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An Analytical Study On Privacy Of Personal Data With Artificial Intelligence For Personalized Medicine

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Abstract
With the evolution in the field of Information and Communications Technology, information is increasingly being widely shared and available. Data generated due to digitization is derived from a range of sources that involve online banking transactions, search queries, online log information, sensor information, click streams, medical software, and online e-commerce applications. Even though data analytics is beneficial to many applications, the downside is that increasingly digital data and their analysis raise questions regarding the privacy breach of the individual. Human activity at large scale is taking place through electronic media and all these applications gather data in one form or another, including an individual's personal details. Unauthorized use of these personal data or the application of gathered personal data for unfair reasons can threaten a person's privacy. For example, privacy can be infringed when access is provided to a person's sensitive information like salary, caste or a disease condition. In order to preserve privacy, analytic methods can opt to hide sensitive data and focus on non-personal data. But such methods that only aim at privacy protection might not provide correct analytical results and suffer from data quality. Therefore, any privacy-conscious technology in data analytics must enable data quality and privacy protection to coexist.
Keywords: AI, Health, ML. genetic, personalized, medicine.

INTRODUCTION

Different organizations that are operating in different areas like scientific research institutions, industrial organizations, educational institutions, business organizations, medical sciences, government institutions, etc [1]. gather and summarize the data in enormous quantities. The data is organized because it is utilized for future outlooks. Data mining is a method that is derived from the Artificial Intelligence method with some rule set to get the necessary information from the current databases[2]. Therefore, these knowledge repositories employ different data mining techniques to make proper decisions based on the acquired knowledge. Various methods, including association rule mining, clustering, classification, and outlier detection, are employed in a variety of applications [10]. Few organizations had the capacity to bring out knowledge from the information that was produced in the company. Some information owners started outsourcing their data to other parties because they lack the equipment to generate samples or fail to meet other broad requirements [14]. Sometimes such information about individuals gathered and detained in any institution is controlled by the law of data confidentiality of the country[3]. Every nation has legislation to safeguard confidentiality along with privacy of information gathered from individuals. Therefore, there is a privacy preservation need for gathered databases. [11].Privacy is a ubiquitous issue for the digital economy of today. The widespread adoption of Internet and its applications has led to an enormous volume of electronic data being gathered and processed. Applications which gather these data, process them to obtain useful information that can be utilized in futuristic decision making, enhancing the chances of

higher economic value from data[4].

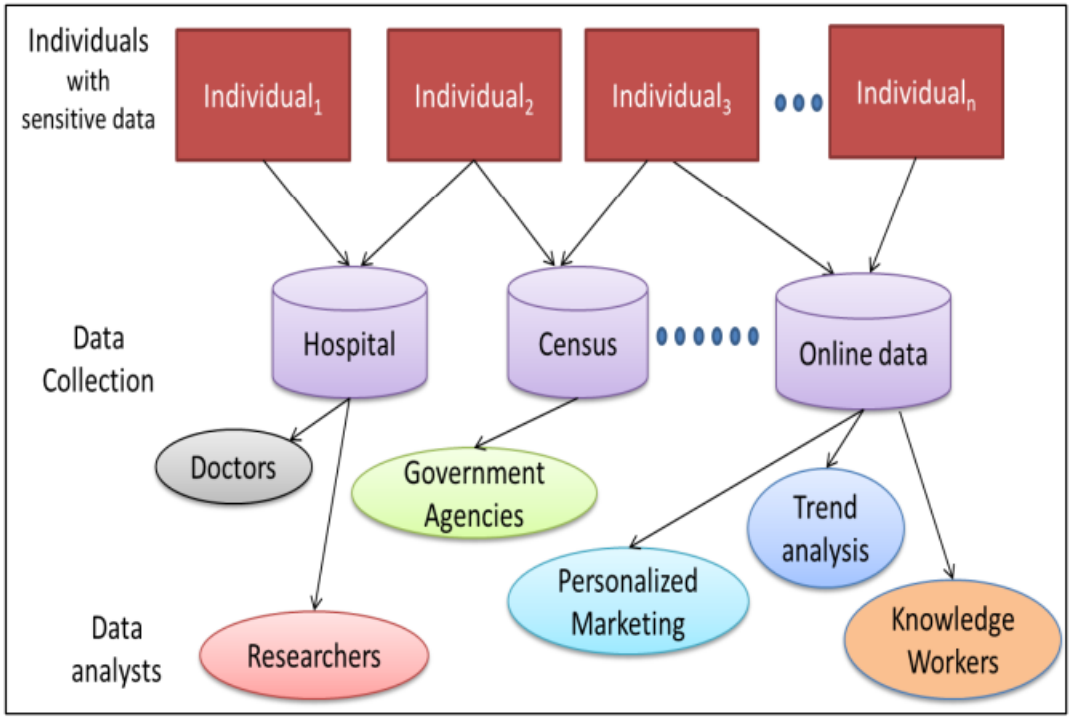

Figure 1: Privacy Preserving Analytics

Need of the study

Other medical specialists are delving into the analysis of genomic data in the interim. This certification represented a major advance in the application of genetic information to healthcare by opening the way for the development and deployment of novel genome-based testing. The FDA collaborated with the National Institute of Standards and Technology to produce a complete human genome DNA sequence and optimal methods for analysing these genomes as a means of creating genomic reference materials for performance testing. If patients ask for genetic testing and there is strong evidence to support the request, they can also set that up. For information on the available genetic tests, their limitations, and their implications, doctors rely on HIM specialists[6]. This partnership assists patients and medical professionals in determining the most effective treatment options currently available. [5].

AI is making waves in healthcare, with applications ranging from image analysis to drug discovery and diagnostics. Recent studies in data-heavy biomedical technology have revealed that individuals can differ significantly in how diseases progress and how they respond to treatments, influenced by behavioural factors [12].

Materials and methods

Furthermore, this data's quality can occasionally be subpar, producing results that are not entirely trustworthy. Sensitive personal genomic information needs to be protected. The management of personal genomic data is governed by a number of laws and regulations. Programs like Gene PING and Inter promote are attempting to safeguard this important data.

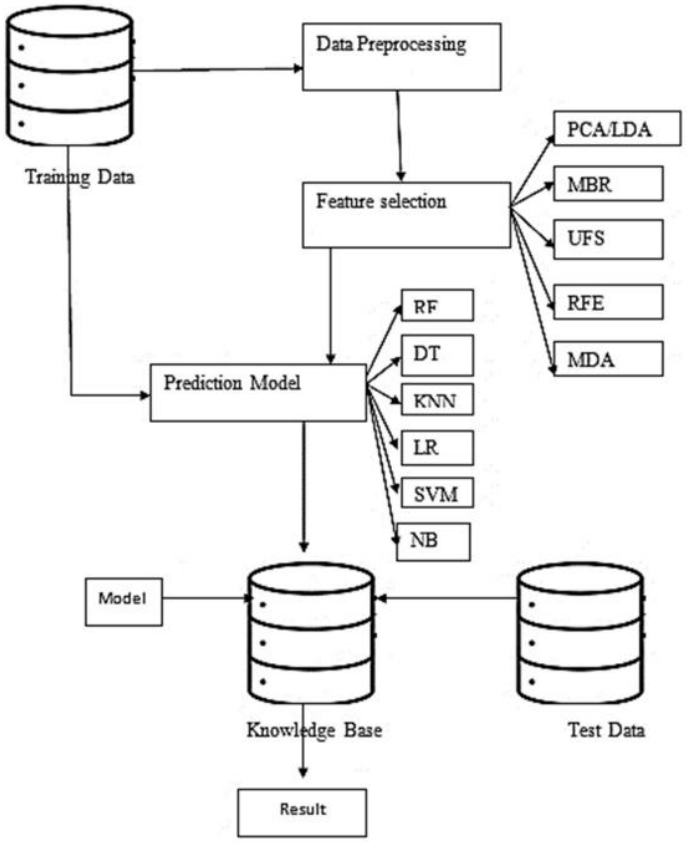

Figure 1: Proposed Flow

Personal genomic information raises a number of ethical, social, and legal issues. It can be difficult for Health Information Management (HIM) specialists to obtain information on available genetic testing, including their limits and possible repercussions, as healthcare providers rely on them to do so [7]. These professionals also have the important task of regularly updating patient data, as new research can uncover fresh insights. It's essential for them to receive proper training to handle this responsibility effectively. In general, applications undertake two kinds of learning viz. supervised and unsupervised[8]. Classification and clustering are the most prevalent tasks that fall under each of these. The efficiency in learning these tasks can be further improved, through proper methods for data cleaning and preparation. Therefore an effective analysis mechanism for privacy preserved data requires an effective mix of learning methods and privacy models.

RESULT AND DISCUSSION

The system has demonstrated promising outcomes in oncology and includes both ML and NLP modules. For instance, 99% of Watson's treatment recommendations in a cancer study concur with the findings of medical research [13].

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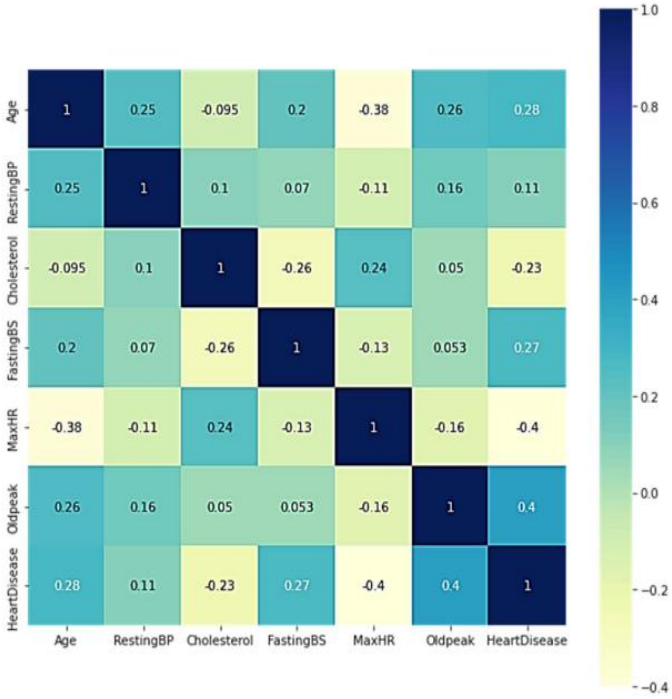

Figure 2: Correlation Matrix of Cleveland Heart Disease

Also, Quest Diagnostics and Watson collaborated to introduce the AI Genetic Diagnostic Analysis. Actual clinical practices are beginning to be affected by this collaboration. For example, Watson detected a rare secondary leukemia associated with myelodysplastic syndromes in Japan by analysing genetic information. An example of combining an AI system with front-end input of data and back-end clinical actions is the cloud-based CC-Cruiser [8].

Figure 3: Correlation Matrix of Hepatitis C Prediction

Though there are many potential benefits to AI in personalized medicine, there are also drawbacks [15]. The requirement of vast quantities of quality data, the risk of bias within data analysis, and significant ethical issues of privacy and security are some of the challenges we need to overcome [16].

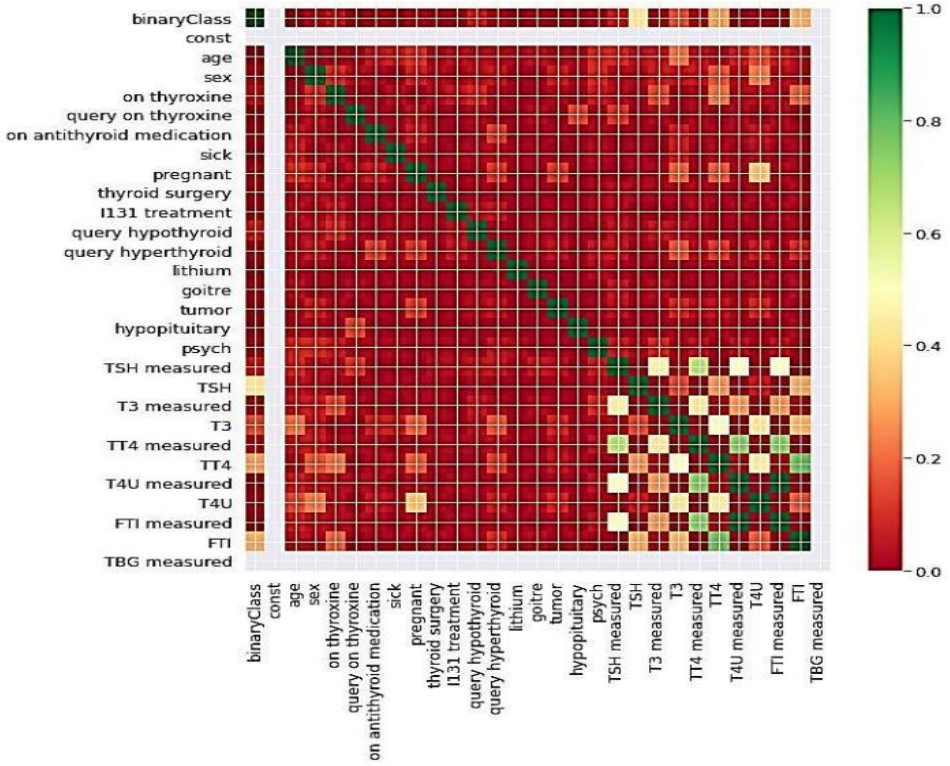

Figure 4: Correlation Matrix of Thyroid Disease

CONCLUSION

These thorough study results, however, also make it more difficult to assess personal genomic information for therapeutic purposes. We'll probably be able to extract much more information from a human genome as genomics research advances, which could put people and their grandchildren at more danger. Therefore, before we start using genomic data widely in clinical settings, we need to establish a stronger and more sophisticated security framework to safeguard personal genomic information. It is imperative that all medical professionals inform the public about the possible risks associated with genetic testing as well as the advantages of personalized therapy.

REFERENCES

1. Boris, Edidin, Bunkov Alexey, and Kochetkova Ksenia. "The Use of AI in Medicine: Health Data, Privacy Risks and More." *Legal Issues in the digital Age* 2 (2024): 57-79.
2. Tang, U., Krezger, H., & LonnerbyRakob. (2024). Design and validation of 6G antenna for mobile communication. National Journal of Antennas and Propagation, 6(1), 6–12.
3. Qader, A. M., & Turkben, A. K. (2022). Multi Channels Deep Convolution Neural Network for Early Classification of Multivariate Time Series. International Journal of Advances in Engineering and Emerging Technology, 13(2), 230–240.
4. Zakaria, R., & Zaki, F. M. (2024). Vehicular ad-hoc networks (VANETs) for enhancing road safety and efficiency. Progress in Electronics and Communication Engineering, 2(1), 27–38. https://doi.org/10.31838/PECE/02.01.03
5. International Conference on Informatics and Computing (ICIC), pp. 1-6. IEEE, 2024.
6. Choset, K., & Bindal, J. (2025). Using FPGA-based embedded systems for accelerated data processing analysis. SCCTS Journal of Embedded Systems Design and Applications, 2(1), 79–85.

7. Vizitiu, Anamaria, Cosmin Ioan Nită, Andrei Puiu, Constantin Suciu, and Lucian Mihai Itu. "Privacy-preserving artificial intelligence: application to precision medicine." In 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), pp. 6498-6504. IEEE, 2019.
8. Marie Johanne, Andreas Magnus, Ingrid Sofie, & Henrik Alexander (2025). IoT-based smart grid systems: New advancement on wireless sensor network integration. Journal of Wireless Sensor Networks and IoT, 2(2), 1-10.
9. Alrefaei, Abdulmajeed F., Yousef M. Hawsawi, Deyab Almaleki, Tarik Alafif, Faisal A. Alzahrani, and Muhammed A. Bakhrebah. "Genetic data sharing and artificial intelligence in the era of personalized medicine based on a cross-sectional analysis of the Saudi human genome program." Scientific Reports 12, no. 1 (2022): 1405.
10. Gatla, Teja Reddy. "An innovative study exploring revolutionizing healthcare with ai: personalized medicine: predictive diagnostic techniques and individualized treatment." International Journal of Advanced Research and Interdisciplinary Scientific Endeavours 1, no. 2 (2024): 61-70.
11. Halim, Erwin, Natasha Edyta Attan, Redondo Delve Chow, and Davine Dorothy Halim. "Using AI Algorithms for Predictive Analysis in Personalized Medicine." In 2024 Ninth
12. Torkzadehmahani, Reihaneh, Reza Nasirigerdeh, David B. Blumenthal, Tim Kacprowski, Markus List, Julian Matschinske, Julian Spaeth, Nina Kerstin Wenke, and Jan Baumbach. "Privacy-preserving artificial intelligence techniques in biomedicine." Methods of information in medicine 61, no. S 01 (2022): e12-e27.
13. Schork, Nicholas J. "Artificial intelligence and personalized medicine." Precision medicine in Cancer therapy (2019): 265-283.
14. Gupta, Nancy Sanjay, and Pravir Kumar. "Perspective of artificial intelligence in healthcare data management: A journey towards precision medicine." Computers in biology and medicine 162 (2023): 107051.
15. Kapoor, R., & Iyer, S. (2024). Renewable Energy Integration in Sustainable Healthcare Systems. International Journal of SDG's Prospects and Breakthroughs, 2(4), 7-12.
16. Kapoor, S., & Sharma, V. (2024). A Comprehensive Framework for Measuring Brand Success and Key Metrics. In Brand Management Metrics (pp. 16-30). Periodic Series in Multidisciplinary Studies.