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Short Communication

The Influence of Artificial Intelligence in Medicine

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The field of Artificial Intelligence ways of Machine Learning is emerging and evolving at a higher pace than the other areas. Artificial Intelligence based systems together with the enhancements in computer processing is bringing in a huge transformation in various fields especially in the field of medicine due to its high percentage of accuracy and the efficiency of disease diagnosis. Based on the accurate diagnosis, treatment can be applied to patients who were lacking appropriate treatment due to the accuracy of the old machines used. The images interpreted by the radiologists vary from person to person depending on various aspects. The accuracy of AI depends on the huge number of data fed into the system which trains the system to generate accurate interpretation of the image. This interpretation will not vary from system to system or person to person. Due to the immense advantages of Artificial intelligence, it is apprehended that in the coming times, AI may replace a major part of the medical industry especially in terms of prediction and interpretation of various medical tests and results.

- AI applications in healthcare
- AI ethics in healthcare
- AI for predicting disease outbreaks and epidemics
- AI in clinical decision support systems
- AI in clinical trials and patient recruitment
- AI in medical education and training
- AI in neurology
- AI-assisted disease monitoring in low-resource settings
- AI-driven telehealth and remote healthcare delivery
- AI-powered tools for rare disease diagnosis
- Data Mining in healthcare
- Decision making in healthcare
- Drug discovery and development
- Drug dosage optimization and pharmacogenomics
- Electronic Health Records
- Emerging applications of AI models in medicine
- Ethical considerations in AI-assisted healthcare
- Healthcare Access and Equity
- Healthcare chatbots and virtual health assistants
- Machine learning and deep learning applications in medicine and healthcare
- AI and wearable devices
- Machine learning models for early disease detection and prevention
- Medical data security and privacy
- Medical imaging
- Mental health diagnostics and interventions
- Natural Language Processing
- Personalized treatment recommendations
- Precision Medicine
- Predictive analytics for patient outcomes and readmission risk
- Predictive modeling for healthcare resource allocation
- Radiomics and AI for tumor characterization and prognosis
- Robotic-assisted surgery and AI-enhanced surgical systems
- Robotics in rehabilitation and physical therapy

- Telemedicine and AI-driven remote patient monitoring
- Text mining for medical applications

Examples regarding the use of AI

Gudmundsson, E. F., *et al*. have identified that significantly better prediction of major adverse cardiovascular events is seen along with carotid plaque and coronary artery calcium (CAC) in comparison to more conventional risk variables. Total carotid plaque area outperformed risk scores and well-established risk variables in predicting incident CAD. Loh, W. J., *et al*. have explored the hypothesis that Lp(a) predicts CAD in a South East Asian population. They have also looked into whether or not Lp(a) is a predictor of acute myocardial infarction (AMI) and severity of coronary artery stenosis among individuals with existing CAD. Among a South East Asian population that is overwhelmingly male, they found that a higher plasma Lp(a) concentration was a predictor of coronary heart disease and acute myocardial infarction. Hodges, G., *et al*. discuss that patients with suspected or confirmed CAD had a higher risk of death or MI if their suPAR is high; however, the existence or severity of CAD is not connected with suPAR in this cohort. Also, suPAR represents end organ damage rather than the severity of atherosclerosis, which is likely why this is the case. Janssen, E. P., *et al*. have researched to identify if incident depression was linked to LGI and ED. Mediating the link between ED and new-onset depression is LGI. ED could tell the difference between the result groups that had just experienced a single episode of depression and the groups that had experienced chronic depression. Results from this study point to a significant role of the cardiovascular system in both the development and maintenance of depressed symptoms. Keyloun, J. W., *et al*. have aimed to determine whether tissue factor pathway inhibitor (TFPI) and syndecan-1 (SDC-1) plasma levels upon admission may be used as parameters to predict 30-day mortality in patients with burn injuries. In fatally burned patients, endotheliopathy biomarkers SDC-1 and TFPI are elevated. Decision-Making in the clinic, such as the selection of resuscitative or transfusion items, can benefit from an accurate assessment of the extent to which endothelium

AI can enable early diagnosis and improved treatment options The interpretation of the results becomes easier. Explainable AI gives ways to penetrate AI black-box models and use AI to achieve two goals: accurate predictions and explanations. Using a prediction model that is easy to understand can help patients accept the results.AI can classify images and lesions. Advanced picture segmentation tools are available which can extract more data from the image.

Support Vector Machine (SVM), Artificial Neural Network (ANN), AdaBoost, and Random Forest are only few of the ML and DL algorithms that have been studied extensively for their potential to forecast CAD. Algorithms from the realm of Explainable AI, such as LRP (Layer-wise Relevance Propagation), DTD (Deep Taylor Decomposition), have the potential to aid with CAD prediction. There has to be a comprehensive investigation into the potential of Explainable AI systems for CAD prediction. 2) Significant work has been done utilizing AI to predict whether a person has CAD based on their physical and biological characteristics. There has not been a substantial amount of research on the ability to predict a particular kind of CAD or the ability to predict mortality based on particular health conditions and biomarkers. Coronary vasospasm and SCAD are not as common as other kinds of CAD, hence there has been less work done on developing prediction models for these. Research has to be done in this regard. 3) There has been an extensive usage of DL algorithms like Deep Neural Networks (DNN), Artificial Neural Networks (ANN) to build prediction models for CAD. Understanding the scope of algorithms like Yolo and ResNet has to be done and the capabilities of these algorithms to build prediction models with improved accuracy has to be done. 4) The development of more accurate prediction models relies on the discovery of novel biomarkers for a variety of uncommon forms of CAD. Exploring the availability of dataset repository for such requirements plays a key role in the research undertaken. 5) Research requires investigating the feasibility of developing a novel model that can forecast a less common form of CAD utilizing an under-explored algorithm such as the Explainable AI algorithm. It is necessary to evaluate the algorithm's effectiveness in terms of its predictive abilities.

Some study discusses that acute coronary syndrome (ACS) caused by spontaneous coronary artery dissection (SCAD) is a diverse illness with a low death rate. This study compares the accuracy of classical logistic regression, ML modelling, and custom-built DL models in predicting death in patients with SCAD using data from a large city's electronic health record (EHR) system. A high c-reactive protein, hypertension, atrial fibrillation, and steroid use were all found to be significant predictors of SCAD mortality in the study. Further, DL models were more effective than regression and ML models. Artificial intelligence (AI) based prediction models have rapidly expanded in the medical profession. The use of these AI-based prediction model tools and software in the treatment of cardiovascular patients is a challenge for cardiovascular researchers and healthcare professionals to comprehend both the potential and the potential boundaries of AI-based predictions. The following key points need to be addressed while using AI based prediction for cardiovascular diseases Although there are many prediction models already, only a few of them are really used. A new complex model's value over an already-existing simpler model is not assured. To recognize and address cultural and technical hurdles, it is crucial to understand where a model fits into the therapeutic process. For model calibration, representative data at the development stage is crucial. Predictive performance measurements may be skewed if those with unusual presentations or missing data are excluded. The outcome status should be accurately verified. Predictions and estimates of predictive performance may be biased by inaccurate verification. Rigorous both internal and external validation processes must be used to test the effectiveness of AI prediction models. To measure the effectiveness of prediction, several different statistics are available. Clinical effects of utilizing the AI prediction model are not described by traditional performance statistics It might be useful to determine which features are most important for making predictions using an explainable AI methodology. It is uncommonly warranted to draw conclusions about causality and effect just from the outcomes of prediction modelling. For reliable ML-based prediction models of CAD, it is important to have the following features. Stronger findings, such as death, the CAC score, or coronary artery stenosis.

Validations in the lab or in the hospital. Adapting to a multiethnic group while using untested AI. The fusion of traditional, lab-based, image-based, and medication-based biomarkers. Krittanawong, C., *et al*. have published an article to evaluate and appraise the general predictive performance of ML algorithms in cardiovascular disorders. A total of 344 studies have been evaluated by them. The following are the key outcomes of the evaluation. Multiple predictive criteria were used to develop traditional ways of making predictions as the Framingham risk score, SCORE, PCE model, and QRISK. These risk scores include few predictors and neglect key variables. To accurately anticipate CAD, stronger prediction tools are needed. Accuracy in predicting cardiovascular disease using ML algorithms is high (AUC 0.8-0.9 s). In terms of AUC, custom-built CAD prediction algorithms performed better than boosting techniques. Custom-built algorithms must be transparent and repeated in numerous experiments using the same group of independent variables before being used in clinical practice. In contrast to traditional risk scores, most ML models included laboratory data and a shared group of quantitatively different demographic factors (such as age, smoking status, sex). Although each of those factors has not been well verified in clinical investigations, in some cases they may offer predictive value.

Patients at risk Alzheimer's can be also detected using an Algorithm.

Google is doing studies in detecting diseases through study of cornea and implementation of new Algorithms using these days analysis.

Blockchain

To address existing challenges in 5G networks, smart healthcare in 6G will need to go one step further. Blockchain integration that is deeper and more widespread in future networks has the potential to develop present healthcare systems and increase performance in terms of decentralization, security, and privacy. The privacy problem is the next in line of these technical issues. Furthermore, thanks to the immutability afforded by blockchain, the integrity of healthcare data is possible. Specifically, blockchain can offer user-controlled privacy and safe data storage without the need for a centralized trusted third-party (F. Tariq, M. R. Khandaker, K.-K. Wong, M. A. Imran, M. Bennis, and M. Debbah (2022)). GDPR directives are major drivers in Europe, and they will get stricter in the future years. Improved decentralization will result in increased security, particularly in terms of availability for this vital sector.

There is several application potential for leveraging blockchain in 6G infrastructures to improve performance or enable new services/use-cases. Namely, Artificial intelligence using blockchain can help Decentralizing network management structures. By Decentralizing blockchain-based network management will improve resource management and system efficiency. Pricing, charging and billing of network services: In comparison to traditional systems, blockchain can enable charging and paying without a centralized infrastructure, resulting in a more flexible and efficient design. Accounting, Authentication, and Authorization (AAA): When vast scale connection with diverse and scattered network parts is used in 6G networks, AAA functions must be decentralized and considerably more resilient in order to ensure service continuity. For example, (group) key management and access control procedures can be delegated to blockchain platforms for improved scalability (particularly for resource-constrained end points) and transparency. Service Level Agreement (SLA) Management: 6G networks will be built on virtualized and sliced network architecture, similar to 5G networks, but on a much larger scale. Furthermore, these networks are intended to provide a broad range of use-cases with varying service level assurances. As a result, SLA management is a critical system need. In this complicated scenario, blockchain will enable decentralized and secure SLA administration. Spectrum Sharing: With centralized management structures and uncoordinated sharing schemes, capacity growth and spectrum agility for 6G radio access (for bands spanning from MHz to THz bands) are not obvious. Blockchain and smart contracts have the potential to improve collaboration and transparency in spectrum sharing. “Extreme Edge”: To achieve extremely low latency communications and instant networks, 6G networks must support the spatial translation of many essential services from the cloud to the edge networks. Blockchain in these systems can provide trustworthy coordination and transparent resource bookkeeping.

Internet of everything (IoE)

The Internet of Everything (IoE) is a broader concept than IoT, with the goal of intelligently connecting people, processes, data, and objects. Discusses the defining function of IoE. The IoE is intended to re-invent corporate processes and business models. First, digital technology is used to improve and automate procedures. Second, new business models in several industries are becoming viable as a result of the use of digital technology. It will be fascinating to study the commercial implications of the different options when adopting IoE. There will be a strong need to compete with unparalleled business velocity and agility. Furthermore, the impact of using blockchain-based technology for the purpose of interoperability among various organizations, such as billing, needs additional investigation.

Data storage and analytics

Millions of items and objects will continually create real-time streams of new data if the IoE is implemented. As a result, adequate and efficient centralized and decentralized data storage systems are necessary in the first place. It is obvious that blockchain-enabled technology can play a significant role in this regard. However, it is unclear how these technologies will be distributed and combined in other fields (edge, fog, and cloud). Second, research into data analytics methodologies will be critical in order to assess and extract the vital parts from this massive amount of data for effective and correct decision making. Methods are classified into four types based on their application: descriptive analytics, diagnostic analytics, predictive analytics, and prescriptive analytics. Again, it will be fascinating to look into the possibility of combining these data analytics methodologies with distributed blockchain-based data storage, where smart contracts may be used to automate procedures.

Summary

Artificial intelligence

AI was not yet used in 4G, however there is a restricted partial use in 5G. We anticipate a far deeper integration of AI across all levels of 6G network communications, with the ultimate objective of making our society extremely smart, super efficient, and super green. First, AI and machine learning approaches have been proven to improve channel coding, range and obstacle detection and physical layer security at the physical layer. Each of these fields is still in the early stages of research and requires more exploration. Following that, at the network layer, current 5G technologies such as SDN, NFV, and network slicing will need to be improved further in order to achieve a more flexible and self-learning adaptive architecture capable of supporting more complex and heterogeneous networks that are frequently also dynamically changing. The blockchain’s purpose in this sector will be primarily to make the decision-making process of machine learning algorithms more intelligible and logical, as all of the underlying elements on which judgments are based can be traced back.

Conclusion

AI has been making big strides in the field of medicine and will continue to do so only a miniscule of information has been described.