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"A STUDY ON PERFORMANCE OPTIMIZATION IN HEALTHCARE AND ITS IMPACT ON PATIENTS SATISFACTION''

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Abstract:
This research investigates the crucial relationship between performance optimization in healthcare systems and its profound impact on patient satisfaction. The healthcare landscape is undergoing rapid transformations, necessitating a paradigm shift towards enhanced efficiency and patient-centric care. The study employs a multidimensional approach, incorporating both quantitative and qualitative methodologies to comprehensively assess the dynamics at play.
The primary objective is to identify key performance indicators (KPIs) within healthcare organizations and analyze their correlation with patient satisfaction levels. By delving into factors such as reduced waiting times, streamlined processes, and improved communication, the research aims to elucidate the intricate interplay between operational efficiency and the overall healthcare experience for patients.
Methodologically, the study employs a mixed-methods design, encompassing surveys, interviews and data analytics. Through the collection and analysis of data from diverse healthcare settings, ranging from hospitals to clinics, the research seeks to draw generalized conclusions applicable to the broader healthcare industry.

Introduction

In the ever-evolving landscape of healthcare, the pursuit of excellence in patient care is a paramount goal. One crucial aspect that plays a pivotal role in achieving this objective is the optimization of performance within the healthcare system. As medical institutions grapple with the challenges posed by burgeoning patient populations, advancing technologies, and complex regulatory frameworks, the need for a comprehensive understanding of performance optimization becomes increasingly evident.
This study delves into the intricate interplay between performance optimization in healthcare and its profound impact on patient satisfaction. By scrutinizing the efficiency, effectiveness, and adaptability of healthcare systems, this research aims to unravel the intricate connections that exist between the operational dynamics of healthcare organizations and the subjective experience of patients. The overarching objective is to identify key performance indicators, strategies, and interventions that not only enhance the operational efficiency of healthcare facilities but also contribute significantly to the overall satisfaction and well-being of patients.
Ultimately, the findings of this research endeavor aspire to inform healthcare practitioners, administrators, policymakers, and researchers about the critical link between performance optimization and patient satisfaction. By shedding light on best practices, potential challenges, and opportunities for improvement, this study aims to contribute to the ongoing discourse on enhancing

the quality of healthcare services, fostering patient-centered care, and ultimately, elevating the overall healthcare experience for individuals around the globe.

Literature review

Dehghanimohammadabadi and Kabadayi [1] present a two-stage Analytic Hierarchy Process (AHP) multi-objective simulation optimization approach in healthcare. Published in the International Journal of the Analytic Hierarchy Process in 2020, their work addresses critical healthcare challenges through a systematic methodology, demonstrating the significance of AHP in optimizing healthcare processes. In their comprehensive review, Joshi et al. [2] (2023) analyze feature selection in healthcare through bibliometric methods, utilizing Scopus and Web of Science databases. The study explores optimization techniques, providing insights into evolving trends and research patterns in this critical domain. Published in Library Philosophy and Practice, the review contributes valuable perspectives for advancing healthcare informatics. Tanantong, Pannakkong, and Chemkomnerd [3] present a resource management framework employing simulation modeling and multi-objective optimization in a case analysis of a Thai public hospital's front-end department. Published in BMC Medical Informatics and Decision Making, their work addresses efficiency and decision-making challenges in healthcare resource allocation, offering insights for improved operations.

Kazemi et al. [4] (Year) conducted an empirical study employing structural equation modeling to assess hospital service excellence's impact on patient satisfaction. Their research, titled "Measuring Hospital Service Quality and its Influence on Patient Satisfaction," delves into the intricate dynamics of healthcare service provision, contributing valuable insights. (Note: Please replace "Year" with the actual publication year of the study. In their 2016 study, Sofia Xesfingi and Athanassios Vozikis [5] explore patient satisfaction with the healthcare system, evaluating the influence of socioeconomic and healthcare provision factors. The research contributes valuable insights into understanding the multifaceted determinants shaping patients' perceptions and experiences within healthcare settings. Brett C. Johnson's [6] "Achieving Patient Satisfaction: The Relationship between Human Motivation and Outcome Optimization" explores the critical connection among human drive and healthcare outcomes, emphasizing the pivotal role in enhancing patient satisfaction. Published in the Journal for Healthcare Quality (Vol. 18, No. 2), the study contributes valuable insights for optimizing healthcare practices.

In their survey, Abdur Rais and Ana Viana [7] explore the application of Operations Research in healthcare. Published in the "International Transactions in Operational Research," the study provides insights into the evolving methodologies and contributions of Operations Research in optimizing healthcare systems, offering a comprehensive overview of its current landscape. Humphreys et al.'s [8] 2022 article, "An Overview of Hospital Capacity Planning and Optimization," explores critical aspects of healthcare management. Addressing capacity challenges, the authors discuss planning and optimization strategies. Their comprehensive review provides valuable insights into enhancing hospital efficiency and ensuring effective resource utilization. Hopfe et al. [9] (2017) emphasize the critical role of functioning information in

optimizing health system responses to patient needs. Arguing for its importance, the authors advocate for a comprehensive understanding of patients' functional status to enhance healthcare delivery. This scholarly work underscores the significance of incorporating functioning information for a patient-centered health system.Friedman and Rigby [10] (Elsevier) explore the framework and implementation of a global learning health system. Their work delves into conceptualization, emphasizing the integration of data and insights to enhance healthcare globally. The authors contribute to the discourse on leveraging collective knowledge for continuous improvement in healthcare systems. Marshall-Ponting et al. [11] (2013) propose a comprehensive strategy for enhancing efficiency in intricate, unplanned healthcare systems. Their multi-faceted approach, explored in the International Journal of Logistics Systems and Management, addresses the complexities of healthcare optimization, offering valuable insights into improving system performance and management. In their critical review, Ferrand et al. [12] (Taylor & Francis Group) explore patient satisfaction with healthcare services. Examining factors such as service quality, communication, and accessibility, the authors provide valuable insights into the multidimensional nature of patient satisfaction, contributing to the ongoing discourse on improving healthcare delivery and patient experiences.

Roy A. Carr-Hill's [13] seminal work, "The Measurement of Patient Satisfaction" in the Journal of Public Health Medicine (Vol. 14, No. 3), explores comprehensive approaches to gauge patient satisfaction. Carr-Hill delves into measurement intricacies, highlighting key factors influencing healthcare quality. This study significantly contributes to the evolving discourse on enhancing patient experience in healthcare settings. Hamid Reza Feili's [14] article, "Improving the Health Care Systems Performance by Simulation Optimization" in the Journal of Mathematics and Computer Science explores the application of simulation optimization to enhance healthcare system efficiency. The study likely delves into mathematical modeling and computer science techniques to optimize healthcare processes, addressing critical performance issues. B.R.P. e Oliveira et al.[15] present a simulation-optimization approach for hospital bed allocation in their work published by Elsevier. Their study explores innovative strategies to enhance the efficiency of bed management, addressing critical challenges in healthcare resource allocation.

Kruk et al.'s [16] 2018 Lancet Global Health Commission advocates for a revolutionary shift towards high-quality health systems to meet Sustainable Development Goals. Emphasizing the urgency for reform, the review underscores the pivotal role of robust healthcare infrastructure in achieving global health objectives, urging transformative action in the SDG era. In their article "Optimization of Health Care Services with Limited Resources," Pardede et al. [17] explore strategies to enhance healthcare efficiency amid resource constraints. Published in the International Journal on Advanced Science Engineering Information Technology, the study navigates the challenges of optimizing health services within limited resources, contributing to the discourse on healthcare management. Qiu, Song, and Liu [18] (2016) explore the optimization of hierarchical healthcare delivery systems using multi-fidelity models. Their study, published in the International Journal of Production Research, employs simulation optimization to enhance patient

flow. The research contributes valuable insights into improving healthcare efficiency through a comprehensive approach to system modeling and optimization.

Abd Rashid, Mansor, and Hamzah [19] (2011) explore the nexus between service quality and patient satisfaction in Malaysian healthcare. Their study, featured in the International Journal of Customer Service Management, delves into factors influencing patient contentment, providing insights crucial for enhancing healthcare services and ensuring patient-centric care in Malaysia. Al-Neyadi, Abdallah, and Malik [20] (Taylor & Francis Group) explore healthcare service satisfaction in UAE hospitals, employing SERVQUAL methodology. Their study evaluates patient perceptions, shedding light on service quality dimensions. This research contributes valuable insights into enhancing healthcare experiences, essential for elevating service delivery in the UAE's healthcare sector. Menear et al. [21] (Health Res Policy Syst, 2023) present a comprehensive framework for value-driven learning health systems. Synthesizing diverse perspectives, the authors emphasize the pivotal role of collaborative networks, technology integration, and organizational culture in fostering continuous learning and innovation within healthcare ecosystems.Wing and Vanberkel [22] (Taylor & Francis Group) explore simulation optimization strategies in healthcare, specifically addressing the challenge of mixing scheduled and walk-in patients. Their study delves into improving operational efficiency, offering valuable insights for healthcare practitioners navigating the dynamic demands of patient scheduling. Waring, Lindvall, and Umeton's [23] literature review, "Automated Machine Learning: Review of the State-of-the-Art and Opportunities for Healthcare" published in Elsevier, comprehensively explores the current landscape of automated machine learning in healthcare, highlighting advancements and identifying potential avenues for future research and application. Shahab Shamshirband et al.'s [24] (Elsevier) literature review delves into deep learning applications in healthcare systems. The paper provides comprehensive taxonomies, highlights challenges, and outlines open issues in this dynamic field. The authors critically analyze the evolving landscape, offering valuable insights for researchers and practitioners navigating the intersection of deep learning and healthcare.

Rudin et al.'s [25] "Optimizing health IT to improve health system performance: A work in progress" critically examines the ongoing efforts to enhance health information technology's impact on healthcare system efficacy. Published by Elsevier, the study navigates the evolving landscape, offering insights into optimizing health IT for continuous improvement in health system performanceLampariello and Sagratella's [26] study, "Effectively managing diagnostic tests to monitor the COVID-19 outbreak in Italy," explores strategic approaches for optimizing d iagnostic testing during the pandemic. Published by Elsevier, the research provides valuable insights into enhancing the efficiency of diagnostic procedures, contributing to effective disease monitoring and control in Italy. Dominic J. Breuer, Nadia Lahrichi, David E. Clark, and James C. Benneyan's [27] "Robust Combined Operating Room Planning and Personnel Scheduling under Uncertainty" explores innovative approaches in healthcare management. Published by Elsevier, the study addresses challenges in optimizing operating room resources amidst uncertainties, offering valuable insights for efficient and resilient healthcare operations.

Abdulaziz Ahmed and Haneen Ali [28] explore patient choice modeling in surgical scheduling in their work "Modeling Patient Preference in an Operating Room Scheduling Problem," published in Elsevier. The study likely delves into optimizing schedules to accommodate patient preferences, contributing valuable insights to healthcare operations and management. Keshtkar et al. [29] (Elsevier) employ a hybrid approach, integrating system dynamics, discrete event simulation, and data envelopment analysis, to scrutinize patient lodging in general hospitals. This interdisciplinary framework enhances understanding of complex healthcare processes, providing valuable insights for optimizing patient flow and resource utilization within hospital settings. In their work, Mahmoudzadeh et al. [30] address the critical issue of patient scheduling in healthcare, proposing a robust multi-class multi-period approach with wait time targets. Published in Elsevier, their study contributes valuable insights into optimizing scheduling processes to enhance patient care and operational efficiency in healthcare settings.

Murch et al. [31] (Elsevier) examine the impact of the initial COVID-19 wave on mental health services through modeling. Their research delves into the multifaceted challenges faced by mental health systems during this period, offering insights crucial for understanding and improving service resilience in the face of global health crises. The literature by Zimmerman et al. [32] explores nurse schedule optimization at a community health center, emphasizing efficiency and resource allocation. Published in Elsevier, the study investigates strategies implemented by healthcare professionals, such as Day and Vasarhelyi, to enhance operational effectiveness in delivering patient care within a community health setting. Sadeem Munawar Qureshi, Nancy Purdy, and W. Patrick Neumann's [33] study, "Developing a modeling approach to quantify the quality of care and nurse workload—Field validation study," published in Elsevier, explores a novel modeling method for assessing both standard care and nurses task load, contributing valuable insights to healthcare management and optimization.

Sommer Gentrya, Mankowski, and Michael [34] explore kidney paired donation in graphs, emphasizing maximum matchings. Their work, published by Elsevier, delves into efficient allocation strategies. The study contributes to optimizing kidney exchange programs, addressing critical issues in organ transplantation to enhance compatibility and increase successful matches.

Garcia-Vicuña, Esparza, and Mallor [35] explore a novel approach to teaching Intensive Care Unit (ICU) management through a Management Flight Simulator. Their work, published in Elsevier, emphasizes the importance of experiential learning for safe ICU management, highlighting the potential of simulation-based training in healthcare education. Apergi et al. [36] (Elsevier) present a robust optimization model for multi-appointment planning in outpatient cardiology, addressing complex logistical challenges. Integrating mathematical modeling, their work contributes valuable insights to enhance efficiency and patient experience in healthcare scheduling systems, with implications for improved resource utilization and overall system performance.

In their work titled "Optimizing Interventions Across the HIV Care Continuum: A Case Study Using Process Improvement Analysis," Barrow, Fairley, and Brandeau [37] employ a systematic approach to enhance HIV care. Published by Elsevier, the study underscores the importance of process improvement in optimizing interventions throughout the HIV care continuum. Zehrouni

et al. [38] (Elsevier) present a novel approach to hospital flood emergency planning, integrating Markov Models and discrete-event simulation. Their work addresses the complex dynamics of flood emergencies, offering a valuable contribution to enhancing hospital preparedness and response strategies. This research provides a foundation for optimizing emergency management in healthcare facilities. In their study, Mariana Oliveira et al. [39] explore the repercussions of patient prioritization on operating room schedules. Published in Elsevier, their research delves into the intricate dynamics that arise from prioritization strategies, shedding light on its profound impact within healthcare settings, particularly in optimizing operating room efficiency.

Amir Ahamdi-Javid and Nasrin Ramshe [40] propose a probabilistic site model in "A Stochastic Location Model for Designing Primary Healthcare Networks Integrated with Workforce Cross-Training" published by Elsevier. The study focuses on optimizing primary healthcare network design through the integration of workforce cross-training, providing insights into enhanced healthcare system efficiency. Na Li et al. [41] propose a decision integration strategy for short-term demand forecasting and ordering of red blood cell components. Published in Elsevier, their work addresses the critical need for efficient blood supply chain management, offering insights into optimizing demand predictions and ordering processes to enhance the availability of red blood cell components. In their study, Priyan and Mala [42] (Elsevier) present a game theory-based optimal inventory system for pharmaceuticals considering quality degradation and expiration dates. The research addresses critical aspects of pharmaceutical supply chain management, contributing valuable insights to enhance inventory control strategies for efficient and cost-effective operations in the pharmaceutical industry.

In their study, Figueroa et al. [43] (Elsevier) examine the impact of race, ethnicity, and community-level variables on COVID-19 incidence and mortality in U.S. counties. The research underscores disparities in pandemic outcomes, emphasizing the need for targeted interventions to address systemic factors influencing health disparities in diverse communities. The literature by Lucinda Lai et al. [44] titled "Digital Triage: Novel Strategies for Population Health Management in Response to the COVID-19 Pandemic" explores innovative approaches in population health management during the pandemic. Published by Elsevier, the authors discuss digital triage methods as crucial tools in healthcare to enhance efficiency and response. Burke et al.'s [45] (Elsevier) "Healthy Days at Home: A Novel Population-Based Outcome Measure" introduces an innovative metric for assessing health outcomes in populations. The study explores the applicability and significance of this measure, contributing valuable insights to public health research and measurement methodologies.

Loerinc et al. [46] (Elsevier) examine the discharge dynamics and care transitions of COVID-19 patients. The study investigates the multifaceted aspects of hospital discharges, shedding light on the challenges and nuances in managing patients during the pandemic. The findings contribute valuable insights to enhance healthcare strategies for improved patient outcomes in similar crises. Reddy et al.'s [47] study investigates the swift deployment of virtual primary care services during the COVID-19 crisis at the Veterans Health Administration. Published by Elsevier, the research explores the effective mobilization of healthcare resources in response to the pandemic, shedding

light on innovative approaches to maintaining essential services. Holt et al. [48] (Elsevier) explore clinician perspectives on integrating patient-generated contextual data into care using the Consolidated Framework for Implementation Science. Their study illuminates challenges and opportunities, contributing valuable insights for effective implementation and utilization of patient-generated information to enhance healthcare delivery.

Hardeman et al. [49] (Elsevier) explore the Roots Community Birth Center, emphasizing its culturally-centered care model for enhanced childbirth equity. The study highlights the center's potential to address disparities and improve value in maternity care, presenting a valuable contribution to advancing culturally competent and equitable healthcare practices. Lakin et al. [50] (Elsevier) present a systematic intervention for enhancing serious illness communication in primary care, exploring its impact on end-of-life outlays. Their research, involving a diverse team of experts, highlights the potential economic benefits of improved communication strategies, addressing a critical aspect of healthcare delivery and resource utilization. Damschroder et al. [51] (Elsevier) offer vital recommendations for enhancing the impact of embedded researchers in health systems. Their state-of-the-art conference workgroup findings emphasize strategies to expedite implementation, providing valuable insights for optimizing the role of embedded researchers in driving advancements within healthcare systems.

Rodin, Lovas, and Berlin [52] explore the post-pandemic landscape of virtual care in cancer treatment. Their Elsevier article delves into the implications and challenges, shedding light on the evolving dynamics of healthcare delivery. The authors navigate the intersection of technology and oncology, offering insights crucial for optimizing cancer care in the virtual realm. Smigelsky et al. [53] (Elsevier) propose the "Dynamic Diffusion Network," an innovative model advancing moral injury care and suicide prevention. The research emphasizes a dynamic approach to facilitate effective diffusion of interventions, enhancing mental health support for individuals experiencing moral injury. Simonetti et al. [54] (Elsevier) explore the repercussions of survey nonresponse on healthcare employee burnout estimates. Investigating the potential bias introduced by nonresponders, their work underscores the importance of addressing survey nonresponse to enhance the accuracy and reliability of burnout prevalence assessments in healthcare settings.

Deeds et al. [55] (Elsevier) explore the efficacy of leveraging electronic health record note templates for standardizing COVID-19 screening and testing. Their study underscores the potential of such templates in enhancing consistency and efficiency in healthcare protocols, providing valuable insights for optimizing pandemic response strategies. Bhatla and Ryskina's [56] study, "Hospital and ICU patient volume per physician at peak of COVID pandemic: State-level estimates" published in Elsevier, explores the impact of COVID on healthcare system strain. The authors analyze patient-to-physician ratios during the peak, providing valuable state-level insights into the challenges faced by medical professionals. Van Houtven et al.'s [57] study, "Advancing the science of population-based measures of home-time," published in Elsevier, explores innovative approaches to enhancing population-based metrics for home-time. The authors contribute to the scientific understanding of measuring and assessing home-time, offering valuable insights for healthcare and population health research.

Harding et al. [58] (Elsevier) examine electronic health record methods for dementia identification. Their study juxtaposes cognitive test scores against dementia algorithms, probing the efficacy of each approach. This literature underscores the critical exploration of diverse strategies in identifying dementia within electronic health records. Rudin et al.'s [59] (Elsevier, year) literature explores ongoing efforts in optimizing health information technology (IT) to enhance health system performance. The work highlights the evolving landscape of health IT, emphasizing the dynamic nature of interventions aimed at improving healthcare delivery. The authors acknowledge the continuous evolution of this field, reflecting a work in progress. Yongkang Zhang et al.'s [60] study, "Developing an actionable patient taxonomy to understand and characterize high-cost Medicare patients," published in Elsevier, explores the creation of a patient taxonomy for comprehending and categorizing high-cost Medicare individuals. The research aims to provide actionable insights for improving healthcare delivery and managing costs efficiently.

In "From the Hospital to the Streets: Bringing Care to the Unsheltered Homeless in Los Angeles" by Brett J. Feldman et al. [61] (Elsevier), the authors address the critical transition in healthcare delivery for unsheltered homeless individuals. The study examines strategies to extend care beyond hospital settings, emphasizing the significance of outreach and community-based interventions. Aron et al. [62] (Elsevier) explore effective strategies for addressing the COVID-19 pandemic in a rural health system in New York. Their comprehensive review integrates insights from diverse disciplines, providing valuable perspectives on optimizing responses to health crises in resource-limited settings. Mehta et al.'s [63] (Elsevier) literature illuminates the L V Prasad Eye Institute, offering a profound case study on its exemplary and egalitarian eye care. The review highlights the institute's comprehensive approach, emphasizing excellence and equity in providing eye care services, contributing significantly to the field.

Mazyavkina et al.'s [64] survey explores the application of reinforcement learning (RL) in combinatorial optimization, offering insights into RL techniques for addressing complex problems. The review discusses key methodologies, challenges, and recent advancements, providing a comprehensive overview of RL's role in optimizing combinatorial tasks. Published by Elsevier, it serves as a valuable resource in this interdisciplinary field. Erdogan's [65] work, "An Open Source Spreadsheet Solver for Vehicle Routing Problems," published in Computers and Operations Research, introduces a novel approach to solving Vehicle Routing Problems. Leveraging open-source spreadsheet tools, the study addresses optimization challenges, providing a valuable contribution to the field of logistics and operations research. The study by Sarah Ali Abdelaziz Ismael, Ammar Mohammed, and Hesham Hefny [66] explores an advanced deep learning method employing Residual Networks for the classification of brain cancer MRI images. Published in Elsevier, the research enhances diagnostic accuracy, providing valuable insights into improving medical imaging for efficient brain cancer detection and diagnosis.

In their comprehensive review, Kazeminia et al. [67] (Elsevier) explore the applications of Generative Adversarial Networks (GANs) in medical image analysis. The authors highlight GANs' potential to generate realistic medical images, enhance data augmentation, and facilitate diagnostic accuracy. The review underscores the evolving role of GANs in advancing medical imaging

research. Ni Zhang et al.'s [68] research, "Skin Cancer Diagnosis Based on Optimized Convolutional Neural Network," published in Elsevier, explores the application of a refined convolutional neural network for skin cancer diagnosis. The study aims to enhance diagnostic accuracy through optimization techniques, contributing to advancements in computer-aided diagnostic systems for dermatology. In their study "Comprehensive electrocardiographic diagnosis based on deep learning," Oh Shu Lih et al. [69] explore the application of deep learning techniques for a thorough electrocardiogram diagnosis. Published in Elsevier, the research delves into the potential of advanced computational models to enhance the accuracy and efficiency of cardiac diagnoses.

The collaborative work of Li et al. [70] explores the construction and applications of a Real-World Data Medical Knowledge Graph. Published in Elsevier, their study delves into the integration and utilization of diverse medical data, emphasizing the potential for advancing healthcare understanding and decision-making through the establishment of a comprehensive knowledge graph. In their comprehensive review, Sengupta et al.[71] (Elsevier) evaluate the application of deep learning in ophthalmic diagnosis through the analysis of fundus images. The authors critically assess the advancements, challenges, and potential implications, providing valuable insights into the evolving landscape of automated diagnostic tools for ocular health. Coronato et al.'s [72] (Elsevier) survey explores the integration of reinforcement learning in healthcare applications. They assess its potential across diverse domains, emphasizing adaptive decision-making and personalized treatment strategies. The review highlights recent advancements, challenges, and the evolving landscape of intelligent healthcare systems utilizing reinforcement learning techniques.

Sangaiah et al. [73] proposed an intelligent learning approach to enhance ECG signal classification and arrhythmia analysis. Published in Elsevier, their work explores innovative techniques to improve the accuracy of diagnosing cardiac abnormalities, showcasing advancements in leveraging artificial intelligence for more effective and reliable medical diagnostics. Zhang et al. [74] present a significant contribution in arrhythmia detection with "ECG-based multi-class arrhythmia detection using spatio-temporal attention-based convolutional recurrent neural network." Published in Elsevier, their research leverages advanced neural network architecture to enhance accuracy, demonstrating the potential for robust ECG-based arrhythmia classification through spatio-temporal attention mechanisms. Fernandes et al.'s [75] literature review, "Clinical Decision Support Systems for Triage in the Emergency Department using Intelligent Systems: a Review," published in Elsevier, explores the application of intelligent systems in emergency department triage. The authors synthesize existing research, providing insights into the evolving landscape of clinical decision support for improved emergency healthcare management.

In their comprehensive systematic review, David Ben-Israel et al. [76] explore the transformative impact of machine learning on patient care. Drawing from the works of W. Bradley Jacobs, Steve Casha, and others, the study, published in Elsevier, synthesizes current research to assess the evolving landscape of healthcare through the lens of artificial intelligence. In their study, Xuechen Li et al. [77] propose a novel approach for lung nodule detection using Multi-resolution Convolutional Networks applied to chest X-ray radiographs. The research, published in Elsevier,

explores advanced techniques to enhance the accuracy of detecting lung nodules, contributing to the field of medical image analysis. Doraiswamy et al.'s [78] 2022 study, "Artificial Intelligence and the Future of Psychiatry: Insights from a Global Physician Survey" published in Elsevier, explores the perspectives of physicians worldwide on the role of AI in psychiatry. The survey provides valuable insights into the potential impact, challenges, and expectations surrounding the integration of AI in mental health care.

In their study, Carvalho et al. [79] (Elsevier) propose a breast cancer diagnosis approach employing textural features and Content-Based Image Retrieval (CBIR) on histopathological images. The integration of these techniques showcases a promising avenue for enhancing accuracy and efficiency in breast cancer detection, contributing to advancements in medical imaging and diagnostics. Nnamoko and Korkontzelos [80] address outlier handling and class imbalance in diabetes prediction, emphasizing efficiency. Their work, published by Elsevier, explores robust methodologies for improved model accuracy and reliability, contributing valuable insights to the evolving field of medical data analytics. Albahri et al. [81] (Elsevier) propose a detection-based prioritization framework for asymptomatic COVID-19 carriers using integrated Entropy-TOPSIS methods. The study emphasizes multi-laboratory characteristics to enhance detection efficacy, contributing valuable insights to the ongoing battle against the pandemic.

The study by Meyer Lauritsen et al. [82] (Elsevier) explores early sepsis detection using deep learning on electronic health record event sequences. The authors, including Kalør and Kongsgaard, contribute to the evolving field of healthcare analytics, emphasizing the potential of artificial intelligence in timely sepsis identification through comprehensive analysis of patient data. Gao et al. [83] (Elsevier) propose an innovative approach for epileptic seizure detection utilizing Approximate Entropy, Recurrence Quantification Analysis, and Convolutional Neural Networks. Their study highlights the potential of integrating diverse techniques for accurate and automated seizure identification, contributing to advancements in epilepsy diagnosis and treatment. The systematic literature review by Luisa F. Sánchez-Peralta et al. [84] explores the application of deep learning in detecting colorectal polyps during colonoscopy. Published by Elsevier, the study provides insights into the advancements, challenges, and trends in this domain, contributing to the evolving landscape of computer-aided diagnosis for gastrointestinal health.

Lorencin et al. [85] (Elsevier) propose a novel approach for bladder cancer diagnosis, employing a multi-layer perceptron in conjunction with a Laplacian edge detector. The study explores the potential of this technique in enhancing diagnostic accuracy, shedding light on innovative methodologies for effective medical applications. In their study, Miao et al. [86] (Elsevier) present an innovative approach for continuous blood pressure monitoring using deep-learning techniques with a single-channel electrocardiogram signal. The research demonstrates advancements in non-invasive blood pressure measurement, showcasing the potential of deep learning in healthcare applications. Monshi et al.'s [87] survey explore the application of neural networks in inciting radiology reports. Addressing the evolving landscape of medical imaging, the authors scrutinize the advancements, challenges, and potential impact of deep learning models. This comprehensive

review provides insights into the integration of artificial intelligence for efficient and accurate radiology reporting.

Xu et al. [88] (Elsevier) propose "Network Differentiation," a computational method for pathogenesis diagnosis in traditional Chinese medicine. Grounded in systems science, their approach offers a novel perspective on understanding complex interactions within the body, presenting a promising avenue for enhanced diagnosis in the context of traditional medicine. Li, Zhang, and Zhou [89] (Elsevier) explore Chinese clinical named entity recognition using variant neural structures based on BERT methods. Their study contributes to advancing medical text processing, leveraging state-of-the-art techniques to enhance accuracy in identifying clinical objects in Chinese texts. Xu et al. [90] (Elsevier) intended a novel approach for handling imbalanced medical data using a hybrid sampling algorithm. Integrating M-SMOTE and ENN within Random Forest, their method aims to enhance classification accuracy. This innovative strategy addresses the challenges posed by imbalanced datasets in medical contexts, offering potential advancements in predictive modeling.

Sethi, Kathuria, and Kaushik [91] (Elsevier) propose a deep learning-based solution for face mask detection, aiming to mitigate the spread of Coronavirus. Their research focuses on leveraging advanced technology to enhance safety measures, emphasizing the crucial role of automated face mask detection in preventing virus transmission. Ayala Solares et al. [92] (Elsevier) present a comparative review on deep learning for electronic health records, assessing multiple neural architectures. The study, authored by a diverse team, explores the effectiveness of deep neural networks in handling electronic health data, providing insights into advancements and challenges in leveraging deep learning for healthcare informatics. Ning An et al. [93] propose a deep ensemble learning approach for Alzheimer's disease classification in their work published by Elsevier. Leveraging the power of ensemble models, the study explores innovative techniques to enhance accuracy and reliability in Alzheimer's diagnosis, contributing valuable insights to the intersection of deep learning and neurodegenerative diseases.

Sadoughi, Behmanesh, and Sayfouri's [94] systematic mapping study, "Internet of Things in Medicine," published in Elsevier, explores the pervasive integration of IoT in healthcare. The review delves into current applications, challenges, and future prospects, offering a comprehensive overview of the evolving landscape where technology intersects with medical practices. In their work titled "Combinatorial Feature Embedding Based on CNN and LSTM for Biomedical Named Entity Recognition," Cho et al [95] explore the integration of social media-based surveillance systems with machine learning in healthcare. Published in Elsevier, their work critically examines the evolving landscape of healthcare monitoring, emphasizing the potential of technology-driven solutions to enhance patient care through data analytics and innovative surveillance methods.

Conclusion

The implications uncovered by the study are anticipated to yield valuable insights for healthcare administrators, policymakers, and practitioners. By understanding the nuanced relationship between performance optimization and patient satisfaction, healthcare organizations can

implement targeted interventions to enhance overall service delivery. Moreover, the research contributes to the academic discourse on healthcare management and patient experience, providing a foundation for future studies and advancements in the field.

In conclusion, this study endeavors to bridge the existing knowledge gap by elucidating the intricate dynamics between performance optimization and patient satisfaction within healthcare systems. The implications of the research extend beyond academic discourse, offering practical implications for healthcare practitioners and administrators striving to elevate the meticulous attention overall satisfaction of patients in an ever-evolving healthcare landscape.

Reference

1. Mohammad Dehghanimohammadabadi, Nihan Kabadayi, "A TWO-STAGE AHP MULTI-OBJECTIVE SIMULATION OPTIMIZATION APPROACH IN HEALTHCARE" International Journal of the Analytic Hierarchy Process Vol. 12 Issue 1 2020 ISSN 1936-6744.
2. Rahul Joshi, Harita Gadikta, Saneeka Kharat, Soumi Mandal, Kalyani Kadam, Anupkumar M. Bongale Dr., and Siddhant Pandit, "Bibliometric of Feature Selection Using Optimization Techniques in Healthcare using Scopus and Web of Science Databases" Library Philosophy and Practice (e-journal).
3. Tanatorn Tanantong, Warut Pannakkong and Nittaya Chemkomnerd, "Resource management framework using simulation modeling and multi-objective optimization: a case study of a front-end department of a public hospital in Thailand" BMC Medical Informatics and Decision Making.
4. Nasim Kazemi, Parisa Ehsani, Farshid Abdi and Mohammad Kazem Bighami, "Measuring hospital service quality and its influence on patient satisfaction: An empirical study using structural equation modeling" Growing Science Ltd. All rights reserved.
5. Sofia Xesfingi and Athanassios Vozikis, "Patient satisfaction with the healthcare system: Assessing the impact of socioeconomic and healthcare provision factors" BMC Health Services Research (2016).
6. Brett C. Johnson, "Achieving Patient Satisfaction: The Relationship between Human Motivation and Outcome Optimization" Journal for Healthcare Qualify Vol. 18, No. 2.
7. Abdur Rais and Ana Viana, "Operations Research in Healthcare: a survey" INTERNATIONAL TRANSACTIONS IN OPERATIONAL RESEARCH.
8. Peter Humphreys, Belinda Spratt, Mersedeh Tariverdi, Robert L. Burdett , David Cook, Prasad K. D. V. Yarlagadda and PaulCorry, "AnOverview of Hospital Capacity Planning and Optimisation" Healthcare 2022.
9. Maren Hopfe, Birgit Prodinger, Jerome E. Bickenbach & Gerold Stucki, "Optimizing health system response to patient's needs: an argument for the importance of functioning information" 2017 Informa UK Limited, trading as Taylor & Francis Group.
10. Charles Friedmana, Michael Rigby, "Conceptualising and creating a global learning health system" Elsevier.

11. Amanda Jane Marshall-Ponting, Khairy A.H. Kobbacy, Stelios Sapountzis and Michail Kagioglou, "A multi-faceted approach to optimising a complex unplanned healthcare system" Int. J. Logistics Systems and Management, Vol. 15, Nos. 2/3, 2013.
12. Yann B. Ferrand, Jennifer Siemens, Danny Weathers, Lawrence D. Fredendall, Yunsik Choi, Ronald G. Pirrallo & Matthew Bitner, "Patient Satisfaction With Healthcare Services A Critical Review" Taylor & Francis Group.
13. Roy A. Carr-Hill, "The measurement of patient satisfaction" Journal of Public Health Medicine Vol. 14, No. 3. pp. 236-249 Printed in Great Britain.
14. Hamid Reza Feili ,"Improving the Health Care Systems Performance by Simulation Optimization" Journal of mathematics and computer Science.
15. B.R.P. e Oliveira, J.A. de Vasconcelos, J.F.F. Almeida, L.R. Pinto, "A Simulation-Optimisation approach for hospital beds allocation" Elsevier.
16. Margaret E Kruk, Anna D Gage, Catherine Arsenault, Keely Jordan, Hannah H Leslie, "High-quality health systems in the Sustainable Development Goals era: time for a revolution" The Lancet Global Health Commission Vol 6 November 2018.
17. A M H Pardede, Herman Mawengkang, Muhammad Zarlis, T Tulus, "Optimization of Health Care Services with Limited Resources" International journal on advanced science engineering information technology .
18. Yunzhe Qiu, Jie Song & Zekun Liu, "A simulation optimisation on the hierarchicalhealth care delivery system patient flow based on multi-fidelity models" International Journal of Production Research, 2016 ,
19. Muhammad Hafiz Abd Rashid , Aida Azlina Mansor , Muhammad Iskandar Hamzah, "Service Quality and Patients' Satisfaction in Healthcare Service in Malaysia" International Journal of Customer Service Management Vol. 1, No. 1, 41-49, 2011.
20. Hamda S. Al-Neyadi, Salam Abdallah & Mohsin Malik, "Measuring patient's satisfaction of healthcare services in the UAE hospitals: Using SERVQUAL" Taylor & Francis Group.
21. Matthew Menear , Marc-André Blanchette3, Olivier Demers-Payette1 and Denis Roy, "A framework for value-creating learning health systems" Health Research Policy and Systems.
22. Jacob Wing & Peter Vanberkel, "Simulation optimisation for mixing scheduled and walk-in patients" Taylor & Francis Group.
23. Jonathan Waring, Charlotta Lindvall, Renato Umeton, "Automated machine learning: Review of the state-of-the-art and opportunities for healthcare" Elsevier.
24. Shahab Shamshirband, Mahdis Fathi, Abdollah Dehzangi, Anthony Theodore Chronopoulos, Hamid Alinejad-Rokny, "A Review on Deep Learning Approaches in Healthcare Systems: Taxonomies, Challenges, and Open Issues" Elsevier.
25. Robert S. Rudin, Lea Xenakis , Shira H. Fischer , Dmitry Khodyakov, Cheryl L. Damberg , M. Susan Ridgely, "Optimizing health IT to improve health system performance: A work in progress" Elsevier.
26. Lorenzo Lampariello, imone Sagratella, "Effectively managing diagnostic tests to monitor the COVID-19 out break in Italy" Elsevier.

27. Dominic J. Breuer , Nadia Lahrichi, David E. Clark, James C. Benneyan, "Robust combined operating room planning and personnels cheduling under uncertainty" Elsevier.
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30. Houra Mahmoudzadeh , Akram Mirahmadi Shalamzari, Hossein Abouee-Mehrizi, "Robust multi-class multi-period patients cheduling with wait time targets" Elsevier.
31. B.J. Murch, J.A. Cooper, T.J. Hodgett, E.L. Gara, J.S. Walkerc, R.M. Wood, "Modelling the effect offirst-wave COVID-19 on mental health services" Elsevier.
32. Samantha L. Zimmerman, Alan Bia, Trevor Dallow, Alexander R. Rutherford, Tamon Stephen, Cameron Bye, David Hall, Andrew Day, Nicole Latham, Krisztina Vasarhelyi, "Optimising nurse schedules at a community health centre" Elsevier.
33. Sadeem MunawarQureshia, Nancy Purdy, W. Patrick Neumann, "Developing a modeling approach to quantify quality of care and nurse workload—Field validation study" Elsevier.
34. SommerGentrya, Michal A. Mankowski, T.S. Michael, "Maximum matchings in graphs for allocating kidney paired donation" Elsevier.
35. Daniel Garcia-Vicuña, Laida Esparza, Fermin Mallor, "Safely learning Intensive Care Unit management by using a Management Flight Simulator" Elsevier.
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41. Na Li, Fei Chiang, Douglas G. Down, Nancy M. Heddle, "A decision integration strategy for short-term demand forecasting and ordering for red blood cell components" Elsevier.
42. S. Priyan, P. Mala, "Optimal inventory system for pharmaceutical products in corporating quality degradation with expiration date: A gametheory approach. Elsevier.
43. Jose F. Figueroa, Ashish K. Jha, Rishi K. Wadhera, Winta T. Mehtsun, Kristen Riley, Jessica Phelan, "Association of race, ethnicity, and community-level factors with COVID-19 cases and deaths across U.S. counties" Elsevier.

44. Lucinda Lai, Kelley A. Wittbold, Farah Z. Dadabhoy, Rintaro Satoc, Adam B. Landman, Lee H. Schwamm, Shuhan He, Rajesh Patel, Nancy Wei, "Digital triage: Novel strategies for population health management in response to the COVID-19 pandemic" Elsevier.
45. Laura G. Burke, E. John Orav, Jie Zheng, Ashish K. Jha, "Healthy Days at home: A novel population-based outcome measure" Elsevier.
46. Leah B. Loerinc, Amy M. Scheel, James B. O'Keefe, Sean T. Evans, Julie M. Shabto", Ghazala A. O'Keefe, "Discharge characteristics and care transitions of hospitalized patients with COVID-19" Elsevier.
47. Ashok Reddy , Eric Gunnink, Stefanie A. Deeds, Scott L. Hagan, Leonie Heyworth, Thomas F. Mattras, Karin M. Nelson, "A rapid mobilization of 'virtual' primary care services in response to COVID-19 at Veterans Health Administration" Elsevier.
48. Jeana M. Holt, Rachel Cusatis, Onur Asan, Joni Williams, Sandile Nukuna, Kathryn E. Flynn, Jennifer Moore, Bradley H. Crotty, "Incorporating patient-generated contextual data into care: Clinician perspectives using the Consolidated Framework for Implementation Science" Elsevier.
49. Rachel R. Hardeman, J'Mag Karbeah, Jennifer Almanza, Katy B. Kozhimannil, "Roots Community Birth Center: A culturally-centered care model for improving value and equity in childbirth" Elsevier.
50. Joshua R. Lakin, Brandon J. Neal, Francine L. Maloney, Joanna Paladino, Christine Vogeli, Joey Tumblin, Maryann Vienneau, Erik Fromme, Rebecca Cunningham, Susan D. Block, Rachelle E. Bernacki, "A systematic intervention to improve serious illness communication in primary care: Effect on expenses at the end of life" Elsevier.
51. Laura J. Damschroder, Andrew J. Knighton, Emily Griese, Sarah M. Greene, Paula Lozano, Amy M. Kilbourne, Diana S.M. Buist, Karen Crottyh, A. Rani Elwy, "Recommendations for strengthening the role of embedded researchers to accelerate implementation in health systems: Findings from a state-of-the-art (SOTA) conference workgroup" Elsevier.
52. Danielle Rodin, Mike Lovas, Alejandro Berlin, "The reality of virtual care: Implications for cancer care beyond the pandemic" Elsevier.
53. Melissa A. Smigelsky, Jason A. Nieuwsma, Keith Meador, Ryan J. Vega, Blake Henderson, George L. Jackson, "Dynamic Diffusion Network: Advancing moral injury care and suicide prevention using an innovative model" Elsevier.
54. Joseph A. Simonetti, Walter L. Clinton, Leslie Taylor, Alaina Mori, Stephan D. Fihn, Christian D. Helfrich, Karin Nelson, "The impact of survey nonresponse on estimates of healthcare employee burnout" Elsevier.
55. Stefanie A. Deeds, Scott L. Hagan, John R. Geyer, Christopher Vanderwarker , Marcus W. Grandjean, Ashok Reddy, Karin M. Nelson, "Leveraging an electronic health record note template to standardize screening and testing for COVID-19" Elsevier.
56. Anjali Bhatla, Kira L. Ryskina, "Hospital and ICU patient volume per physician at peak of COVID pandemic: State-level estimates" Elsevier.

57. Courtney Harold Van Houtven, Valerie A. Smitha, Nina R. Sperber, Cynthia J. Coffman, Susan Nicole Hastings, "Advancing the science of population-based measures of home-time" Elsevier.
58. Barbara N. Harding, James S. Floyda, Jeffrey F. Scherrer, Joanne Salas, John E. Morleyg, Susan A. Farr, Sascha Dublin, "Methods to identify dementia in the electronic health record: Comparing cognitive test scores with dementia algorithms" Elsevier.
59. Robert S. Rudin, Lea Xenakis, Shira H. Fischer, Dmitry Khodyakov , Cheryl L. Damberg , M. Susan Ridgely, "Optimizing health IT to improve health system performance: A work in progress" Elsevier.
60. Yongkang Zhang, Zachary Grinspan, Dhruv Khullar, Mark Aaron unruh, Elizabeth Shenkman, Andrea Cohen, Rainu Kaushal, "Developing an actionable patient taxonomy to understand and characterize high-cost Medicare patients" Elsevier.
61. Brett J. Feldman, Jeniffer S. Kim Charles E. Coffey Jr. , Laura Mosqueda , Brad Spellberg, Hurnan Vongsachang , Michael Hochman, Josh Banerjee , Jehni Robinson, "From the hospital to the streets: Bringing care to the unsheltered homeless in Los Angeles" Elsevier.
62. Jamie A. Aron, Alexander J.B. Bulteel, Kelsey A. Clayman, Joseph A. Cornett, Kerry Filtz, Liam Heneghan, Kenneth T. Hubbell, Ryan Huff, Adam J. Richter, Kathleen Yu, Henry Weil, Steven Heneghan, "Strategies for responding to the COVID-19 pandemic in a rural health system in New York state" Elsevier.
63. Mehul C. Mehta, Raja Narayanan, H. Thomas Aretz, Rohit Khanna, Gullapalli N. Rao, "The L V Prasad Eye Institute: A comprehensive case study of excellent and equitable eye care" Elsevier.
64. Nina Mazyavkina, Sergey Sviridov, Sergei Ivanov, Evgeny Burnaev, "Reinforcementlearning for combinatorial optimization: A survey" Elsevier.
65. Gunes Erdogan, "An Open Source Spreadsheet Solver for Vehicle Routing Problems" Computers and Operations Research.
66. Sarah Ali Abdelaziz Ismael, Ammar Mohammed, Hesham Hefny, "An Enhanced Deep Learning Approach for Brain Cancer MRI Images Classification using Residual Networks" Elsevier.
67. Salome Kazeminia Nassir Navab, Christoph Baur , Shadi Albarqouni, Arjan Kuijper , Anirban Mukhopadhyay, "GANs for medical image analysis" Elsevier .
68. Ni Zhang, Yi-Xin Cai, Yong-Yong Wang, Yi-Tao Tian, Xiao-Li Wang, Benjamin Badami, "Skin Cancer Diagnosis Based on Optimized Convolutional Neural Network" Elsevier.
69. Oh Shu Lih, V Jahmunah, Tan Ru San, Edward J Ciaccio, Toshitaka Yamakawa, Masayuki Tanabe, Makiko Kobayashi, Oliver Faust, U Rajendra Acharya "Comprehensive electrocardiographic diagnosis based on deep learning" Elsevier.
70. Linfeng Li, Peng Wang, Jun Yan, Yao Wang, Simin Li, Jinpeng Jiang, Zhe Sun, Buzhou Tang, Tsung-Hui Chang, Shenghui Wang, Yuting Liu, "Real-world data medical knowledge graph: construction and applications" Elsevier.

71. Sourya Sengupta, Amitojdeep Singh, Henry A. Leopold, Tanmay, Gulati, Vasudevan Lakshminarayanan, "Ophthalmic Diagnosis Using Deep Learning with Fundus Images- A Critical Review" Elsevier.
72. Antonio Coronato, Muddasar Naeem, Giuseppe De Pietro, Giovanni Paragliola, "Reinforcement Learning for Intelligent Healthcare Applications: A Survey" Elsevier.
73. Arun Kumar Sangaiah, Maheswari Arumugam, Gui-Bin Bian, "An intelligent learning approach for improving ECG signal classification and arrhythmia analysis" Elsevier.
74. Jing Zhang, Aiping Liua, Min Gao, Xiang Chen, Xu Zhang, Xun Chen, "ECG-based multi-class arrhythmia detection using spatio-temporal attention-based convolutional recurrent neural network" Elsevier.
75. Marta Fernandes, Susana M. Vieira, Francisca Leite, Carlos Palos, Stan Finkelstein, Jo˜ ao M.C. Sousa, "Clinical Decision Support Systems for Triage in the Emergency Department using Intelligent Systems: a Review" Elsevier.
76. David Ben-Israel, W. Bradley Jacobs, Steve Casha, Stefan Lang, Won Hyung A. Ryu Madeleine de Lotbiniere-Bassett, David W. Cadotte, "The impact of machine learning on patient care: A systematic review" Elsevier.
77. Xuechen Li, Linlin Shen, Xinpeng Xie, Shiyun Huang, Zhien Xie, Xian Hong, Juan Yu, "Multi-resolution Convolutional Networks for Chest X-Ray Radiograph Based Lung Nodule Detection" Elsevier.
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79. Edson D. Carvalho, Antônio O.C. Filho, Romuere R.V. Silva, Flávio H.D. Araújo, João O.B. Diniz, Aristófanes C. Silva, Anselmo C. Paiva, Marcelo Gattass, "Breast cancer diagnosis from histopathological images using textural features and CBIR" Elsevier.
80. Nonso Nnamoko, Ioannis Korkontzelos, "Efficient treatment of outliers and class imbalance for diabetes prediction" Elsevier.
81. A.S. Albahri, Rula A. Hamid , O.S. Albahri , A.A. Zaidan, "Detection-based prioritisation: Framework of multi-laboratory characteristics for asymptomatic COVID-19 carriers based on integrated Entropy–TOPSIS methods" Elsevier.
82. Simon Meyer Lauritsen, Mads Ellersgaard Kalør, Emil Lund Kongsgaard, Katrine Meyer Lauritsen, Marianne Johansson Jørgensen, Jeppe Lange, Bo Thiesson, "Early detection of sepsis utilizing deep learning on electronic health record event sequences" Elsevier.
83. Xiaozeng Gao, Xiaoyan Yan, Ping Gao, Xiujiang Gao, Shubo Zhang, "Automatic Detection of Epileptic Seizure Based on Approximate Entropy, Recurrence Quantification Analysis and Convolutional Neural Networks" Elsevier.
84. Luisa F. Sánchez-Peralta, Luis Bote-Curiel, Artzai Picón, Francisco M. Sánchez-Margallo, J. Blas Pagador, "Deep learning to find colorectal polyps in colonoscopy: A systematic literature review" Elsevier.
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86. Fen Miao, Bo Wen, Zhejing Hu, Giancarlo Fortino, Xi-Ping Wang, Zeng-Ding Liu, Min Tang, Ye Li, "Continuous Blood Pressure Measurement from One-Channel Electrocardiogram Signal Using Deep-Learning Techniques" Elsevier.
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92. Jose Roberto Ayala Solares, Francesca Elisa Diletta Raimondi, Yajie Zhu, Fatemeh Rahimian, Dexter Canoy, Jenny Tran, Ana Catarina Pinho Gomes,Amir H. Payberah, Mariagrazia Zottoli, Milad Nazarzadeh , Nathalie Conrad, Kazem Rahimi , Gholamreza Salimi-Khorshidi, "Deep learning for electronic health records: A comparative review of multiple deep neural architectures" Elsevier.
93. Ning An, Huitong Ding , Jiaoyun Yang, Rhoda Au, Ting F.A. Ang, "Deep ensemble learning for Alzheimer's disease classification" Elsevier.
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