A Proposed System of Smart Diagnosis based on AI for Early Disease Detection Aligned with Islamic Healthcare Values

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ABSTRACT

The rapid advancement of machine learning and web technologies is transforming the healthcare sector, offering innovative solutions for disease diagnosis and management. This conceptual paper explores the development of a web-based disease detection platform that utilizes machine learning algorithms to predict potential diseases based on user-reported symptoms. The primary objective of this platform is to provide users with accurate diagnostic results, enhancing the accessibility and efficiency of healthcare services. A distinctive feature of this platform is its integration of Islamic principles, specifically the inclusion of INAQ (Islamic Network for Artificial Intelligence) elements, such as the practice of Ruqyah (spiritual healing), within the technological framework. This approach seeks to align the proposed platform with the Islamic understanding of Tawhid (the Oneness of God) and its relationship to knowledge and healing. The proposed platform will design with a user-friendly interface to ensure accessibility for individuals with varying levels of technological literacy. It aims to bridge the gap between modern medical technologies and traditional Islamic perspectives on health and healing, offering a culturally sensitive solution to healthcare challenges. By embedding Islamic ethical considerations, the platform provides a holistic approach to disease detection, which acknowledges both the scientific and spiritual dimensions of health. This work contributes to the emerging field of culturally inclusive healthcare solutions, laying the groundwork for future research and development in medical technologies that respect and incorporate diverse cultural and religious values. The proposed platform highlights the potential for AI-driven healthcare innovations that are both technically advanced and socially sensitive, thus setting the stage for inclusive, ethically grounded solutions in healthcare technology.

1. Introduction

Diagnosis is what helps healthcare professionals to ascertain a disease or condition in a person based on their symptoms and signs. To perform this task, they gather data from a medical history and physical examination of the patient. Moreover, diagnostics are often done including diagnostic procedures like laboratory tests. This aims at enabling the patient to plan effectively manage

treatment. It is common to start both from listening to a person's complaints and finding some characteristic signs after detailed examination. It might be necessary to carry out different tests, such as taking one's blood samples or performing imaging to confirm all doubtful moments regarding our previous point about what caused this illness. All the objectives of diagnosing are aimed at indicating the person's health condition, enabling healthcare professionals to devise personalized treatment strategies to the individual's needs. AI, which is in other words Artificial intelligence, has become a very important tool in healthcare that helps in finding and identifying initial symptoms of diseases that are caused by variety of reasons. The diagnosis of diseases using medical images is largely based on human interpretation of the image to reach a conclusion. In most cases, it is important to make an early decision in order to commence treatment early enough before the situation gets out of hand. Machine learning and deep learning are some of the well-known.

AI methods that have played a significant role in transforming medical diagnostics by facilitating accurate and efficient analysis of huge amounts of data. AI can recognize delicate patterns and anomalies in medical pictures, review EHRs for concealed insights and make future projections about patient results from multiple inputs covering a wide range of data streams thanks to advanced algorithms. Computer engineers and health researchers are designing an AI model that could anticipate breast cancer. This algorithm could estimate the survival chances of a patient [1]. These capabilities hold immense promise for improving patient care and outcomes by providing healthcare professionals with timely and accurate diagnostic insights. Diagnosis is a cornerstone in medicine enabling the specifics of diseases and conditions on an individual level so that they can be treated effectively by planning of time. This means that though physicians may start diagnoses from listening to people's complaints about sicknesses including their physical exams, this process often goes beyond into other examination tactics for better understanding. Moreover, integrating AI in healthcare may act as an entry point to the world of medicine with unimaginable chances for early identification and perfect diagnosis implying that working on AI within healthcare will continue to be the transformative force which can entirely change the diagnostic sphere to the betterment of all patients worldwide. AI in healthcare has been shown to improve the efficiency and effectiveness of service delivery, offering unparalleled opportunities for early disease detection and accurate diagnosis [2].

2. Literature Review

Artificial intelligence is rapidly transforming healthcare, presenting novel avenues for early disease detection and intervention. Its ability to analyze complex datasets, recognize subtle patterns, and predict potential health risks positions it as a powerful tool for proactive healthcare management [3]. AI algorithms excel at identifying patterns in large datasets, which can lead to earlier and more accurate diagnoses, thereby transforming our understanding of the human body and disease [4]. Currently, AI is being used in disease detection, for example, for detecting diseases such as skin, liver, heart, and Alzheimer in the early stages [5]. However, the increased use of AI in healthcare has led to several moral and legal dilemmas like data privacy protection alongside assurance, as well as transparency of AI algorithms employed within healthcare services [6]. To maintain trust and guarantee the long-lasting progress of AI in medicine it is imperative that such questions be answered. The solution to these challenges is necessary for the continuity of trust and future growth of the field. Consequently, AI development in disease diagnosis demonstrates that we are on the verge of significant changes happening in terms of healthcare provision since more accurate, efficient as well as individualized medical treatment is coming. By leveraging AI, healthcare professionals can potentially identify diseases in their nascent stages, when treatment is often more effective, leading to improved patient outcomes and reduced healthcare costs [4].

AI's capacity to process and interpret vast amounts of data at speeds exceeding human capabilities enables a more precise and objective evaluation of patient information[7]. This capability is particularly valuable in identifying subtle indicators of disease that might be missed by the human eye [7]. The application of AI extends to diverse areas, including disease diagnostics, prediction of infectious disease outbreaks, identification of drug targets, interpretation of medical imaging, and

optimization of drug delivery systems [8]. Machine learning, deep learning, and natural language processing are some of the prominent AI techniques used to analyze structured and unstructured healthcare data, supporting advancements in disease areas such as cancer, neurology, and cardiology [9][8]. The integration of AI in healthcare requires a robust regulatory framework to ensure patient safety, equitable care, and the algorithm's effectiveness in real-world scenarios [10].

AI's capability to enhance diagnostic precision and speed holds immense potential, especially in cardiovascular care, where early detection can significantly improve patient outcomes [10][4]. AI algorithms can analyze various inputs, including patient history, examination findings, imaging data, and test results, to detect cardiovascular diseases efficiently [10]. Such algorithms can efficiently screen for cardiovascular diseases because they capture non-linear relationships more effectively than traditional linear models, improving the analysis of real-world data with complex relationships [10]. AI can automate repetitive and mundane tasks, which frees up healthcare professionals to focus on more critical aspects of patient care [11]. The automation of administrative tasks, document searches, and medical scribing through AI can lead to reduced healthcare costs and increased physician efficiency [11].

The use of AI to analyze large datasets can reveal data patterns, which results in improved and more accurate diagnoses. By identifying patterns in the occurrence of specific diseases, AI algorithms can help identify groups that are more likely to acquire particular ailments [4]. This knowledge can then inform the development of focused preventative measures and therapies [4]. AI has the potential to completely change our knowledge of the human body and illness, in addition to enhancing the precision and speed of diagnostic purposes [4]. The transformative potential of AI in healthcare lies in its ability to analyze large-scale data, recognize patterns, and make predictions, ultimately improving public health outcomes [8][4]. AI extracts medical insights and provides data-driven recommendations through the identification of patterns, trends, and correlations that helps to improve fast and enhanced decision-making toward patient healthcare [11]. Furthermore, predictive models and patient-specific treatment plans are generated through the application of AI, allowing for personalized care [12].

AI offers innovation opportunities because it learns salient features from large volumes of healthcare data. AI systems can assist clinicians by interpreting diagnostic, prognostic, and therapeutic data from patient populations, providing real-time guidance on risk, clinical care options, and outcome, as well as providing up-to-date medical information from journals, textbooks, and clinical practices to inform proper patient care [13]. By combining access to such extensive knowledge, AI systems can help to reduce diagnostic and therapeutic errors that are inevitable in conventional human clinical practice [13]. AI systems are being trained not just from one data modality but from multivariate data generated across multiple clinical activities including imaging, genomics, diagnosis, and treatment assignment where associations can be determined through AI deep learning algorithms [7] [13]. The predictive capabilities of AI may be leveraged to provide anticipatory decision-making and targeted treatment to high-risk patients [11][7][13]. AI empowers patients by providing them with more control over their health. AI algorithms can provide patients with tailored recommendations for maintaining good health by analyzing patient data such as medical histories and lifestyle factors [1][14]. This information can help patients better understand their health and make informed decisions about their care [15].

2.1 The Use of AI In Medical Field

AI is revolutionizing the medical field in numerous ways, offering significant advancements in diagnostics, treatment, patient care, and operational efficiency.

2.1.1 Artificial Intelligence in Diagnostic Imaging

As suggested by [16], significant progress has been made in medical field in patient care, diagnosis, treatment, and operational efficiency through the use of artificial intelligence (AI). With cooperation between data scientists, computer scientists, and engineers, machine learning (ML) can revolutionize

the management of prostate cancer by enhancing its diagnostic accuracy, efficiency, clinical workflow, and treatment choices. There is a growing emphasis in research and therapeutic management of prostate cancer on ML. Digital pathology and genomics, surgical intervention, diagnostic imaging, and treatment planning are some of the areas where this is happening. In diagnostic imaging, machine learning algorithms carry out assignments such as prostate segmentation, fusion of information derived from different imaging modalities such as MRI and CT among others in addition to being able to locate and depict various characteristics of prostate cancer. ML techniques with CNNs have the potential to enhance the accuracy of CAD systems based on MRI and mpMRI for prostate cancer detection, characterization, and prognostication

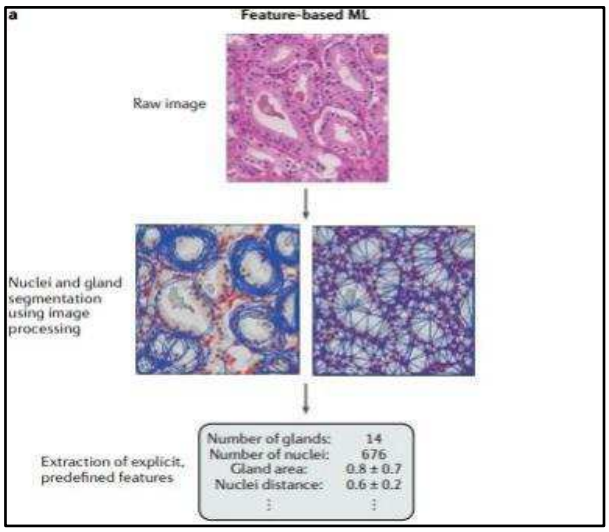

Figure 1. Machine Learning image processing [5].

While [16] provides useful insights into how AI and machine learning technologies are used in the field of prostate cancer research and treatment, it also has some limitations that should be considered. Trusting computer diagnosis can be tricky because AI algorithms applied to prostate cancer research and treatment could be biased. Algorithm development, data gathering, or interpretation can impact efficacy and the reliability of AI systems. It might just be something that human beings can tell apart. There is nothing a computer decides that doesn't come from training the data only.

2.1.2 Artificial Intelligence Using Big Data Machine Learning

According to [17], Artificial Intelligence is also utilized to predict the progression of Diabetic Kidney Disease (DKD) in human patients through the use of big data, machine learning, and electronic medical records. This analysis achieved 71% accuracy on predicting progression of DKD elevation, thereby underlining an early corrective measure towards reducing dependency on hemodialyzer. The researchers used AI in analysing electronic medical records (EMR) for 64,059 people with diabetes. They also employed big data machine learning (BDML) in developing a predictive model that would predict DKD. The AI algorithm involved a convolutional autoencoder to pull raw information over a period of 6 months as well as chose twenty-four features that could help identify time-series patterns associated with worsening DKD cases. Afterward, a model containing 3,073 features and time series was created using logistic regression analysis. This allowed for the determination of critical markers and patterns that could be employed in predicting the evolution of DKD among individuals who are suffering from T2DM.

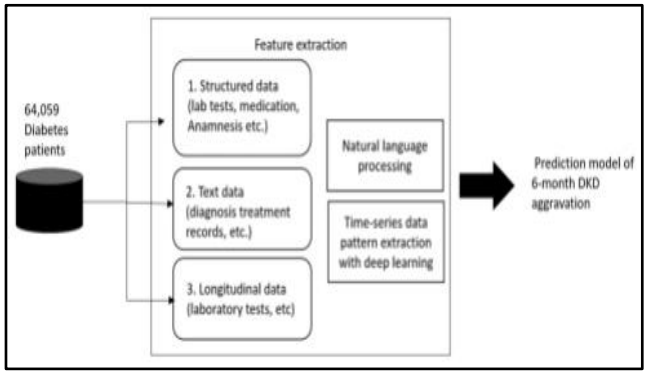

Figure 2. Methods taken to extract clinical features from EMR data [6].

Makino et al. [17] explained the study identified several limitations despite AI being very good at predicting DKD progression among people who have diabetes. The constraints included anon-uniform test timespan, varying EMR reports, study limitations from only one institution and pharmaceutical effects that have not been explored. Forecasting DKD course with AI has numerous hurdles. EMR contain diverse information which may vary greatly from one doctor's records to another thus hampering accurate information retrieval. To further complicate the data analysis, the scheduling of routine laboratory tests depends on individual-patient availability. There is a limitation to applying the results of this research to other health centres or communities since only one centre was involved in this study.

2.2 Comparison of Machine Learning Algorithms and Existing Systems

This section will compare several machine learning algorithms and compare few existing systems related to disease diagnosis.

2.2.1 Machine Learning Algorithms

Machine learning algorithms are computational models that allow computers to understand patterns and make predictions or decisions based on data, without being directly programmed to perform the task. They adjust their processing as they are exposed to more data, much like humans learn from experience.

Table 1. Machine Learning algorithms comparison

Algorithms	Advantages	Disadvantages
Bayesian network	It makes heavy use of conditional independence, which allows for the precise and affordable representation of the joint probability distribution [18]	To thoroughly examine every possible combination and ultimately estimate the probability distribution from the training set, this classifier needs a very large training dataset [18].
Decision tree	Easy to interpret because it is simple and very flexible [18].	Decision Tree tend to overfit to the training data hence they capture noise or peculiarities instead ofpatterns that are general, and this can result into low generalization on new data [19].
Random forest	It can manage high-dimensional data with continuous, binary, and categorical variables as well as missing values [18].	Random Forest prediction is slow due to the creation of many Decision Trees in succession. This may make it difficult to use random forests in real- time prediction case [20].
K-Nearest neighbour	KNN is easy to understand and implement, making it suitable for quick prototyping [21].	KNN can be computationally expensive, especially with large datasets and high dimensions [21].
Naïve bayes	Simple classification method and performs well in various scenes [22].	Assumes independence among predictors [22]. It assumes that the presence or absence of one feature does not affect the presence or absence of any other feature.

2.3 Existing Systems

This section compares several existing systems related to disease diagnosis. It shows the advantages of the existing systems as well as its ' advantages.

Table 2. Existing systems comparison

Systems	Advantages	Disadvantages
WebMd	- Interactive body map - Provide details about possible diseases. - Suggests treatments based on the possible diseases.	- Crowded interface. - Unattractive interface.
Symptomate	- User can make assessment by answering questions. - The system asks very detail questions to the users including user background - Interactive body map.	- Too many questions users need to answer.
MediFind	- Very detailed information on predicted diseases including treatments and complications. - Suggests nearby local doctors.	- Not many local doctors are affiliated MediFind. - Location access is not accurate to suggest nearby doctors.

2.4 Examining the Role of Ruqyah Treatments in Artificial Intelligence

The integration of Ruqyah, a spiritual healing practice rooted in Islamic tradition, within the realm of Artificial Intelligence presents a fascinating interdisciplinary challenge, demanding careful consideration of ethical, philosophical, and technological dimensions. Scholars are increasingly exploring the intricate interactions between AI and religion, with the aim of ensuring that AI serves as a facilitator rather than a disruptor, preserving the fundamental values and traditions of religious practices [23]. Ruqyah, traditionally performed through recitation of specific verses from the Quran and prophetic prayers, seeks to address spiritual ailments and physical afflictions believed to be influenced by supernatural forces. The potential application of Ruqyah principles within AI could manifest in various forms, such as developing AI systems capable of analyzing and interpreting religious texts related to healing, designing virtual environments that simulate Ruqyah healing sessions, or creating AI-driven tools that assist practitioners in diagnosing and administering appropriate treatments [24]. The study of the Quran encompasses a wide range of sciences related to its revelation, interpretation, history, and implementation [25]. Such integration could provide comfort and spiritual support to individuals facing psychological distress or spiritual crises [26].

The development of AI-powered Ruqyah tools requires a meticulous approach, taking into account the sensitivities surrounding religious beliefs and practices. It is crucial to ensure that AI systems are designed and utilized in a manner that respects the sanctity of Ruqyah, avoiding any form of misrepresentation, distortion, or commercial exploitation. Data privacy and security are paramount concerns, particularly when dealing with personal information related to individuals' spiritual beliefs and health conditions. AI systems should be developed with transparency and explainability, allowing users to understand the underlying logic and reasoning behind the AI's recommendations or actions. Bias in AI algorithms is another critical issue, as algorithms trained on biased data could lead to discriminatory or unfair outcomes. Therefore, it is essential to carefully curate and validate the data used to train AI models, ensuring that they accurately reflect the diversity of religious beliefs and practices. The involvement of religious scholars, ethicists, and community representatives is vital in guiding the development and deployment of AI-powered Ruqyah tools, ensuring that they align with established religious principles and ethical guidelines. The intersection of digital health and artificial

intelligence has the potential to reduce human errors and empower individuals [27]. However, neither human nor AI tools are 100% accurate in the health system [27]. Explicit guidelines and ethical frameworks are essential for developing, deploying, and evaluating AI-based solutions, ensuring they align with principles and promote trust and accountability in healthcare applications [27].

The ethical implications of AI in healthcare extend to the therapeutic relationship and impacts on individual self-consciousness, agency, and identity [28]. Long-term effects, ranging from health reductionism to increased objectification and impacts on our understandings of what it means to be human, need to be monitored [28]. The implementation of AI systems must adhere to the core principles of medical ethics, encompassing autonomy, beneficence, non-maleficence, and justice [29]. Transparency and explainability are crucial, ensuring that AI systems operate with clarity and provide understandable explanations for their decisions to both practitioners and patients [30]. Furthermore, safeguarding patient data through strict adherence to privacy regulations, such as the Health Insurance Portability and Accountability Act, is imperative. Addressing bias in AI technologies requires inclusive design practices, actively working to mitigate biases in datasets and algorithms to ensure equitable outcomes for diverse populations [30]. The responsible use of AI in healthcare requires addressing principles such as transparency, patient privacy and autonomy, data security, equity, fairness, and beneficence.

AI systems should be designed with diverse populations in mind, actively working to mitigate biases in datasets and algorithms [30]. The development of AI systems capable of understanding and responding to the emotional and spiritual needs of individuals could offer valuable support in mental health and well-being. Such systems could be trained to recognize and respond to expressions of grief, anxiety, or spiritual distress, providing personalized guidance and support based on religious teachings and practices. This necessitates a comprehensive approach to data collection, annotation, and validation, ensuring that AI models are trained on representative datasets that accurately reflect the diversity of human experiences and beliefs. Moreover, ongoing monitoring and evaluation are essential to identify and address any unintended biases or discriminatory outcomes that may arise over time. Open debate is necessary regarding the algorithms used in different applications.

AI models used in healthcare need to be scrutinized for bias [28]. Ideally, health professionals should be trained in communicating to their patients the role of the algorithms used in different applications they might be using or consider using. The collaboration between AI developers and healthcare professionals can lead to the creation of AI-powered tools that augment human capabilities and improve patient care. Clinicians should be confident that AI systems can be trusted. Explainability is essential in creating trustworthy artificial intelligence for health care, addressing concerns such as potential algorithmic bias and lack of model robustness or generalizability [31].

3. Proposed Systems

Many methods to support early diagnosis and therapy suggestions have been developed in the quickly developing field of AI-based disease prediction. But these systems frequently lack important features that are essential for complete and easily navigable healthcare solutions. This chapter describes the main distinctions between the suggested concept and the systems that are now in use, emphasizing how our method overcomes the drawbacks of the solutions that are currently in use.

3.1 User Interface

3.1.1 Existing Systems

Unattractive Interface: Many existing disease prediction systems suffer from cluttered interfaces that can overwhelm users, making navigation complex and confusing. The lack of ergonomic design often discourages engagement, causes frustration, and ultimately diminishes the system's overall efficacy. Users may find it challenging to locate pertinent information or utilize the features effectively, leading to underutilization of potentially life-saving tools.

3.1.2 Proposed Idea

Simplicity Of Interface Design: The user interface of our suggested system is designed to be clear, simple, and easy to use. By simplifying the navigation process and guaranteeing that users can quickly obtain the information they require, the design seeks to improve the user experience. This system's simplicity also promotes regular system use.

3.2 Treatment Recommendations

3.2.1 Existing Systems

Allopathy Treatments Only: Current disease prediction systems primarily focus on recommending allopathic treatments based on diagnosed conditions. While effective in many cases, this singular approach often neglects the holistic practices that may resonate more with certain patient demographics, including those who seek alternative or complementary treatments.

3.2.2 Proposed Idea

Allopathy and Ruqyah Treatments: Our proposed system expands treatment recommendations to include Islamic therapies alongside conventional allopathic methods. By integrating these complementary treatment options, we cater to a broader audience, acknowledging and respecting diverse healthcare preferences. This dual approach not only provides comprehensive treatment solutions but also empowers patients to make informed decisions regarding their health—thereby enhancing patient satisfaction and adherence to treatment protocols.

3.3 Nearby Healthcare Facilities

3.3.1 Existing Systems

Suggestions of Nearby Local Doctors: Our proposed system expands treatment recommendations to include Islamic therapies alongside conventional allopathic methods. By integrating these complementary treatment options, we cater to a broader audience, acknowledging and respecting diverse healthcare preferences. This dual approach not only provides comprehensive treatment solutions but also empowers patients to make informed decisions regarding their health—thereby enhancing patient satisfaction and adherence to treatment protocols.

3.3.2 Proposed Idea

In addition to standard recommendations for local doctors, our system uniquely identifies nearby Islamic treatment centers, such as Darussyifa', that specialize in alternative therapies aligned with Islamic principles. This functionality not only improves access to culturally relevant care but also fosters community trust and engagement. Users seeking treatment from an Islamic perspective can conveniently find appropriate options, enabling a more personalized and meaningful healthcare experience.

3.4 Online Consultation

3.4.1 Existing Systems

Many existing systems fall short in facilitating direct communication between patients and healthcare providers, particularly through online consultation platforms. This limitation poses significant barriers to medical advice availability, especially for patients in remote areas or those with mobility challenges.

3.4.2 Proposed Idea

Online Consultation Setup: Our proposed system includes a robust online consultation feature, allowing users to request appointments with healthcare professionals via a virtual platform. This functionality is especially advantageous for users in rural areas, those with scheduling conflicts, or individuals who prefer the convenience of remote consultations. By breaking down geographical barriers to healthcare access, we aim to ensure that all users can receive timely medical advice, follow-ups, and support – ultimately promoting better health outcomes.

4. Conclusion

In conclusion, the integration of machine learning and web technologies offers significant potential for revolutionizing healthcare, particularly in the realm of early disease detection. This paper has presented a conceptual framework for a disease detection platform that leverages AI algorithms to predict potential diseases based on user-reported symptoms. Beyond its technological capabilities, the platform introduces an innovative approach by incorporating Islamic principles, such as the inclusion of Ruqyah, to create a culturally sensitive and holistic healthcare solution. By aligning the platform with the understanding of Tawhid and its connection to knowledge, this work emphasizes the importance of integrating both scientific and spiritual perspectives in modern healthcare. The user-friendly design ensures that individuals, regardless of their technological proficiency, can access and benefit from the platform. This approach not only meets the growing demand for accessible healthcare solutions but also bridges the gap between modern technology and traditional values. The inclusion of Islamic ethical considerations sets a precedent for the development of culturally inclusive medical technologies that respect diverse beliefs. Ultimately, this research underscores the need for healthcare innovations that are not only advanced but also socially and culturally sensitive, paving the way for future work in creating inclusive, ethical, and accessible healthcare solutions that cater to the needs of diverse populations. The development of precise, dependable, and efficient diagnostic instruments that can greatly enhance patient care and results depends on this understanding.

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