pattern recognition, and decision-making. Supervised learning is effective when labelled data are available, whereas unsupervised learning helps identify hidden structures in unlabelled data. Reinforcement learning is useful for interactive decision-making, while deep learning is effective for complex image, video, text, and sequential data. Ensemble methods improve the robustness of individual models, and fuzzy logic is useful for handling uncertainty and imprecision. However, AI also presents several challenges, including dependence on data quality, overfitting, high computational requirements, implementation costs, privacy and security concerns, ethical issues, lack of transparency, and excessive dependence on technology. AI systems may also reduce human interaction and lack the empathy, creativity, and emotional understanding associated with human decision-making. These limitations indicate that AI should be implemented with appropriate human supervision, ethical safeguards, and responsible data management.

The comparative performance of AI techniques varies according to the nature of the problem, type of data, computational requirements, and purpose of the application. Supervised methods are suitable for prediction and classification, while unsupervised techniques are useful for discovering hidden patterns and relationships. Decision

trees provide relatively understandable decision structures, support vector machines are useful for complex classification problems, and K-means supports pattern-based grouping. Artificial neural networks are capable of modelling complex nonlinear relationships, whereas ensemble techniques combine multiple learning models to improve robustness and predictive capability. Deep learning is particularly suitable for unstructured information such as images, speech, and text. Therefore, the performance of an AI technique should be assessed according to the characteristics of the application rather than assuming that one method is universally superior.[26]

AI has significant potential in healthcare for diagnosis, medical image analysis, disease prediction, patient monitoring, and clinical decision support. Machine learning can identify patterns within clinical records, while deep learning can analyse medical images and other complex clinical information. AI applications can also support the analysis of disease-related information, medical records, and clinical observations. Haug and Drazen highlighted the use of AI in medical image analysis, disease identification, diagnosis, and other clinical applications. AI therefore has the potential to improve healthcare efficiency and support medical professionals; however, issues related to patient privacy, safety, transparency, bias, and accountability must be carefully considered. AI should complement professional clinical judgement rather than completely replace human expertise.

AI techniques have also demonstrated important applications in finance, particularly in financial forecasting, credit evaluation, portfolio management, risk assessment, and financial decision-making. Artificial neural networks are useful for modelling complex and nonlinear financial relationships, while genetic algorithms and particle swarm optimisation can support optimisation and decision-making problems. Beiranvand, Bakar, and Othman compared neural networks, genetic algorithms, and particle swarm optimisation across financial forecasting, credit evaluation, and portfolio management and highlighted their usefulness for complex financial problems. The reviewed studies also indicate the application of neural networks in credit scoring, credit evaluation, portfolio optimisation, bankruptcy forecasting, asset prediction, and other financial tasks. Nevertheless, changing market conditions, data quality, transparency, security, and regulatory requirements remain important challenges in financial AI applications.

Across different domains, AI demonstrates diverse and complementary capabilities. In education, AI can support personalised learning and instructional activities, while healthcare applications assist diagnosis and clinical decision-making. Manufacturing can benefit from intelligent monitoring, prediction, and automation, whereas transportation can use AI for traffic forecasting, navigation, and intelligent vehicle systems. In cybersecurity, AI can support anomaly and intrusion detection, while retail and e-commerce can use recommender systems to analyse customer preferences. AI also contributes to energy management, agriculture, entertainment, social media, robotics, and language-based applications. These applications demonstrate that the suitability of an AI technique depends mainly on the characteristics of the data and the requirements of the task. Therefore, different AI methods should be considered complementary approaches rather than competing technologies.

Comparative accuracy is an important factor in selecting an appropriate AI technique, but accuracy alone should not determine model selection. Regression techniques can be effective where relationships between variables can be represented through statistical modelling, whereas neural networks are useful for complex nonlinear relationships. Ensemble techniques such as XGBoost, random forests, and other tree-based methods can improve predictive performance by combining multiple learning structures. Elmousalami's comparative study demonstrated the usefulness of comparing different AI and statistical approaches for project cost prediction and identified ensemble learning as an effective approach within the investigated application.[28] Similarly, comparative research on streamflow forecasting demonstrated the potential of CNN-based approaches to extract complex features while also highlighting challenges such as overfitting and uncertainty.[29] Thus, AI models should be evaluated not only according to predictive accuracy but also according to robustness, interpretability, computational requirements, generalisation, and practical suitability.

9. CONCLUSION

The study concludes that Artificial Intelligence has become a significant technology across diverse domains, with different AI techniques offering distinct capabilities for solving domain-specific problems. The analysis shows

that machine learning, deep learning, neural networks, NLP, ensemble methods, fuzzy logic, expert systems, and robotics are being widely applied in areas such as healthcare, finance, education, manufacturing, transportation, cybersecurity, energy, retail, and other sectors. AI contributes to improved efficiency, automation, prediction, pattern recognition, and decision-making; however, challenges related to data quality, privacy, security, ethics, transparency, cost, employment, computational requirements, and human involvement remain important. The comparative analysis further indicates that the suitability of an AI technique depends on the nature of the problem, data characteristics, and requirements of the application rather than the use of a single universally superior method. Overall, the study concludes that effective and responsible adoption of AI, supported by appropriate technique selection, human supervision, transparency, and ethical safeguards, can strengthen decision-making and improve performance across different domains.

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