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A Scoping Review on the Use of Artificial Neural Networks (ANNs) in Decision Adoption Systems (DAS) for Psychological Data Interpretation

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Abstract: In the past decade, there has been a surge of interest in the potential of artificial neural networks (ANNs) to enhance decision-making processes in a variety of domains, including decision adoption systems (DAS). This scoping review focuses on the utilization of ANNs in DAS for the interpretation of psychological data. The major goal of this scoping review is to determine the current status of research on the usage of ANNs in DAS for psychological data interpretation and highlight the advantages and limitations of using ANNs in this context. Through a comprehensive search of relevant databases, a range of studies were identified that have employed ANNs in DAS for psychological data interpretation. These studies demonstrate the potential of ANNs to improve decision-making processes in psychological data interpretation, resulting in more accurate diagnoses.. The scoping review presents information on the actual status of research on the usage of ANNs in DAS for psychological data interpretation, offering a comprehensive understanding of the potential of ANNs in enhancing decision-making processes in this context. As such, the findings of this review have significant implications for future research on ANNs in DAS for psychological data interpretation, which may result in the development of more effective decision-making tools for this purpose.

Keywords: Scoping review, Artificial Neural Networks (ANNs), Decision Adoption Systems (DAS), Psychology, data interpretation

1. Introduction

There has been an increase in interest in the usage of artificial neural networks (ANNs) to enhance decision-making processes in a wide range of domains. One such domain is the field of decision adoption systems (DAS). DAS stands for Decision Adoption System, while

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DSS stands for Decision Support System. Although they both involve decision-making processes, there are differences in their focus and functionality.

A Decision Adoption System (DAS) is designed to assist in the adoption or acceptance of decisions. It typically involves the implementation and execution of decisions already made. DAS may provide tools, technologies, or frameworks to facilitate the implementation process and monitor the outcomes of decisions. It focuses on ensuring that decisions are effectively implemented within an organization or system.

On the other hand, a Decision Support System (DSS) is designed to assist decision-makers in making informed decisions by providing them with relevant information, analysis, and tools. DSS aims to enhance decision-making processes by providing support, insights, and data-driven recommendations. It helps users explore different alternatives, evaluate potential outcomes, and analyze the consequences of decisions before they are made. In summary, DAS is concerned with the adoption and execution of decisions, while DSS focuses on providing support and guidance in the decision-making process itself. DAS is more implementation-oriented, while DSS is more analysis and decision-making oriented.

The use of ANNs in DAS has shown great potential for improving decision-making processes, particularly in the interpretation of psychological data.

Psychological data is complex and often difficult to interpret accurately. It involves various factors, such as emotions, personality traits, and behavioral patterns, that are difficult to quantify and analyze. Therefore, the use of ANNs in DAS for psychological data interpretation is particularly valuable. ANNs are capable of processing large amounts of data and can identify patterns and relationships that may not be readily apparent to human decision-makers. As a result, they have the potential to improve the accuracy of psychological diagnoses and the effectiveness of psychological treatments.

This scoping review's goal is to identify the current level of research on the usage of ANNs in DAS for psychological data interpretation. The review aims to highlight the advantages and limitations of using ANNs in this context and to provide insights into the potential of ANNs to enhance decision-making processes in psychological data interpretation. A comprehensive search of relevant databases was conducted, and a range of studies were identified that have employed ANNs in DAS for psychological data interpretation.

The review found that the use of ANNs in DAS for psychological data interpretation has shown promising results in improving the accuracy of psychological diagnoses and the effectiveness of psychological treatments. ANNs have been used to predict various outcomes, such as the likelihood of a patient developing a particular mental disorder or the effectiveness of a specific treatment for a given patient. Additionally, ANNs have been used to identify patterns and relationships in psychological data that were previously unknown, leading to a deeper understanding of psychological processes.

The review also highlighted several challenges and limitations associated with the use of ANNs in DAS for psychological data interpretation. One of the main challenges is the requirement for large amounts of high-quality data. ANNs are data-hungry and require large datasets to achieve optimal performance. Additionally, the potential for bias in the training data must be addressed to ensure that ANNs do not replicate or amplify existing biases in the data.

Overall, this scoping review provides valuable insights into the potential of ANNs in enhancing decision-making processes in psychological data interpretation. The findings of this review have significant implications for future research on ANNs in DAS for psychological data interpretation, which may result in the development of more effective decision-making tools for this purpose. As such, the use of ANNs in DAS for psychological data interpretation is an exciting and rapidly evolving area of research with the potential to revolutionize the field of psychology.

2. Methodology

The PRISMA standards were followed for this scoping review (Moher et al., 2009). The strategy was created in consultation with a research librarian to identify relevant studies that have employed ANNs in DAS for psychological data interpretation. The databases searched included PubMed, PsycINFO, and IEEE Xplore. The search was conducted in March 2023 and was limited to studies published in English.

The search terms used were "artificial neural networks," "decision adoption systems," "psychological data interpretation," and variations of these terms. Boolean operators (AND, OR) were used to combine the search terms to retrieve relevant studies. The inclusion criteria for this review were studies that utilized ANNs in DAS for psychological data interpretation and were published in peer-reviewed journals. Studies that did not meet these criteria were excluded from the review.

The initial search identified a total of 273 potential studies. After removing duplicates and conducting a preliminary screening of titles and abstracts, 44 studies were identified as potentially relevant for full-text review. These studies were then assessed for eligibility based on the inclusion criteria. After this process, a final set of 21 studies were included in this review.

Data were extracted from each of the 21 studies using a standardized data extraction form. Each study yielded the following data: study design, sample size, kind of psychological data studied, type of ANN employed, and major conclusions.

The Cochrane Risk of Bias tool (Higgins et al., 2011) and QUADAS-2 tool were used to evaluate the study quality (Whiting et al., 2011), depending on the type of study design. Two independent reviewers assessed the quality of each study, and any discrepancies were resolved through discussion.

The data extracted from the studies were synthesized and analyzed to identify patterns and themes related to the utilization of ANNs in DAS for psychological data interpretation. The findings were organized according to the main objectives of this review, which were designed to determine the present status of research on the usage of ANNs in DAS for psychological data interpretation, highlight the advantages and limitations of using ANNs in this context, and identify areas for further research.

Overall, this scoping review followed rigorous and transparent methods for identifying, assessing, and synthesizing relevant studies. The results of this review provide important insights on the present level of research on ANNs in DAS for psychological data interpretation and offer important implications for future research in this area.

The 21 studies comprised in this review varied in their study design and sample sizes. The studies analyzed different types of psychological data such as emotion recognition, personality traits, mental health diagnosis, and cognitive performance. The types of ANNs used in these studies included feedforward neural networks, recurrent neural networks, and convolutional neural networks.

3. Results

Dabek and Caban (2015) put forward a neural network framework aimed at forecasting the likelihood of developing psychological disorders subsequent to a concussion, including conditions like anxiety, behavioral disorders, depression, and post-traumatic stress disorder. The efficacy of the model was assessed using a dataset comprising 89,840 patients, and the results revealed that it achieved varying levels of accuracy for each specific disorder, ranging from 73% to 95%. Overall, the model exhibited an accuracy of 82.35% when considering all the disorders collectively. The study emphasizes neural networks' promise in preventative care and their capacity to alert patients and professionals to potential problems or diseases that a patient may face.

Tian and Pu (2008) investigated the factors impacting employee satisfaction among hotel staff in China using an Artificial Neural Network (ANN). According to the report, hotel employee satisfaction in China is poor, and hotel staff turnover is significant. Employee professional development possibilities and the hotels' long-term growth potential were discovered to be the most important drivers to employee happiness. The report makes recommendations for increasing employee happiness and so supporting China's hotel industry's long-term economic health.

The Psychometric Item Generator (PIG), developed by Götz et al. (2023), is an open-source and freely accessible natural language processing algorithm. This self-contained tool allows users to effortlessly generate extensive and customizable text outputs that closely resemble human-generated content. Leveraging the power of the GPT-2 generative language model, the PIG operates within the Google Colaboratory environment.

The study showcases the versatility and effectiveness of the PIG in generating large sets of face-valid items for novel constructs, such as "wanderlust." Furthermore, it demonstrates the PIG's capability to construct concise, yet reliable scales for existing constructs, including the Big Five personality traits. These scales have proven to yield robust results when applied in real-world scenarios and have been benchmarked against established gold standards for assessment.

By addressing the longstanding challenge of scale development, which necessitates researchers to produce high-quality items in substantial quantities, the PIG introduces an innovative and successful machine learning solution. With just a few simple actions, researchers can harness the PIG's potential to generate a vast array of items, advancing the field of psychological assessment.

Based on integrated educational paradigms, Moridis and Economides (2009) sought to create a system that could properly detect a student's mood during an online self-assessment

exam and activate an appropriate reaction. They created a formula-based strategy and evaluated it using data from 153 high school students from three distinct areas of a European country. Using the same set of data, they also created a neural network approach, and the formula-based method served as an input parameter selection module for the neural network method. The findings indicated that the formula-based method's assumptions about students' moods were mainly true, and that neural networks and traditional algorithmic approaches should be used in tandem to construct affect identification systems. The paper also proposed that neural networks could provide an alternative and an improvement over tutoring systems' affect recognition methods.

Ding et al. (2022) aimed to enhance the decision-making process in nursing evaluations for cancer patients. Their approach involved the introduction of nursing outcome classifications based on standardized nursing language, as well as the development of a comprehensive nursing evaluation decision-making system model utilizing an artificial neural network and fuzzy comprehensive evaluations.

The study delved into an analysis and comparison of stressors experienced by cancer patients, along with their respective frequencies of occurrence. Through this analysis, five major stress factors were identified: lack of privacy, attitude of medical workers, unfamiliarity with medical staff, uncomfortable ward temperatures, and the impact of hospitalization on both patients and their families. Additionally, the study uncovered that cancer patients' involvement in treatment decision-making was lower than anticipated. By implementing their proposed system, the study aimed to assist patients in swiftly adjusting to the hospital environment while fostering feelings of comfort, tranquility, and satisfaction through a humanistic atmosphere. The ultimate goal was to improve patients' quality of life and well-being.

Averkin et al. (2019) discussed the theoretical and practical implications of using artificial intelligence in the context of psychological security. They argued that developments in artificial intelligence were especially relevant against the background of growing challenges and threats arising from the use of the digital environment by actors of psychological warfare, such as strategists and tactics of "color revolutions" as well as terrorist and criminal groups. The authors proposed the use of hybrid intellectual systems for decision support based on fuzzy cognitive maps, the method of hierarchies, and artificial neural networks as a tool in psychological warfare. They also suggested the creation of mathematical models of decision support in psychological warfare and the need for training based on data mining obtained from the internet using deep learning networks.

Kanimozhiselvi and Pratap (2016) demonstrated the utility of a Possibilistic-Linear Vector Quantization (Po-LVQ) neural network for the preliminary screening and grading of childhood autistic disorder. The diagnostic system assesses the grades as: "Normal," "Mild-Moderate," "Moderate-Severe," and "Severe." The system takes into account various parameters, such as communication, social, and behavioral skills, to assess the severity of the disorder. The study found that the Po-LVQ neural network was a useful tool for the preliminary screening and grading of childhood autistic disorder.

In summary, the studies discussed demonstrate the potential of artificial intelligence in various domains related to psychology and mental health. The studies show how artificial intelligence can be used to predict students' mood during online self-assessment tests, enhance the nurse evaluation decision-making process for cancer patients, assist in countering the destructive psychological impact on the individual, society, and assist in the preliminary screening and grading of childhood autistic disorder. These studies provide evidence for the potential of artificial intelligence to augment and improve human decision-making and problem-solving abilities in the field of psychology and mental health.

In recent years, there has been an increase in interest in the usage of artificial intelligence (AI) in the field of education. This is due to the potential benefits that AI can bring to educational institutions, including improved decision-making, personalized learning experiences, and the ability to predict student performance.

Yessefi et al. (2020) suggested a novel method for watching and assessing students' behavior during their university education. The researchers created a system that might predict a student's future professional condition by merging psychological and moral data with academic and professional data. The system is based on Neural Networks' algorithms and was tested on a sample of graduate students from Moroccan Universities. The results showed an accuracy of 75% in terms of adaptation and reorientation. This study highlights the potential of AI in helping students make informed decisions about their study paths.

Another area where AI can be applied in education is in stress diagnosis. Stress is a prevalent psychological condition that can have a significant impact on individuals' physical, mental, and social behavior. Sharma et al. (2021) conducted an extensive review exploring the utilization of supervised learning (SL) and soft computing (SC) approaches in stress diagnosis. The review encompassed an analysis of the strengths and weaknesses of various SL and SC techniques while emphasizing the potential of employing nature-inspired computing methods. The study employed deep learning algorithms to process multimodal data derived from behavioral tests, electroencephalogram signals, finger temperature, respiration rate, pupil diameter, galvanic skin response, and blood pressure. By leveraging these data sources, the researchers aimed to diagnose and assess stress levels. Furthermore, the study proposed a hybrid model that combined distinctive computational approaches influenced by both SL and SC methodologies. This hybrid model incorporated adaptations, parameter adjustments, as well as the utilization of chaos, Levy, and Gaussian distributions. The study also shed light on the challenges associated with developing precise and innovative AI-based stress diagnostic systems. These challenges encompassed real-time data gathering, addressing bias, ensuring data integrity, handling multi-dimensional data, and safeguarding data privacy. Overall, Sharma highlighted the potential of supervised learning and soft computing techniques in stress diagnosis while acknowledging the intricacies involved in creating robust and accurate AI-based diagnostic systems.

Livieris et al. (2016) suggested a user-friendly decision support tool for forecasting students' success on the year's final exams. The suggested tool is based on a hybrid prediction system that incorporates a variety of different machine learning approaches and outperforms

any single learning algorithm tested. The provided solution has the benefit of having a simple interface and being able to be installed on any platform running any operating system. According to the findings, this tool might be utilized to assist with student admission procedures and to boost the service system at educational institutions.

DAS in mental health is still in their early phases of development. Bertl et al. (2022) reviewed the literature on AI-based digital DAS for post-traumatic stress disorder (PTSD). The study discovered that, while research on medical DAS has increased in the recent decade, DAS in mental health is still in the early phases of development. The review identified several challenges, including the lack of standardized diagnostic criteria and the need for more research on the effectiveness of AI-based decision support systems in treating PTSD. The study suggested that AI-based decision support systems could be an effective tool for clinicians in treating PTSD, but more research is needed in this area.

AI can also be used to improve the quality of teaching and learning experiences. Liu et al. (2017) developed an intelligent tutoring system (ITS) that used natural language processing (NLP) to provide personalized feedback to students on their writing assignments. The ITS was trained on a dataset of student essays and used machine learning algorithms to identify common errors and provide feedback on grammar, syntax, and content. The study found that the ITS was effective in improving students' writing skills and provided personalized feedback that was tailored to individual students' needs. This study demonstrates the potential of AI in providing personalized learning experiences that can improve student outcomes.

In recent years, Artificial Intelligence (AI) has been increasingly used in the medical and clinical fields, bringing efficient results and solutions. This technology has the potential to revolutionize the way healthcare is delivered and has been applied to many areas, including the diagnosis and treatment of psychiatric disorders. In this synthesis, we will explore four studies that have used AI-based decision support systems to pre-diagnose and predict psychiatric disorders and quality of life among the elderly.

Bouaiachi et al. (2014) present a decision assistance system for pre-diagnosis of psychiatric diseases based on neural networks. The objective of the study is to utilize neural networks to streamline the modeling process of a decision assistance system. After conducting a comparative analysis with Case-Based Reasoning, the researchers opt for a neural network as the preferred decision-making tool. In their experiment, the effectiveness of the pre-diagnosis neural network is evaluated, and it demonstrates an accuracy of 90% in accurately identifying specific categories, particularly psychotic diseases. This indicates the potential of the neural network-based system in assisting with the early identification and classification of psychiatric conditions.

The utilization of neural networks in the decision assistance system simplifies the modeling process and enhances the accuracy of the pre-diagnosis phase. Bouaiachi et al.'s findings highlight the efficacy of neural networks as a valuable tool in the domain of psychiatric disease pre-diagnosis. The study reveals the efficacy of AI-based decision support systems in psychiatric diagnosis and the promise of neural networks in this sector.

The study by Bird et al. (2019) explores the application of EEG-based brain-machine interfaces (BMI) for mental emotional sentiment classification. The study aims to evaluate the effectiveness of single and ensemble methods of classification to quantify data into an emotional representation of what the participant was feeling at that time. The study shows that using a low resolution, commercially available EEG headband can be effective for classifying a participant's emotional state. The results of the study demonstrate the potential of AI-based decision support systems to improve interaction and, for mental-health systems, contribute to the overall assessment of issues and how to resolve them.

Suhasini et al. (2011) introduces a multimodel decision support system aimed at identifying mental health issues in patients. The study focuses on utilizing backpropagation neural networks (BPNN), radial basis function neural networks (RBFNN), and support vector machine (SVM) models to construct the decision support system. To develop the system, characteristics from a total of 400 patients are collected and divided into four equally-sized groups. Three sets of patient characteristics are utilized for training the decision support system, while the remaining set is used to evaluate the system's performance. By employing the combination of BPNN, RBFNN, and SVM models, Suhasini et al. demonstrate the potential of their decision support system in accurately identifying mental health issues. The use of multiple models allows for a comprehensive and robust assessment of patient characteristics, enhancing the system's effectiveness in detecting and classifying mental health conditions. The study's findings highlight the value of a multimodel approach in developing a reliable decision support system for mental health diagnosis. The incorporation of diverse models contributes to a more comprehensive understanding of patient characteristics and improves the system's overall performance. The suggested technique has an accuracy of 98.75% in diagnosing psychiatric issues, according to experimental data. The study highlights the efficacy of AI-based decision support systems in psychiatric diagnosis and the promise of multimodel decision support systems.

Ahmadi and Nopour (2022) conducted research aimed at developing a Clinical Decision Support System (CDSS) using Artificial Neural Networks (ANN) to assess the quality of life (QoL) among the elderly population. The study involved the analysis of 980 instances that encompassed both positive and negative QoL experiences of elderly individuals. To identify the critical factors influencing QoL in the elderly, the researchers employed the BLR (Binary Logistic Regression) and simple correlation coefficient approaches. Through these analyses, 13 elements were identified as the most significant determinants impacting the QoL of the elderly. Next, three configurations of Backpropagation Neural Networks (BPNN) were evaluated to determine the most effective model for predicting QoL. The examined configurations were CF-BP, FF-BP, and E-BP. Comparing the different ANN configurations, the CF-BP model with a structure of 13-16-1 demonstrated the best performance. It achieved a sensitivity of 0.95, specificity of 0.97, accuracy of 0.96, F-Score of 0.96, Positive Predictive Value (PPV) of 0.95, and Negative Predictive Value (NPV) of 0.97. The results of Ahmadi and Nopour's study indicate that their CDSS, utilizing the CF-BP model, is highly effective in

predicting the QoL of the elderly population. The chosen model demonstrates strong performance metrics, suggesting its potential for practical applications in healthcare settings.

Artificial intelligence (AI) has shown great promise in the field of healthcare, particularly in assisting physicians with diagnosing complex and heterogeneous illnesses. Decision support systems (DSS) that utilize AI have been developed to assist with the diagnosis of various mental disorders, including Attention-Deficit/Hyperactivity Disorder (ADHD), depression, and schizophrenia.

Delavarian et al. (2012) conducted research aimed at developing a Decision Support System (DSS) to differentiate children with Attention-Deficit/Hyperactivity Disorder (ADHD) from other related behavioral illnesses. The study specifically focused on distinguishing ADHD from conditions such as depression, anxiety, comorbid depression and anxiety, and conduct disorder. The objective of the study was to create a reliable and accurate system that could assist in the identification and classification of ADHD among children, while distinguishing it from other similar behavioral disorders. By developing a robust DSS, the researchers aimed to improve diagnostic accuracy and provide appropriate intervention and treatment strategies for children with ADHD. Delavarian et al.'s research emphasizes the importance of accurate differentiation between ADHD and other related behavioral illnesses. By implementing their DSS, healthcare professionals can make informed decisions and provide tailored interventions based on the specific diagnosis. The development of such a system contributes to the advancement of clinical practice and enhances the overall care and well-being of children with ADHD. To categorize the illnesses based on indications and symptoms, the system used Radial Basis Function and multilayer neural networks. The average accuracy for multilayer and radial basis function networks was 95.50% and 96.62%, respectively. The authors came to the conclusion that the DSS, particularly the RBF network, might be a useful tool for supporting psychiatrists in the diagnosis of high-risk behavioral problems in children.

Similarly, Ekong et al. (2012) developed an intelligent DSS for diagnosing depression. The system utilized a neuro-fuzzy-Case Base Reasoning (CBR) hybrid that retained previous solutions to assist physicians in diagnosing depression. The system represented depression by categorizing 25 symptoms into five groups, with fuzzy logic managing inaccurate symptoms. The system described in the text employed a combination of techniques to determine the local similarity between input and retrieved examples. The absolute deviation was utilized as the distance metric to assess the similarity between the input and retrieved examples. This metric allowed for a quantitative measurement of the dissimilarity between the data points. In addition, the system employed an adaptive neuro-fuzzy inference system to handle fuzzy rules. Fuzzy logic and fuzzy rule-based systems are known for their ability to handle imprecise or uncertain information. By using an adaptive neuro-fuzzy inference system, the system was able to capture and represent fuzzy rules that captured the relationships and patterns within the data. By combining the absolute deviation distance metric and the adaptive neuro-fuzzy inference system, the system aimed to provide a comprehensive and robust approach to assess local similarity and handle fuzzy rules. This integrated methodology allowed for a more nuanced analysis of the input and retrieved examples, enhancing the system's ability to make accurate

assessments and decisions based on the data. The system then ranked the retrieved cases based on global similarity, upon which the 5 best-matched cases underwent an emotional filter for diagnostic decision-making. The authors concluded that the hybrid approach was effective in diagnosing depression, with the tools complementing one another.

Another study, conducted by Razzouk et al. (2006), focused on developing a clinical DSS for diagnosing schizophrenia spectrum disorders (SADDESQ). The system's development occurred in four stages: knowledge acquisition, knowledge organization, computer-assisted model development, and system performance evaluation. Knowledge was extracted from an expert through open interviews, a graph-based methodology was utilized to identify the components engaged in the process of diagnostic decision-making. Algorithms were used to organize and model the knowledge, which was then transferred to a computational model using the covering approach. The system's performance was evaluated through comparison of diagnoses between an expert and the SADDESQ, with an accuracy of 66-82% demonstrated by the system. The authors concluded that the system was effective in diagnosing schizophrenia and had a relatively low rate of misclassification.

Rad et al. (2022) predicted preschool instructors' technology adoption behavior using a radial basis function neural network (RBFNN). The system used the TAM, which has eight dimensions: perceived utility, perceived enjoyment, intention to use, perceived ease of use, actual usage, compatibility, attitude, and self-efficacy. In reference to the TAM, the other seven factors strongly predict actual usage. Based on these variables, the scientists used the RBFNN technique to predict technological acceptance behavior. The results showed that the system was effective in predicting technology acceptance behavior, with the RBFNN approach being a valuable tool in modeling the behavior of preschool teachers.

In conclusion, DAS utilizing AI have shown promise in assisting physicians with diagnosing various mental disorders, including ADHD, depression, and schizophrenia. The studies reviewed above demonstrated the effectiveness of DAS utilizing different AI techniques, including radial basis function and multilayer neural networks, neuro-fuzzy-Case Base Reasoning, and the covering approach. These studies highlight the potential of AI in assisting physicians with diagnosing complex and heterogeneous illnesses, which could lead to more accurate and timely diagnoses and ultimately better patient outcomes.

4. Conclusions

The studies discussed in this scoping review underscore the transformative potential of artificial intelligence (AI) in the realms of psychology and mental health. These investigations reveal that AI can serve as a powerful tool for enhancing various facets of the field. From improving decision-making processes to predicting psychological conditions, countering detrimental psychological impacts on individuals and society, to even assisting in the preliminary screening and grading of childhood autistic disorders, the applications of AI are vast and impactful.

Moreover, the development of innovative tools like the Psychometric Item Generator (PIG) and the creation of hybrid intellectual systems based on fuzzy cognitive maps, hierarchy

methods, and artificial neural networks further exemplify the capacity of AI to augment and refine human decision-making and problem-solving skills within the context of psychology and mental health.

Additionally, these studies indicate that AI holds the potential to revolutionize educational institutions by ushering in personalized learning experiences, enhancing decision-making, and promoting cost-effectiveness. As AI technology continues its rapid advancement, it opens doors to further innovations in the realms of psychology and mental health. These innovations hold the promise of delivering superior outcomes for patients, students, and society as a whole.

In summary, the studies we have reviewed demonstrate the profound potential of Artificial Neural Networks (ANNs) within Decision Adoption Systems (DAS). They hold the power to significantly improve the diagnosis, treatment, and overall quality of life for individuals grappling with mental disorders and the elderly. Despite the promise they exhibit, it's crucial to recognize that these DAS are still in their nascent stages and confront several challenges. These challenges encompass the absence of standardized diagnostic criteria, the imperative need for more rigorous research to ascertain the effectiveness of AI-based DAS, and the necessity to address the ethical and privacy considerations associated with AI utilization in healthcare.

While the findings from these studies are encouraging, indicating the viability of Artificial Neural Networks (ANNs) in Decision Adoption Systems (DAS) to aid clinicians in diagnosing various mental disorders, there's an evident need for further research and development to refine these systems and seamlessly integrate them into clinical practice. The potential benefits of AI in healthcare are substantial, yet the responsible and ethical deployment of this technology remains paramount, with a steadfast focus on enhancing patient outcomes and elevating the overall quality of care.

To conclude, these reviewed studies provide compelling evidence for the efficacy of Artificial Neural Networks (ANNs) within Decision Adoption Systems (DAS) for assisting physicians in diagnosing a range of mental disorders. These DAS, leveraging diverse AI techniques, have demonstrated remarkable accuracy in diagnosing conditions such as ADHD, depression, and schizophrenia. By enabling more precise and timely diagnoses, they facilitate appropriate and effective treatment, ultimately contributing to superior patient outcomes. The success of these systems underscores the vast potential of AI in supporting clinicians in diagnosing complex and heterogeneous illnesses, establishing a solid foundation for future research in this dynamic field.

Looking ahead, future studies should explore the broader applications of Artificial Neural Networks (ANNs) in Decision Adoption Systems (DAS) across various dimensions of mental health, thereby expanding the horizons of AI in healthcare and advancing the quest for enhanced patient outcomes.

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5. Limitations

Despite the promising prospects of Artificial Neural Networks (ANNs) in Decision Adoption Systems (DAS) across various facets of psychology and mental health, it is essential to recognize and address several inherent limitations:

1. Emphasis on Development and Validation: The majority of the studies under review predominantly concentrate on the development and validation of ANN-based DAS, rather than their direct clinical application. While these investigations lay a solid foundation, their real-world clinical effectiveness remains to be comprehensively evaluated. Future research must bridge this gap by examining how these systems perform in practical clinical settings.
2. Limited Generalizability: Many of the reviewed studies are context-specific, conducted within distinct populations or geographical regions. This context specificity may restrict the broad applicability of their findings to diverse populations with varying cultural, demographic, and clinical characteristics. Consequently, there is a need for research that investigates the generalizability of AI applications in mental health across a more extensive spectrum of populations.
3. Ethical and Privacy Concerns: The integration of AI in mental health raises significant ethical and privacy concerns. There is a looming risk that AI technologies may inadvertently perpetuate biases and reinforce existing disparities within mental healthcare. Additionally, questions surrounding the security and confidentiality of patient data in AI-based systems necessitate careful consideration and safeguards.
4. Resource and Accessibility Challenges: The development, deployment, and maintenance of ANN-based DAS require substantial resources and specialized expertise. This presents a potential barrier for smaller healthcare providers or institutions in low-income regions, potentially exacerbating disparities in access to mental healthcare services. Addressing these resource and accessibility challenges is vital to ensuring equitable access to AI-driven mental health solutions.
5. Ongoing Monitoring and Evaluation: The continuous monitoring and evaluation of ANN-based DAS are imperative to ensure their sustained safety and effectiveness. This endeavor demands sustained investment, interdisciplinary collaboration between researchers, healthcare providers, and policymakers, and a commitment to refining and optimizing these systems over time.

In summation, while the promise of AI in the realm of mental health is undeniable, it is equally vital to acknowledge and confront these multifaceted limitations and challenges. Responsible and ethical utilization of AI in mental healthcare necessitates a concerted focus on enhancing patient outcomes and elevating the overall quality of care while proactively addressing these critical issues. By doing so, the potential of AI to revolutionize mental health can be harnessed responsibly and inclusively, benefitting individuals and communities alike.

6. Implications for Future Research

The results of this scoping review provide important implications for future research in this area. Further research is needed to address the limitations of using ANNs in DAS for psychological data interpretation, such as improving the quality of data and developing more robust ANN models that can generalize to new data. Additionally, future research should investigate the ethical implications of using ANNs in psychological data interpretation, such as issues related to privacy and transparency.

The studies discussed in this synthesis demonstrate the potential of artificial intelligence (AI) to revolutionize the field of psychology and mental health. AI-based DAS have shown promise in improving decision-making processes, predicting psychological conditions, assisting in countering destructive psychological impact, and screening and grading childhood autistic disorder. Moreover, innovative tools like the Psychometric Item Generator (PIG) and hybrid intellectual systems based on fuzzy cognitive maps, the method of hierarchies, and artificial neural networks have shown the potential of AI to augment and improve human decision-making and problem-solving abilities.

The use of AI in psychology and mental health can also bring personalized learning experiences, improved decision-making, and cost-effectiveness to educational institutions. As the technology continues to develop, further innovations in the field of psychology and mental health could lead to better outcomes for patients, students, and society as a whole.

The findings from these studies also highlight several challenges that need to be addressed before ANN-based DAS can be integrated into clinical practice. One of the major challenges is the lack of standardized diagnostic criteria. The diagnosis of mental disorders is complex and often subjective, making it difficult to develop standardized criteria for AI-based DAS. Another challenge is the need for more research on the effectiveness of AI-based DAS. While the initial results are promising, more research is needed to assess their effectiveness in real-world settings.

Moreover, there are ethical and privacy concerns related to AI usage in healthcare that need to be addressed. The use of AI in psychology and mental health raises questions about who will be responsible for the decisions made by the AI systems, how the data collected by these systems will be used, and how to ensure that the AI systems are transparent and accountable.

Despite these challenges, the findings from these studies suggest that AI-based DAS systems have the potential to be an effective tool for clinicians in treating patients with mental disorders and the elderly. The use of AI could lead to more accurate and timely diagnoses, allowing for appropriate and effective treatment, ultimately leading to better patient outcomes. The success of these systems highlights the potential of AI in assisting physicians in diagnosing complex and heterogeneous illnesses and provides a framework for further research in this area.

The studies discussed demonstrate the potential of artificial intelligence (AI) in various domains related to psychology and mental health, indicating the increasing maturity of AI technology in these fields. As ANN technology continues to develop, there is great potential

for further innovations in the field of psychology and mental health, which could lead to better outcomes for patients, students, and society as a whole. However, it is important to acknowledge that ANN-based DAS are still in the early stages of development and require further research and refinement to fully realize their potential.

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