IOP20HEN - Plagialism Check

by Admi Syarif

Implementation of Various Artificial Intelligence Approach for Prediction and Recommendation of Personality Disorder Patient

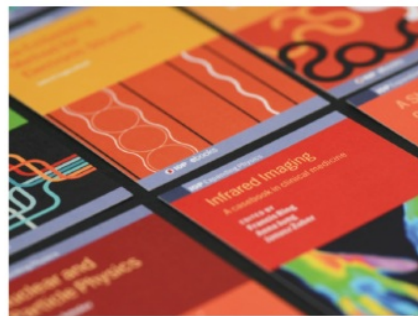# Implementation of Various Artificial Intelligence Approach for Prediction and Recommendation of Personality Disorder Patient

H Sulistiani[1,2]**, K Muludi**[3*]**, A Syarif**[4]

[1] Doctoral Program of Mathematics and Natural Sciences Faculty, University of Lampung, Jl. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia.
[2] Faculty of Engineering and Computer Science, Universitas Teknokrat Indonesia, Jl. ZA. Pagaralam No. 9-11, Bandar Lampung, Indonesia.
[3,4] Department of Computer Science, Faculty of Mathematics and Science, University of Lampung, Jl. Sumantri Brojonegoro No. 1, Bandar Lampung, Indonesia.

email: henisulistiani@teknokrat.ac.id[1], kmuludi@fmipa.unila.ac.id[3], admi.syarif@fmipa.unila.ac.id[4]

Abstract. Personality disorder is known as chronic psychological disorders. It is a serious problem of the individual character and behavior that affect work, family and social life of a person. In many cases, the possibility of people do not realize that they have a personality disorder as a way of thinking and behaving seems natural to the patient, and the patient may blame others. To diagnose a personality disorder early, it is necessary to develop a system that is able to predict personality disorders and recommendation type of therapy patients should undergo. Artificial Intelligence is a technique that is very popular today. Various kinds of approaches and algorithms can be applied in the world of health, such as expert systems, neural networks and fuzzy logic. The aim of this study is to assess the artificial intelligence approach in predicting and recommending the type of therapy for patients with personality disorders.

Keyword: artificial intelligence, expert system, fuzzy logic, neural network, personality disorder.

1. Introduction

Personality greatly affects the way a person interacts in his environment. So, it is often found in the environment there are some people who have a tendency to experience personality disorders [1]. The emergence of personality disorders stems from the presence of stress, which then has an impact on suppressing certain feelings and behaving like people who experience stress in general [2]. Based on WHO data (2016), there are around 35 million people affected by depression, 60 million people with bipolar disorder, 21 million affected by schizophrenia, and 47.5 million affected by dementia. Meanwhile, according to the Hasil Riset Kesehatan Dasar (Riskedas) in 2018, it shows that the prevalence of mental emotional disorders that have symptoms of depression and anxiety for those aged 15 years and over reaches around 6.1% of the total population of Indonesia. The prevalence of serious

mental disorders, such as schizophrenia reaches around 400,000 people or as much as 1.7 per 1,000 population [3].

This is not comparable to the number of clinics in Indonesia, only around 2,717 according to data available from the Ikatan Psikolog Klinis (IPK). The limited number of clinicians will cause problems in terms of speed in establishing a diagnosis, because each patient has to wait for a clinician's queue schedule to consult as well as carry out treatment therapy [4]. In addition, the method used to diagnose patients using traditional methods is mostly based solely on the patient's verbal reports and lengthy interview sessions with medical professionals, the results of which can be subjective, costly and take a long time [5]. So we need tools to facilitate the performance of a psychologist or psychiatrist in diagnosing patients suffering from personality disorders.

Artificial intelligence-based applications are being quickly developed for psychiatrist research and diagnosis [6]. In recent years, various techniques have been developed to be able to access personality and have been refined by researchers [7] and there have been applications developed to determine patient personality disorders such as online or smartphone-based applications [8]. However, until now there have been no studies that discuss various kinds of artificial intelligence approaches to predict and recommend therapy for patients with personality disorders. Therefore, this study will conduct an assessment of various kinds of artificial intelligence approaches used to predicting and recommending the types of therapy needed by patients with personality disorders.

This paper is organised as follows: Section 2 provides an overview of the artificial intelligence approach used to predict personality disorders. This section will discuss in detail the popular approaches to personality disorder prediction. Section three will present will discuss the discussion and results. The last section will present the conclusions from the discussion and the results of the research review.

2.   Artificial Intelligence Approach

Predicting computerized personality disorder is one of the new research areas and will be a topic of discussion in the future. Not many literature surveys have been conducted to predict personality disorders and this study is the first to provide readers with broad knowledge of the latest trends and developments in the application of various artificial intelligence approaches to predicting personality disorders.

Artificial intelligence has received tremendous attention in recent years from academia, industry and the general public. The main part of the application of artificial intelligence is the existence of knowledge which is an understanding of several subject areas obtained through education and experience. Although it is not easy to gain experience or learn and research like humans, computers are able to obtain the necessary knowledge information through the presence of an expert. With the knowledge and ability to draw conclusions from experience, computers can be used as practical tools for solving problems and making decisions.

Artificial Intelligence technology is no longer a futurological realm but an integral component of an organization's business model and a key strategic element in the plans of the business, medical and government sectors on a global scale [9]. Artificial intelligence has a variety of different approaches, from top-down knowledge representation to bottom-up machine learning [10]. Increasingly, artificial intelligence techniques and mathematical modeling are being introduced to help solve problems in mental health research [6]. This artificial intelligence technique is able to obtain detailed information to determine traits in predicting personality disorders [11]. As the capabilities of computer processors have increased, various artificial intelligence-based methods have been developed as approaches to modeling complex problems [12]. There are also many artificial intelligence techniques that have been used for the decision-making process. These techniques are based on artificial intelligence approaches, such as expert systems, neural networks, case-based reasoning and Fuzzy Logic [13].

2.1. Expert System

Artificial intelligence techniques are generally used to develop expert system software, which is a program capable of acting as a smart advisor or consultant. Expert system is one of the areas of artificial intelligence. With an expert system, even ordinary people can solve problems or seek quality information that comes from experts in their fields without having to meet face to face. An expert system also known as knowledge based system is a computer program that contains the knowledge and analytical skills of one or more human experts in a specific problem domain [14]. Several studies have been conducted to develop expert systems for predicting personality disorders using methods applicable to expert systems. Such as the application of the Certainty Factor method [15][16][17], Dempster Shafer [17], procedural Rule-Based Expert System (RBES) [18]. The expert system developed can determine the type of personality disorder based on the symptoms experienced and provide information on how to handle it according to the type of personality disorder.

Expert system consists of three main components, namely user interface, inferece engine, and knowledge base. These components can be seen in Figure 1.
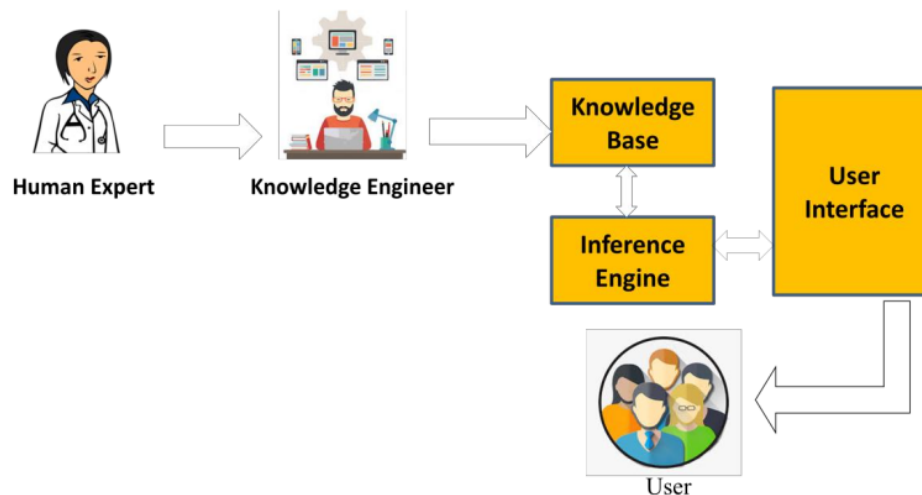

Figure 1. Components of the Expert System

From figure 1, it can be seen the user interface is the most crucial part of the expert system. This component takes the user's query in a readable form and passes it to the inference engine. After that, it displays the results to the user. In other words, it's an interface that helps the user communicate with the expert system. While the inference engine is the brain of the expert system and the knowledge base is a repository of facts.

2.2. Neural Network

Neural Network is an Artificial Intelligence method whose concept mimics the existing neural network system in the human body, where nodes are built that are interconnected with one another. Neural Network method is a method that has good performance in overcoming nonlinear data problems, but this method has limitations in overcoming high noise data. Neural networks are formed as a generalization of the mathematical model of biological neural networks, with the assumption that information processing occurs in many simple elements (neurons). Neural networks can have a variety of different structures for each neuron [19] and have a large number of advantages compared to other calculation methods, namely the ability to acquire knowledge even in conditions of disturbance and uncertainty, this is because neural networks are able to generalize, abstract, and extract statistical

properties from data [20]. Neural networks have been used by several researchers in medical health, such as to predict personality disorders [21][22][23][24].

2.3. Case-Based Reasoning

Case Based Reasoning (CBR) is a method of reasoning in the field of artificial intelligence that can be used to assist in the decision-making process. In this method, there are four processes that must be done in solving the problem, including retrieve, reuse, revise and retain. These processes can be seen in Figure 2 [25].
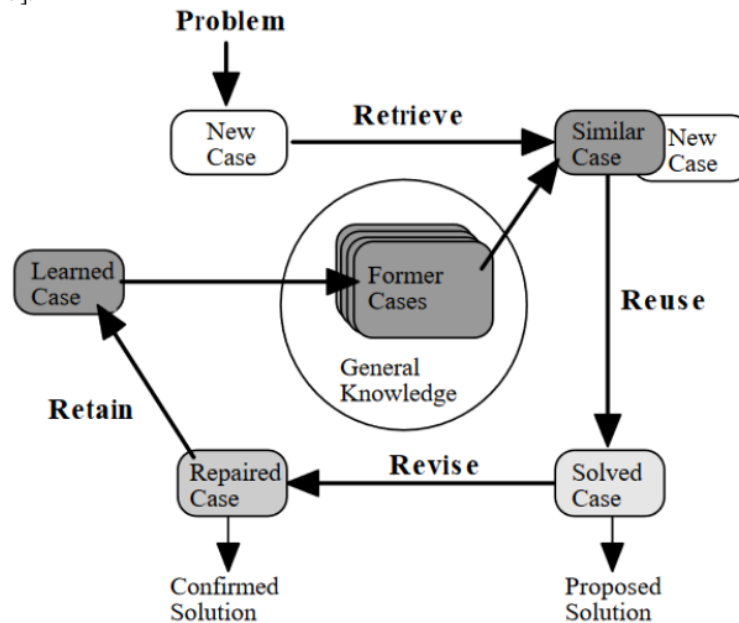

Figure 2. Process of the CBR [25]

CBR has become a successful technique for knowledge-based systems in many domains, while in medical domains some more problems arise to use this method. Such as implementation CBR for assessment and diagnosis of depression [26], for mental health [27].

2.4. Fuzzy Logic

Fuzzy Logic is an approach to computation based on the degree of truth which is usually stated as true or false / 1 or 0. Fuzzy logic can be used in various fields, such as disease diagnosis systems (in medicine), marketing system modeling, operations research (in economics), water quality control, earthquake prediction, classification and pattern matching. In medicine, fuzzy logic is also used to predict stress levels [28][29], the level of depression of a person [30] and mental disorder [31], which is a personality disorder. Fuzzy logic has become a very popular area of research because of its ability to bridge precise machine language with human language that tends to be imprecise, by emphasizing meaning or meaning.

3. Methodology

A scoping review methodology was chosen to achieve this article goal of mapping the state of the field of artificial intelligence in personality disorder. We search three databases to find related research article: (1) ScienceDirect, (2) IEEE, (3) Springer. In searching these databases, we used the keyword "Artificial Intelligence", "Personality Disorder", "Machine Learning" and "Mental Health". the criteria used to select articles are (i) the article was written in English and published within the past four years (2017 – 2020); (ii) the article discussed the artificial intelligence application and method in the detection personality disorder; (iii) the article discussed the different types of personality disorder and how treat them. Articles were excluded if the following criteria were met: (i) The article does not contain a specific discussion of applications and methods of artificial intelligence for personality disorders; (ii) the article was a theoretical discussion that is used as a course material or tutorial; (iii) the articles only contain abstracts or certain sections.

4. Discussion and Result

In this section, we analyzed individual papers in detail, discussing various techniques, approaches and methods. This article aims to assessment the literature on artificial intelligence for personality disorder, highlighting current research and application in practice. based on a review of research articles using NVIVO, the results are obtained personality disorder were identified in various key domain, can be seen figure 3.

Figure 3. Various key domain of Personality Disorder

The application of artificial intelligence applications to diagnose personality disorders can improve diagnostic results. Besides that, the application of artificial intelligence are improve the efficiency of clinical and research pro-cesses and to generate new insights into personality disorder and well being. The results of the assessment of research articles regarding the artificial intelligence approach to personality disorders can be seen in table 1.

Table 1. Various artificial intelligence approach for predicting and recomendating of personality disorder

References	Method	Type of Personality Disorder	Data
[15]	Expert System with Certainty Factor method	Personality Disorder: Paranoid, Anti-Social,	10 (ten) patients whose mental disease was observed by 2

References	Method	Type of Personality Disorder	Data
		Histrionics, Obsessive Compulsive, Worried and Dependent	physciatrics. For their descriptions of personality disorders with the symptom codes
[16]	Expert System with Certainty Factor method	Three groups based on the characteristics and symptoms: - Cluster A Schizoid, schizotypal, paranoid - Cluster B Histrionics, narcissistic, borderline, antisocial - Cluster C Avoidance, dependent, obsessive-compulsive	Symptom data and way of handling patient
[17]	Certainty Factor and Dempster Shafer	Paranoid, schizoid, histrionic, schizotypal, narcissi, antisocial, borderline, avoidant, dependent, obsessive-compulsive	20 medical records from the Counseling Guidance Laboratory
[18]	Rule-Based Expert System (RBES)	Psychological anxiety, Obsessive-compulsive disorder, hysteria, depression	23 symptoms
[21]	Neural Network	Borderline personality disorder	BPD behavior and consult the literature
[22]	Convolutional Neural Network and Long Short-term Memory	Mood disorder	Emotional speech data from 15 people with BD, 15 people with UD, and 15 healthy controls
[23]	Neural Network	Major Depressive Disorder	Functional magnetic resonance imaging (fMRI) in 37 MDD patients and 33 healthy controls
[24]	Neural Network	Complex Trauma Disorder	Measurement point of treatment, subjects filled out questionnaires and performed an EEG experiment
[26]	Case-Based Reasoning	Depression	Static background data and patient journal data, in addition to answers to questionnaires: The PHQ PRIME-MD, and ESAS (Edmonton Symptom Assessment Scale), which assesses 9 commonly experienced symptoms of palliative care patients including anxiety and depressed mood

References	Method	Type of Personality Disorder	Data
[27]	Case-Based Reasoning	Mental disorders except Personality Disorders and Mental Retardation	Used 30 different features collected during the pre-test
[28]	Fuzzy Logic	Stress Level	Using multimodal biosensor, blood pressure, heart rate (ECG), respiration rate, and heart rate are measured repeatedly and data are collected from four persons
[29]	Fuzzy Logic	Stress Level	Temperature, physical activity and humidity data obtained from the sensor
[30]	Fuzzy Logic	Depression	Physiological attributes (e.g. Age, BMI, systolic blood pressure (SBP), 9-item patient health questionnaire (PHQ-9)) are recorded and where psychological symptoms are suspected, a DSM-IV criteria PHQ-9 depression test
[31]	Fuzzy Logic	Mental disorder	Data from filling out questionnaires that were distributed to 16 selected respondents. the data consists of a list of symptoms and types of disorders

Based on table 1, information is obtained that personality disorders are divided into several types, among others Paranoid, Anti-Social, Histrionics, Obsessive-Compulsive, Worried, Dependent, Schizoid, Histrionic, Schizotypal, Narcissi, Borderline, Avoidant, Psychological Anxiety, Hysteria, Depression, Mood disorder, Stress and Mental Disorder. The process of predicting personality disorders can be done through medical records, BPD behavior, Emotional speech, Functional magnetic resonance imaging (fMRI), Measurement point of treatment, Subjects filled out questionnaires, Performed an EEG experiment, Static background data, Patient journal data, Multimodal biosensor, Blood pressure, Heart rate (ECG), Respiration rate, Heart rate, Temperature, Physical activity and Humidity data, and Physiological attributes.

There are various ways and symptoms of personality disorders, causing traditional methods to predict personality disorders to be inaccurate and take a long time. The continuous development of clinical examination technology and artificial intelligence technology can not only greatly reduce costs, but also obtain assistant diagnosis results in real time. Artificial Intelligence can help doctors to provide more accurate and efficient diagnoses [32][33], so as to improve the results of the accuracy of the clinical diagnosis of the disease.

Although artificial intelligence has had a huge impact in diagnosing personality disorders, there are still many areas of research that need to be developed using artificial intelligence technology [34]. Previous research is only based on the application of the classic shallow learning algorithm, it has not been able to be applied to high-dimensional features. Therefore, it is necessary to develop an application by applying deep learning for future research.

5. Conclusion

For diagnose personality disorders, there are personality types with a large number of symptoms, and there are overlapping factors of symptoms between one personality type and another. So that it causes difficulty in building a diagnosis and choosing the right treatment therapy for patients with personality disorders.

6. Acknowledgments

[1] K. Nasution, Huzaeni, and A. Fata 2018 Sistem Pakar Diagnosa Penyakit Mata Menggunakan Metode Dempster Shafer Berbasis Web, *Proceeding Semin. Nas. Politeknik Negeri Lhokseumawe*, vol. 2, no. 1, pp. 33–43.

[2] A. Johar and D. D. Palupi, 2014 Implementasi Metode Frame untuk Mendiagnosa Gangguan Kepribadian Dramatik Menggunakan Sistem Pakar *Journal Rekursif*, vol. 2, no. 2, pp. 72–80, 2014.

[3] I. Maulana, A. Sriati, T. Sutini, E. Widianti, I. Rafiah, and N. O. Hidayati 2019 Penyuluhan Kesehatan Jiwa untuk Meningkatkan Pengetahuan Masyarakat tentang Masalah Kesehatan Jiwa di Lingkungan Sekitarnya *Media Karya Kesehatan*, vol. 2, no. 2, pp. 218–225.

[4] A. Noor 2019 Sistem Pakar Diagnosa Gangguan Kepribadian *Journal Hum. Technology.*, vol. 5, no. 2, pp. 33–41.

[5] S. Jaiswal and M. Valstar 2019 Automatic Prediction of Depression and Anxiety from Behaviour and Personality Attributes *2019 8th International Conference Affective Computing Intelligence Interaction*, pp. 1–7, 2019.

[6] G. Liu, Y. Li, W. Zhang, and L. Zhang 2020 A Brief Review of Artificial Intelligence Applications and Algorithms for Psychiatric Disorders *Engineering*, vol. 6, no. 4, pp. 462–467.

[7] S. Raj and S. Masood 2020 Analysis and Detection of Autism Spectrum Disorder Using Machine of Learning Analysis and Detection Autism Techniques Spectrum Disorder Using *International Conference Computing Intelligence Data Science (ICCIDS 2019)*, vol. 167, no. 2019, pp. 994–1004.

[8] A. Z. Antosik-wójcinska *et al.*, 2020 Smartphone as a Monitoring Tool for Bipolar Disorder : a Systematic Review Including Data Analysis, Machine Learning Algorithms and Predictive Modelling, *International Journal of Medical Informatics - Elsevier*, vol. 138, November.

[9] Y. K. Dwivedi *et al.* 2019 Artificial Intelligence (AI): Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Agenda for Research, Practice and Policy *International Journal Information Management*, August, pp. 2–47.

[10] Y. Hu *et al.* 2019 Artificial Intelligence Approaches, in *The Geographic Information Science & Technology Body of Knowledge (3rd Quarter 2019 Edition)*, pp. 1–12.

[11] A. Jan *et al.* 2018 Artificial Intelligent System for Automatic Depression Level Analysis Through Visual and Vocal Expressions I*EEE Transactions on Cognitive and Developmental Systems*, vol. 10, no. 3, pp. 668–680.

[12] A. Seyedzadeh, S. Maroufpoor, E. Maroufpoor, and J. Shiri, 2019 Artificial Intelligence Approach to Estimate Discharge of Drip Tape Irrigation Based on Temperature and Pressure *Agricultural Water Management - Journal - Elsevier*, November, pp. 1–11.

[13] L. C. Nunes, P. R. Pinheiro, and T. C. P. Graduate, 2009 An Expert System Applied to the Diagnosis of Psychological Disorders in *IEEE International Conference on Intelligent Computing and Intelligent Systems*.

[14] K. P. Tripathi, 2011 A Review on Knowledge-based Expert System : Concept and Architecture *International Journal of Computer Applications - IJCA Specific Issue Artificial Intelligence Technology Approaches Practice Application*, pp. 19–23, 2011.

[15] T. B. Adji, C. P. B. R, and A. E. Permanasari 2015 Expert System for Diagnosis of Personality Disorders with Certainty Factor Approach in *International Conference on Electrical Engineering, Informatics, and Its Education* pp. 116–120.

[16]   C. P. B. Randa and A. E. Permanasari 2014 Development of Diagnosis Expert System for Personality Disorders in *Makassar International Conference on Electrical Engineering and Informatics (MICEEI)* November, pp. 180–183.

[17]   D. T. Yuwono, A. Fadlil, and Sunardi 2019 Comparative Analysis of Dempster-Shafer Method and Certainty Factor Method On Personality Disorders Expert Systems *Scientific Journal of Informatics* vol. 6, no. 1, pp. 12–22.

[18]   A. A. Al-hajji, F. M. Alsuhaibani, and N. S. Alharbi 2019 An Online Expert System for Psychiatric Diagnosis," *International Journal of Artificial Intelligence & Applications*, vol. 10, no. 2, pp. 59–76.

[19]   M. M. Mijwil and A. Alsaadi 2019 Overview of Neural Networks *Comput. Eng. Tech. Dep. Baghdad Coll. Econ. Sci. Univ. Iraq*, no. April.

[20]   P. K. L. Utama 2010 Implementasi Metode Neural Network Pada Perancangan Pengenalan Pola Plat Nomor Kendaraan in *Konferensi Nasional Sistem & Informatika 2015*, pp. 9–10.

[21]   C. H. Berdahl 2010 A Neural Network Model of Borderline Personality Disorder *Neural Networks*, vol. 23, no. 2, pp. 177–188.

[22]   K. Huang, C. Wu, and M. Su 2018 Attention-based Convolutional Neural Network and Long Short-term Memory for Short-term Detection of Mood Disorders based on Elicited Speech Responses *Attention-based Convolutional Neural Netw. Long Short-term Mem. Short-term Detection Mood Disordoder based Elicited Speech Responses*, Desember.

[23]   E. Bilek *et al.* 2019 Neural network-based alterations during repetitive heat pain stimulation in major depression *Europe Neuropsychopharmacol.*, pp. 1–8.

[24]   Y. R. Schlumpf, E. R. S. Nijenhuis, C. Klein, L. Jäncke, and S. Bachmann 2019 Functional Reorganization of Neural Networks Involved in Emotion Regulation Following Trauma Therapy for Complex Trauma Disorders *Neuro Image Clin.*, vol. 23, no. December.

[25]   R. Schmidt and L. Gierl 2000 Case-based Reasoning for Medical Knowledge-based Systems.

[26]   A. Aamodt, O. E. Gundersen, J. H. Loge, E. Wasteson, and T. Szczepanski 2010 Case-Based Reasoning for Assessment and Diagnosis of Depression in Palliative Care in *Proceedings of the IEEE Symposium on Computer-Based Medical Systems*.

[27]   R. Janssen, P. Spronck, and A. Arntz 2014 Case-Based Reasoning for Predicting the Success of Therapy *Expert System*.

[28]   Y. Jung and Y. I. Yoon 2017 Multi-level Assessment Model for Wellness Service Based on Human Mental Stress Level *Multimed Tools Application*, vol. 76, pp. 11305–11317.

[29]   L. Rachakonda and E. Kougianos 2018 A Smart Sensor in the IoMT for Stress Level Detection in *2018 IEEE International Symposium on Smart Electronic Systems (iSES) (Formerly iNiS)*, pp. 141–145.

[30]   E. Victor, O. Uyinomen, E. Enobakhare, Festus, and E. A 2014 A Fuzzy Inference System for Predicting Depression Risk Levels *African Journal Mathemathic Computer Science Resource*, vol. 6, no. January, pp. 197–204.

[31]   M. Silvana, M. Audina, R. Akbar, Derisma, and Firdaus 2018 Development of Classification Features of Mental Disorder Characteristics Using The Fuzzy Logic Mamdani Method in *2018 International Conference on Information Technology Systems and Innovation (ICITSI)*, pp. 410–414.

[32]   L. Zhang and S. Zhang 2017 Using Game Theory to Investigate the Epigenetic Control Mechanisms of Embryo Development: Comment on: 'Epigenetic Game Theory: How to Compute the Epigenetic Control of Maternal-to-Zygotic Transition' by Qian Wang et al. *Physical Life Rev.*, vol. 20, pp. 140–142.

[33]   L. Zhang, W. Tao, H. Feng, and Y. Chen 2017 Transcriptional and Genomic Targets of Neural Stem Cells for Functional Recovery after Hemorrhagic Stroke *Stem Cells Intillenge*, pp. 1–8.

[34]   U. R. Acharya, S. L. Oh, Y. Hagiwara, J. H. Tan, H. Adeli, and D. P. Subha 2018 Automated EEG-based Screening of Depression using Deep Convolutional Neural Network *Computing Methods Programs Biomedic*, vol. 161, pp. 103–113.

IOP20HEN - Plagialism Check

1 Guang-Di Liu, Yu-Chen Li, Wei Zhang, Le Zhang. "A Brief Review of Artificial Intelligence Applications and Algorithms for Psychiatric Disorders", Engineering, 2019
Publication
1%

2 Aamodt, Agnar, Elisabet Wasteson, Tomasz Szczepanski, Odd Erik Gundersen, and Jon Havard Loge. "Case-based reasoning for assessment and diagnosis of depression in palliative care", 2010 IEEE 23rd International Symposium on Computer-Based Medical Systems (CBMS), 2010.
Publication
1%

3 Submitted to iGroup
Student Paper
1%

4 Yogesh K. Dwivedi, Laurie Hughes, Elvira Ismagilova, Gert Aarts et al. "Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy",
1%

International Journal of Information Management, 2019
Publication

5   web.tuat.ac.jp
    Internet Source   1%

6   brain.edusoft.ro
    Internet Source   1%

7   La Ode Ichlas Syahrullah, Nazaruddin Sinaga.   1%
    "Optimization and Prediction of Motorcycle
    Injection System Performance with Feed-
    Forward Back-Propagation Method Artificial
    Neural Network (ANN)", American Journal of
    Engineering and Applied Sciences, 2016
    Publication

8   Submitted to Fakultas Teknologi Kebumian dan   1%
    Energi Universitas Trisakti
    Student Paper

9   link.springer.com
    Internet Source   1%

10 Submitted to Seevic College   1%
    Student Paper

11 epdf.pub
    Internet Source   1%

12 www.zora.uzh.ch
    Internet Source   1%

13 doctorpenguin.com
Internet Source
1%

14 Kun-Yi Huang, Chung-Hsien Wu, Ming-Hsiang Su. "Attention-based convolutional neural network and long short-term memory for short-term detection of mood disorders based on elicited speech responses", Pattern Recognition, 2019
Publication
1%

15 www.ieeetclt.org
Internet Source
1%

16 Specker, S.. "Psychopathology in subgroups of obese women with and without binge eating disorder", Comprehensive Psychiatry, 199405/06
Publication
1%

17 Larry R. Medsker. "Hybrid Intelligent Systems", Springer Science and Business Media LLC, 1995
Publication
1%

18 repo.unand.ac.id
Internet Source
<1%

19 Submitted to Universiti Putra Malaysia
Student Paper
<1%

20 www.researchgate.net
Internet Source
<1%

21 worldwidescience.org
Internet Source
<1%

22 doaj.org
Internet Source
<1%

23 Submitted to Udayana University
Student Paper
<1%

24 "Advances in E-Business Engineering for Ubiquitous Computing", Springer Science and Business Media LLC, 2020
Publication
<1%

25 ekp.fe.um.ac.id
Internet Source
<1%

26 researchportal.port.ac.uk
Internet Source
<1%

27 Asim Jan, Hongying Meng, Yona Falinie Binti A. Gaus, Fan Zhang. "Artificial Intelligent System for Automatic Depression Level Analysis Through Visual and Vocal Expressions", IEEE Transactions on Cognitive and Developmental Systems, 2018
Publication
<1%

28 wseas-computers.blogspot.com
Internet Source
<1%

29 journal.ugm.ac.id
Internet Source
<1%

| Exclude quotes | Off | Exclude matches | Off |
| Exclude bibliography | On | | |

IOP20HEN - Plagialism Check

FINAL GRADE

/0

GENERAL COMMENTS

Instructor