



Course Title: Research Methodology in Computer Science

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(Assignment 1)

Assignment Report: AI in healthcare



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Summary of research papers:

Paper1: The Transformative Role of Artificial Intelligence in Modern Healthcare

This research paper discusses how artificial intelligence can fundamentally transform the practice of medicine and delivery of healthcare. AI systems use machine learning & deep learning techniques to analyse large volumes of medical data & improve diagnostic accuracy. Also, the paper highlights current applications used like medical imaging, diabetic retinopathy screening. It explains AI designed to augment & support clinicians rather than replace them. Also, the paper emphasises the importance of building safe & ethically responsible AI systems. The future of healthcare is expected to move toward precision medicine driven by data and AI-enabled decision support systems.

Paper2: AI in Healthcare: An Islamic Ethical View on Medical Accountability

The study discusses the impact of AI in healthcare from an Islamic ethical perspective, focusing on the concept of medical accountability. The paper examines AI applications in medical diagnosis, robotic surgery, hospital management, genomic medicine & virtual care delivery, highlighting the anticipated benefits in improving accuracy and efficiency while reducing costs. The study demonstrates that integrating these technologies raises complex ethical challenges, particularly regarding the determination of liability in cases of medical errors. The paper also discusses the Western perspective on bioethics, focusing on the "black box" issue and the difficulty in interpreting the decision-making mechanisms within AI systems.

Paper3: The Impact of AI on Healthcare Service Quality

This study aimed to measure the role and impact of artificial intelligence technologies on the quality of healthcare services in Hafr Al-Batin Governorate the researcher employed a descriptive-analytical approach and applied the study to 31 government health centers the study sample consisted of 219 respondents out of a total of 592 employees representing a participation rate of 38.3% the study utilized questionnaires and semi-structured interviews with managers and physicians as data collection tools the results demonstrated a positive correlation between the use of artificial intelligence (AI) technologies and employee performance and behavior within healthcare institutions A strong correlation was also found between intelligent programs and work efficiency as well as the effectiveness of healthcare service delivery the results confirmed a positive relationship between the use of AI and the achievement of Total Quality Management (TQM) objectives the study revealed administrative shortcomings in some departments particularly concerning professional training the results highlighted the importance of continuous training and development to ensure the optimal use of modern technologies

Paper4 : Predicting Cervical Cancer Risk Using AI

This study explored the development of a predictive model using machine learning techniques to improve cervical cancer screening management in low-screening settings It relied on national data from China encompassing over 599,000 women who underwent high-risk HPV screening. The study compared several algorithms including XGBoost, SVM Random Forest & Naïve Bayes the XGBoost model demonstrated the best performance in terms of accuracy and differentiation between benign and high-risk cases the final model was based on nine key variables including HPV type age & cytology results The results proved its effectiveness in predicting precancerous conditions improving referral efficiency and supporting clinical decision making



Paper5: Healthcare Providers' Perceptions of AI in Medical Practice

This study aimed to explore the perceptions of healthcare providers in Japan regarding the use of artificial intelligence (AI) in medical practice it included 37 participants physicians nurses and other healthcare professionals who participated in focus group interviews the interviews addressed three scenarios lung cancer detection clinical audio documentation and health monitoring using wearable devices and the results revealed a divergence of opinions between those who support and those who are apprehensive about AI applications concerns centered on the accuracy of algorithms bias legal liability and the technology's impact on the physicians role and patient communication the study emphasized the importance of early stakeholder engagement and the establishment of regulatory frameworks to ensure safe and effective use

Paper6: AI and the Future of Predictive Healthcare

Medical AI is transitioning from task specific tools to general purpose foundation models capable of systematizing vast clinical knowledge. The research advocates for AI for Medical Science shifting the focus from treating symptoms to predicting disease onset based on underlying causes Machine learning enables identifying a patient state through numerical variables providing higher diagnostic and prognostic accuracy than traditional symptom based methods this framework supports the realization of P4 medicine emphasizing personalized predictive preventive and participatory healthcare by integrating organism mechanics the study applies physics based principles to interpret biological changes as transitions in a state space finally these elements combine into a large-scale disease model aiming for a sustainable and predictive future for medicine

Critical Analysis:

Studies examine the use of (AI) in healthcare and its impact on improving the quality of medical services and developing diagnostic and treatment methods. The literature indicates that AI has become a crucial tool in analyzing big data and identifying patterns which helps physicians make more accurate treatment decisions. Also, the studies used diverse research methodologies, some of which relied on machine learning techniques to analyze large scale medical data with the aim of predicting diseases and improving the efficiency of medical examinations. Other studies using qualitative methods like interviews with healthcare providers to understand their perceptions of the use of artificial intelligence in medical practice. The results show that AI applications can contribute to improving the accuracy of medical diagnosis, accelerating the analysis of health data and enhancing the efficiency of health institution staff which positively impacts the quality of services provided to patients. Some studies have also discussed the ethical aspects associated with the application of artificial intelligence in healthcare and stressed the importance of establishing clear regulatory frameworks to ensure the responsible use of modern technologies while emphasizing that artificial intelligence should be a supportive tool for the physician and not a replacement for him.

Connections:

- 1- **All studies** agree that artificial intelligence plays an increasingly important role in developing healthcare systems and improving the quality of medical services provided to patients
- 2- **Studies** indicate that machine learning and big data analytics techniques help improve the accuracy of medical diagnosis and predict diseases at early stages
- 3- **Studies** confirm that artificial intelligence contributes to supporting medical decision making by analyzing large amounts of health data quickly and with high efficiency
- 4- **Studies highlight** a positive relationship between the use of artificial intelligence and improved efficiency of healthcare workers and increased effectiveness of medical institutions
- 5- **Studies** agree that AI acts as a support tool for doctors and not a replacement for them helping to improve the accuracy of medical decisions without eliminating the role of the human element
- 6- **Studies** indicate that there are some challenges associated with the use of AI such as bias in algorithms difficulty in interpreting some models and issues of privacy and legal liability

Conflicts between the findings:

- 1- The results of studies vary regarding the extent to which artificial intelligence affects the quality of health services some studies indicate a significant improvement in the efficiency of medical services while other studies believe that this improvement depends largely on the level of training and the technological infrastructure in health institutions
- 2- There is a difference of opinion among studies regarding the accuracy of artificial intelligence systems in medical diagnosis some studies confirm that machine learning algorithms achieve high accuracy in predicting diseases while other studies indicate that these systems still need further improvements to ensure their reliability in all cases
- 3- Studies vary in their assessment of the role of artificial intelligence in medical decision making some see it as a powerful tool to support doctors in diagnosis and treatment while other studies point to concerns about excessive reliance on intelligent systems

4-Researchers have conflicting opinions about the impact of artificial intelligence on the role of doctors in the future some studies believe it will enhance the doctors role and increase their efficiency while other studies indicate the possibility of significant changes in the nature of the medical profession

5- Studies vary in their assessment of the ethical aspects associated with the use of artificial intelligence, with some studies focusing on the medical benefits of the technology while others highlight the risks associated with privacy algorithmic bias & legal liability

6-There is a difference of opinion among studies regarding the readiness of health systems to adopt artificial intelligence technologies. Some studies believe that these technologies are widely applicable while others point to regulatory and technical challenges that may hinder their full use at present

Synthesis Matrix for Literature Review:

Study	Authors	Year	Research Design	Key Findings / Results	Methodology	Limitations
Artificial Intelligence in Healthcare Transforming the Practice of Medicine	Bajwa et al	2021	Review Study	AI can improve diagnostic accuracy and healthcare efficiency by analyzing large medical datasets and supporting clinical decision making	Literature review analyzing recent developments in AI applications in healthcare.	Conceptual study without primary empirical data.
AI Ethics in healthcare	Ghali et al.	2024	Conceptual / Ethical Analysis	Discusses ethical issues of AI in healthcare including medical accountability patient privacy and doctor patient relationships Found a positive relationship	Ethical and conceptual analysis of medical accountability in AI-supported healthcare	Does not include empirical or statistical data.
	Al-Dhafeeri et al	2024			Questionnaires and semi	Study limited to one

Role of AI in Improving Healthcare Services in Hafr Al-Batin			Quantitative Study	between AI use and improved healthcare service quality and staff performance.	structured interviews with healthcare workersstatistical data analysis.	geographic region, reducing generalizability
Machine Learning Model for Cervical Cancer Screening	Dong et al.	2025	Predictive Modeling Study	Developed a machine learning model to predict cervical cancer risk with high accuracy using HPV genotyping data.	Machine learning algorithms applied to large-scale medical screening datasets.	Model depends on specific medical datasets and requires validation in other environments
Perspectives on the Use of AI in Japan	Kogetsu et al.	2026	Qualitative Study	Healthcare professionals expressed both positive expectations and concerns regarding AI accuracy, responsibility, and workflow impact.	Focus group interviews with healthcare providers and thematic qualitative analysis.	Small sample size and subjective perspectives.
Medical AI and AI for Medical Sciences	Sakurada et al.	2025	Review / Conceptual Study	AI can support predictive and personalized medicine and improve understanding of disease mechanisms.	Scientific review of machine learning and deep learning applications in medicine.	Conceptual review without direct clinical experimentation.

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