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A Comprehensive Study on Different Artificial Intelligence Applications

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ABSTRACT –

The abstract summarizes multiple studies exploring the application of artificial intelligence (AI) in various domains. The first study focuses on eXplainable Artificial Intelligence (XAI) in pharmacovigilance, highlighting the limited use of XAI despite its potential benefits in drug treatment and adverse effect analysis. The second study introduces Trustworthy AI (TAI), emphasizing the need for transparency and post hoc explanations in AI systems to ensure reliability across different industries. The third study presents a hybrid AI model for predicting the uniaxial compressive strength of foam-cement-based paste inlay (FCPB), considering the effects of foaming agents on concrete properties. The fourth study discusses the role of smart devices and AI technologies in enhancing safety and disaster management within the context of smart cities. The fifth study addresses the interpretability of AI algorithms and the importance of evidence-based explanations, exploring theoretical frameworks and computational structures for contrastive and counterfactual explanations. Finally, the sixth study introduces a model combining eXplainable AI with Predictive Maintenance (PdM) in Smart Agricultural Facilities (SAF), demonstrating improvements in accuracy and providing insights into data purity, global and local explanations, and counterfactual scenarios. The research encourages future exploration of multi-modal data integration and Human-in-the-loop (HITL) systems to enhance the effectiveness and address ethical concerns in agricultural AI applications.

Keywords: Machine learning , Artificial Intelligence

I. Introduction

Artificial Intelligence (AI) has emerged as a revolutionary field that seeks to imbue machines with the ability to simulate human intelligence. At its core, AI involves the development of algorithms and computational models that enable machines to learn from data, recognize patterns, and make decisions autonomously. The applications of AI are diverse and impact various aspects of our daily lives, ranging from virtual assistants and recommendation systems to advanced robotics and autonomous vehicles. One of the key strengths of AI lies in its capacity to process vast amounts of information at speeds beyond human capabilities, leading to improved problem-solving and efficiency in numerous fields. While the potential benefits are significant, ethical considerations and responsible deployment are essential to mitigate potential risks and ensure the positive impact of AI on society. As we continue to advance in this field, the responsible integration of AI technologies holds the promise of transforming industries, enhancing human capabilities, and addressing complex challenges. Artificial Intelligence (AI) stands as a transformative force in today's rapidly evolving technological landscape, shaping industries and redefining the way we live and work. Its significance lies not only in its ability to automate mundane tasks but also in its capacity to augment human capabilities and tackle complex challenges. AI systems excel in processing vast amounts of data, extracting valuable insights, and making predictions, thereby enhancing decision-making processes across various domains. From healthcare and finance to education and manufacturing, the impact of AI is profound, fostering innovation, efficiency, and productivity. Moreover, AI has the potential to address societal issues, such as healthcare diagnostics, climate change modeling, and personalized learning. As we navigate the future, the responsible development and ethical implementation of AI will be crucial to harness its full potential, ensuring that it benefits humanity while respecting ethical considerations and preserving individual privacy.

II. Different Implementations of AI

Reasonable simulated intelligence (XAI) is a technique that supplements the black box of fake intelligence, and its need has as of late been featured in different fields. The motivation behind this exploration is to distinguish concentrates in the field of pharmacovigilance utilizing XAI. However there have been numerous past endeavors to choose papers, with a sum of 781 papers being affirmed, just 25 of them physically met the determination rules. The author presented a natural survey of the capability of XAI[1] advances in the field of pharmacovigilance. In the included examinations, clinical information, library information, and information were utilized to research drug treatment, secondary effects, and communication concentrates on tree models, brain network models, what's more, diagram models. At last, key difficulties for a few examination issues for the utilization of XAI in pharmacovigilance were distinguished. Albeit man-made reasoning (man-made intelligence)[1] is effectively utilized in drug observation and patient wellbeing, gathering unfriendly medication response data, extricating drug corporations, and foreseeing impacts, XAI isn't typically used. Thus, the

potential difficulties engaged with its utilization close to future possibilities ought to be consistently talked about. The progression of Man-made consciousness (artificial intelligence) innovation has sped up the turn of events of a few frameworks that are inspired from it. This blast has made the frameworks defenseless against security assaults also, permits impressive predisposition to deal with blunders in the framework. This endangers people and leaves machines, robots, and information helpless. Dependable man-made intelligence (TAI) ensures human worth and the climate. This author has presented an extensive survey of the cutting edge of the most proficient method to construct a Dependable and Reasonable computer based intelligence[2] , considering that man-made intelligence is a black box with little knowledge of its fundamental design. The paper likewise examines different TAI parts, their related predisposition, and tendencies that make the framework problematic. The concentrate likewise talks about the need for TAI in numerous verticals, including banking, medical services, independent framework, and IoT. Author joined the approaches to building trust in undeniably divided areas of information security, estimating, cost, unwavering quality, affirmation, and dynamic cycles using TAI in a few various enterprises and to varying degrees. It likewise stresses the significance of straightforward and post hoc clarification models in the development of a Logical artificial intelligence and records the likely disadvantages and traps of building Logical man-made intelligence. At last, the approaches for creating TAI in the independent vehicle development areas are completely inspected and mixed approaches to building a solid, interpretable, Reasonable, and Reliable computer based intelligence frameworks are cleared up to ensure safe independent vehicle frameworks.

Froth established glue inlay (FCPB)[3] has turned into a pattern to tackle the issue of rooftop reach filling. To address the tedious and work escalated hindrances of research center uniaxial compressive strength (UCS) tests, a half and half man-made reasoning model which consolidates irregular backwoods (RF) calculation and lattice search streamlining agent (GSO) was proposed for FCPB strength expectation. Additionally, the impacts of frothing specialists on concrete hydration and pore structure attributes were contemplated. The outcomes demonstrated the way that GSO can successfully tune the hyper-boundaries of the proposed GSO-RF model furthermore, the created model is a productive and precise instrument to anticipate the UCS[3] for FCPB. However the frothing specialist won't change the impact pattern of concrete tailings proportion, strong substance and restoring time, the impact degree will be debilitated by the frothing specialist. The positioning of the overall significance of affecting factors is: concrete tailings proportion > relieving time > frothing specialist dose > strong substance. Likewise, the frothing specialist significantly affects the hydration of concrete. The frothing specialist predominantly changes the strength by changing the pore structure attributes (particularly the huge pore volume). This exploration can give a direction to creating the UCS expectation model for FCPB.

Inside the worldview of shrewd urban communities, brilliant gadgets can be considered as an instrument to upgrade safety. Edge detecting, Web of Things (IoT)[4] , large information, virtual entertainment investigation, edge figuring, and fake knowledge are key advancements that can be applied through savvy gadgets to make crisis mindful systems. The utilization of these innovations could make the board undertakings, for example, picturing, breaking down, and anticipating fiascos simpler to perform. The point of this research was to lead a survey of later exercises in writing about catastrophe and crisis the board, and showing the job of various edge innovations utilized in such manner, and through the various phases of managing a catastrophe circumstance. Special significance is given to two primary innovations: Online entertainment investigation and man-made brainpower, due to their outstanding effect on crisis circumstances. Web-based entertainment addresses a rich wellspring of information while fake knowledge stands apart as the component to manage the immense measure of information produced by brilliant gadgets, and subsequently expected to handle all wellsprings of information, to anticipate, recognize, oversee data, and for specialists to answer crisis circumstances. This study is an exhaustive survey for the new writing on the related subjects, giving the peruser a reasonable outline of the ongoing status and grouping the papers into bunches with relations among them. The organizing of the new writing into four stages makes it more straightforward for the peruser to understand the present status of the craftsmanship. For fulfillment, this review closes with a segment on open issues and exploration patterns in a debacle and crisis in the board frameworks.

Various calculations in the field of computerized reasoning proposition inadequately interpretable choices. To uncover the thinking behind such calculations, their result can be made sense of through supposed proof based (or real) clarifications. Then again, contrastive and counterfactual clarifications legitimize[5] why the result of the calculations isn't any unique and how it very well may be changed, separately. It is of significant significance to overcome any barrier between hypothetical ways to deal with contrastive and counterfactual clarification furthermore, the relating computational systems. In this work the author directs a deliberate writing survey which gives perusers an exhaustive and reproducible investigation of the interdisciplinary examination field under study. We initially look at hypothetical groundworks of contrastive and counterfactual records of clarification. Then, at that point, we report the cutting edge computational structures for contrastive and counterfactual clarification generation. Also, author investigates how grounded such systems are on the experiences from the assessed hypothetical methodologies. Thus, presented features of various properties of the methodologies under study and uncover various deficiencies thereof. Besides, characterize a scientific classification in regards to both hypothetical and functional ways to deal with contrastive and counterfactual clarification.

Due to the energy change and the dispersion of power age, appropriation power frameworks gain a great deal of consideration as their significance increases and new difficulties in activity arise. The joining of renewables and electric vehicles for example prompts complex changes in the framework, for example cooperation in arrangement of auxiliary administrations. To settle these difficulties man-made brainpower gives an assortment of arrangements in light of the expansion in sensor information and computational capacity. This survey gives an efficient outline of probably the latest examinations applying man-made brainpower strategies[6] to circulation power framework activity distributed during the most recent 10 years. In view of that, a common principle is created to help the peruser in finding a reasonable artificial intelligence strategy for a particular activity task. Hence, four general measurements were proposed to give a direction of the prerequisites of every application. Subsequently, an end can be drawn introducing reasonable calculations for every activity task.

Man-made brainpower (computer based intelligence) in Brilliant Horticultural Offices (SAF) frequently needs logic, ruining ranchers from making the most of their capacities. This study handles this hole by presenting a model that joins Logical Man-made brainpower (XAI)[7] , with Prescient

Support (PdM). The model means to give both prescient experiences and clarifications across four key aspects, specifically information, model, result, and end-client. This approach denotes a change in horticultural man-made intelligence, reshaping how these technolo- gies are perceived and applied. The model beats related investigations, showing quantifiable upgrades. In particular, the Long-Transient Memory (LSTM) classifier shows a 5.81% ascent in precision. The Limit Slope Helping (XGBoost) classifier displays a 7.09% higher F1 score, 10.66% expanded precision, and a 4.29% expansion in Collector Working Trademark Region Under the Bend (ROC-AUC). These outcomes could prompt more exact upkeep expectations in certifiable settings. This concentrate additionally gives bits of knowledge into information immaculateness, worldwide and neighborhood clarifications, and counterfactual situations for PdM in SAF. It progresses simulated intelligence by underlining the significance of reasonableness past conventional exactness measurements. The outcomes affirm the predominance of the proposed model, denoting a critical commitment to PdM in SAF. In addition, this review advances the comprehension of simulated intelligence in horticulture, underlining reasonableness aspects. Future exploration bearings are supported, including multi-modular information coordination and carrying out Human-in the know (HITL) frameworks pointed toward working on the adequacy of computer based intelligence and tending to moral worries like Reasonableness, Responsibility, and Straightforwardness (FAT) in horticultural artificial intelligence applications.

III . Conclusion

In conclusion, the diverse range of studies presented underscores the evolving landscape of artificial intelligence (AI) and its profound impact across various sectors. The exploration of eXplainable AI (XAI) in pharmacovigilance highlights the potential of transparency and interpretability in addressing challenges within the healthcare domain. The discussion on Trustworthy AI (TAI) emphasizes the importance of responsible AI development, especially in sectors like banking, healthcare, and autonomous systems. The application of AI in construction materials, such as the foam-cement-based paste inlay (FCPB), showcases the efficacy of hybrid AI models in predicting material strength. The examination of AI's role in smart cities and disaster management demonstrates its significance in enhancing safety through technologies like IoT and online entertainment analysis. The study on contrastive and counterfactual explanations for AI decisions emphasizes the need for interpretable AI algorithms. Additionally, the integration of AI in distribution power systems and agricultural facilities further highlights its potential in addressing challenges related to energy transition and sustainable farming. Overall, these studies collectively contribute to the ongoing discourse on responsible and innovative AI applications, emphasizing the need for ongoing research, interdisciplinary collaboration, and ethical considerations in the rapidly advancing field of artificial intelligence.

IV. References

1. S. Lee, S. Kim, J. Lee, J. -Y. Kim, M. -H. Song and S. Lee, "Explainable Artificial Intelligence for Patient Safety: A Review of Application in Pharmacovigilance," in IEEE Access, vol. 11, pp. 50830-50840, 2023, doi: 10.1109/ACCESS.2023.3271635.
2. V. Chamola, V. Hassija, A. R. Sulthana, D. Ghosh, D. Dhingra and B. Sikdar, "A Review of Trustworthy and Explainable Artificial Intelligence (XAI)," in IEEE Access, vol. 11, pp. 78994-79015, 2023, doi: 10.1109/ACCESS.2023.3294569.
3. J. Qiu, Z. Guo, L. Li, S. Zhang, Y. Zhao and Z. Ma, "A Hybrid Artificial Intelligence Model for Predicting the Strength of Foam-Cemented Paste Backfill," in IEEE Access, vol. 8, pp. 84569-84583, 2020, doi: 10.1109/ACCESS.2020.2992595. .
4. M. Aboualola, K. Abualsaud, T. Khattab, N. Zorba and H. S. Hassanein, "Edge Technologies for Disaster Management: A Survey of Social Media and Artificial Intelligence Integration," in IEEE Access, vol. 11, pp. 73782-73802, 2023, doi: 10.1109/ACCESS.2023.3293035.
5. I. Stepin, J. M. Alonso, A. Catala and M. Pereira-Fariña, "A Survey of Contrastive and Counterfactual Explanation Generation Methods for Explainable Artificial Intelligence," in IEEE Access, vol. 9, pp. 11974-12001, 2021, doi: 10.1109/ACCESS.2021.3051315.
6. S. Stock, D. Babazadeh and C. Becker, "Applications of Artificial Intelligence in Distribution Power System Operation," in IEEE Access, vol. 9, pp. 150098-150119, 2021, doi: 10.1109/ACCESS.2021.3125102
7. M. Kisten, A. E. -S. Ezugwu and M. O. Olusanya, "Explainable Artificial Intelligence Model for Predictive Maintenance in Smart Agricultural Facilities," in IEEE Access, vol. 12, pp. 24348-24367, 2024, doi: 10.1109/ACCESS.2024.3365586
8. P. Verma and S. K. Sood, ‘‘Fog assisted-IoT enabled patient health monitor ing in smart homes,’’ IEEE Internet Things J., vol. 5, no. 3, pp. 1789–1796, Jun. 2018.
9. T. N. Gia, M. Jiang, A.-M. Rahmani, T. Westerlund, P. Liljeberg, and H. Tenhunen, ‘‘Fog computing in healthcare Internet of Things: A case study on ECG feature extraction,’’ in Proc. IEEE Int. Conf. Comput. Inf. Technol.; Ubiquitous Comput. Commun.; Dependable, Autonomic Secure Comput.; Pervas. Intell. Comput., Oct. 2015, pp. 1–8.
10. B. Negash, A. Anzanpour, I. Azimi, M. Jiang, T. Westerland, A. M. Rahmani, P. Liljeberg, and H. Tenhunen, ‘‘Leveraging fog computing for healthcare IoT,’’ in Fog computing in the Internet of Things Intelligence at the edge. Cham, Switzerland: Springer, 2017, pp. 145–169.
11. A. M. Rahmani, T. N. Gia, B. Negash, A. Anzanpour, I. Azimi, M. Jiang, and P. Liljeberg, ‘‘Exploiting smart e-health gateways at the edge of healthcare Internet-of-Things: A fog computing approach,’’ Future Gener. Comput. Syst., vol. 78, pp. 641–658, Jan. 2018.
12. I. Azimi, A. Anzanpour, A. M. Rahmani, T. Pahikkala, M. Levorato, P. Liljeberg, and N. Dutt, ‘‘HiCH: Hierarchical fog-assisted computing architecture for healthcare IoT,’’ ACM Trans. Embedded Comput. Syst., vol. 16, no. 5s, pp. 1–20, Oct. 2017.

13. Y. Wang, Y. Kong and P. Fan, "Research on trusted traceability with Block Chain and Handle System Network," 2021 International Conference on Information Science, Parallel and Distributed Systems (ISPDS), Hangzhou, China, 2021, pp. 125-130, doi: 10.1109/ISPDS54097.2021.00032.

14. Y. Zhang, R. Wang, Q. Li, N. Xia, N. Zhang and J. Hu, "Research and Application of Block Chain Technology in Electricity Market Transactions," 2022 4th International Conference on Smart Power & Internet Energy Systems (SPIES), Beijing, China, 2022, pp. 2180-2183, doi: 10.1109/SPIES55999.2022.10082649.

15. Z. Xiaoming, L. Caiping, T. Dejin, S. Yuchen, H. Zhen and Z. Jisheng, "Design of Remote Sensing Image Sharing Service System Based on Block Chain Technology," 2019 IEEE International Conference on Signal, Information and Data Processing (ICSIDP), Chongqing, China, 2019, pp. 1-4, doi: 10.1109/ICSIDP47821.2019.9173237.

16. Pavan Manjunath, Pritam Gajkumar Shah, "IoT Based Food Wastage Management System", I-SMAC (IoT in Social Mobile Analytics and Cloud) (I-SMAC) 2019 Third International conference on, pp. 93-96, 2019.#

17. Z. Xiaoming, L. Caiping, T. Dejin, S. Yuchen, H. Zhen and Z. Jisheng, "Design of Remote Sensing Image Sharing Service System Based on Block Chain Technology," 2019 IEEE International Conference on Signal, Information and Data Processing (ICSIDP), Chongqing, China, 2019, pp. 1-4, doi: 10.1109/ICSIDP47821.2019.9173237.

18. Z. Ullah, G. Mokryani, B. Khan, I. Khan, C. A. Mehmood and S. M. Ali, "Smart Grid Block-Chain (BC) Conceptual Framework: Bi-Directional Models for Renewable Energy District and Utility," 2019 15th International Conference on Emerging Technologies (ICET), Peshawar, Pakistan, 2019, pp. 1-5, doi: 10.1109/ICET48972.2019.8994500.

19. W. Liu, S. S. Zhu, T. Mundie and U. Krieger, "Advanced block-chain architecture for e-health systems," 2017 IEEE 19th International Conference on e-Health Networking, Applications and Services (Healthcom), Dalian, 2017, pp. 1-6, doi: 10.1109/HealthCom.2017.8210847.