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Machine Learning Based Psychological Disease Support Model Assisting Psychoanalysts and Individuals in Clinical Decision Ministration

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Abstract: Mental Pressure is a significant contributor to an individual's health and is directly linked with various diseases including depression and mental disorder. It is therefore extremely important to monitor the patient's misbehavior. Therapeutic-psychology based on machine learning algorithms clearly concentrates on studying multifaceted datasets to deduce statistical features in order to create generalized projections about patients. A novel paradigm to develop Psychological Disease Support Model (PDSM) will be discussed through this research paper. This model will support diagnosis of various psychological diseases like schizophrenia, bipolar disorder and obsessive compulsive disorder. It will take some health parameters as input from end user, process that data based on machine learning approach and provides desired outcome in user friendly way. Existing methods of wellness surveillance continue to confront many difficulties owing to inadequate information from healthcare records. The proposed approach seeks to develop a scheme of autonomous choice assistance for an initial treatment of important psychological occurrences. Machine based learning is widely described as a methodology that automatically knows how to solve the issue optimally, instead of being programmed by natural beings in order to provide a set answer. The suggested model comprises of machine-learning based diagnostic system which pre-processes the data available and applies classification procedures on it. The main objective of proposed model is to create interventions to enhance the health scores of patients that will be useful for psychiatrists and dedicated hospitals. Scientifically evaluated results obtained from the proposed model will be compared with other models of similar kind. The paper will also discuss various barriers while designing a psychological disease diagnosis decision support system.

Keywords: Psychological Diseases, Decision Support System, Machine Learning, Health Informatics

1. INTRODUCTION

Psychotic disturbances, mood patterns, mental illnesses, disruptive character, numerous personalities etc are among the most severe issues under psychological illnesses. It can harm people, families or colleagues, and community as well. The most common and inhibiting circumstances in infancy and adulthood include psychotic diseases [1]. Regrettably, doctors and healthcare professionals are not properly educated to tackle these omnipresent issues. Technological advances can be the answer to this issue, which is mainly intended for experts to create sound clinical choices in real-time by the help of psychological disease support model. Psychological Informatics is a medical computer industry that integrates distinctive requirements and contexts of mental wellbeing into information technology domain. It involves EHRs, uniform electronic diagnostic evaluation variants, and IT tools that suit the patient's specific features and clinical information to an existing database and recommends therapy instructions [2].

The research paper presented here is organized into seven different sections. First section contains the introduction part which elucidate about different types of psychological diseases, their common causes and their impacts on individuals. This section also presents a block diagram for decision support algorithm for psychological diseases. Second section covers comprehensive literature review related with the proposed research work. It gives insights to various kinds of psychological diseases and the similar models developed so far to diagnose psychological diseases. Section third covers in detail about three main type of psychological diseases viz. Schizophrenia, Bipolar Disorder, and Obsessive Compulsive Disorder. The initial

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symptoms, side effects, and treatment recommendations by various psychologists for these diseases are covered in this section. Fourth section in this paper is dedicated to Proposed - Psychological Disease Support Model (PDSM). It provides the General Architecture of PDSM in the form of a diagram. It also explains about primary and secondary datasets used in this research work. The experimental results of the proposed model are covered under section five of this paper. In this section, accuracy of the proposed model is compared with other similar models. Results are also shown in the form of a graph under this section. In the sixth section, some hindrances related with diagnostic decision making process are covered. Finally, in the seventh section, discussions on results and conclusion are covered. After this, references and author's brief profiles are written.

Psychological behavioral principle portrays evolutionary behavior, determined by a mixture of views on how the impact of one's own conduct affects results or attitudes about one's ability to conduct. It is a cognitive framework that illustrates the connection between cognitive attitudes and examines the direct influences of cognitive purpose. It suggests that expectation is the strongest predictor of a person's behavior, but recognizes that expectation is often not conduct-predictive. The relationship between conduct and expectation is influenced by factors like time-span. This hypothesis claims that the purpose is to choose among cognitive options. It's also an awareness model of behavior connected to wellness. It says that measures are taken if motive or wellness concerns are adequate to bring the wellness problem into line. There is also the conviction that someone is vulnerable to the issue of hygiene and will decrease risk at small price pursuing wellness advice [3].

It is challenging to collaborate on psychiatric illness. Psychiatric problems are still hard to treat owing to the inherent absence of official limits, despite the quantity of data and decision-making structures accessible. The aid mechanisms for clinical choices vary from information promoters who guide decision-making to people with natural knowledge and counseling [4]. A significant tool for assessment of risk can be the synergistic mixture of scientific evidence and the clinical knowledge of the proposed model [5]. The method of assessing and measuring psychological conditions or the socio-cultural associations of individuals with probable psychological disorders may be described as a psychological evaluation. In particular, the diagnosis is used to identify if a person's symptoms fulfill all particular psychological disorder requirements [1].

Artificial intelligence is presently used for early diagnosis of psychological diseases, a clear understanding towards the growth of the disease, optimizing dosages of medication for individuals, etc. The quick pattern evaluation of large amounts of data is a major strength of artificially intelligent systems. Artificial intelligent systems can work in a way smarter than qualified physicians, by using pattern recognition techniques. Whilst these machines are unlikely to fully replace physicians, smart devices are more and more useful for psychologists to take medical decisions. Whereas the ability to understand & access information resources, experiences of human learning is restricted, artificial smart machines can easily refine data from a small number of medical references. Quite large data systems can be computerized to display individual conduct and their behavioral patterns that are often difficult for psychologists to retrieve. Because the science of psychological health is becoming increasingly popular in healthcare, still it is slower to embrace deep learning and artificial intelligence. It is because psychologists are more realistic and patient-centered, not machine dependent [6].

Machine learning is an active area of research in psychological diseases with a strong innovative capacity and perspective change, since these algorithms enable the incorporation and interpretation of historically unseen findings. Such methods are usually coded in following two critical steps. First, the knowledge from subjects is divided into two parts, known as training dataset and testing dataset and then training dataset is used to practice the learning model of a computer. Second, the testing dataset evaluates predictive precision, which consists of previously unseen observations and reports on algorithm efficiency [7].

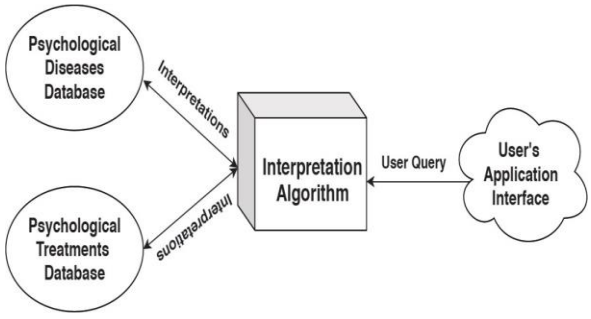

Figure 1. Block Diagram of Decision Support Algorithm for Psychological Diseases

As shown in figure 1, there are three main components in any psychological disease diagnosis decision support system. First component is Database Section, which is divided into two sub-components namely, Psychological Diseases Database and Psychological Treatments Database. These database components comprise all the psychological data and pieces of evidence involved in psychological disease diagnosis and data concerning the medicines to be used based on the sort of illness studied. Second component is Interpretation Algorithm which receives the input requests from the User's Application Interface and generates queries towards the database components through a bi-directional communication. Third component is User's Application Interface which is provided to the end person using the model. It permits the

entry of the clinical information within the database components through interpretation algorithm [10].

Wearable medical equipment can always be used to capture health-related signals. For the transmission of these impulses a wireless transmission network can be used [8]. Data obtained from wearable medical devices can be combined with support structures for disease diagnosis. Disease forecasting can be achieved extensively with machine-based learning algorithms and data storage and mining technologies. Different sensor types can be strengthened by body parts for useful information about the weather, temperature, light and humidity. All these instruments conduct the monitoring of the patient status. To this purpose, multi-band wireless communication system [9] can be established by many sensors included in a portable microwave device These sensors provide essential information in order to diagnose, treat and track patient actions. If the major information accumulated by the patient's medical records and/or clinical trials are effectively assessed, the remote monitoring scheme is seen as successful. This clinical history is used to determine the measures to avoid the disease. The flexibility required to effectively deal with big data is lacking in most remote control systems.

Medical supervision facilities, especially in the elderly population, including disabled and seriously ill people, can be instrumental in enhancing healthcare. The patient surveillance scheme has been greatly improved over the last twenty years. Presently, systems for diagnostic judgment assistance are regarded as the choice of clinicians for taking clinical decisions. These technologies offer doctors and patients prospective advantages for health monitoring and reduction of the workload assigned to medical personnel [11]. Many psychologist systems were created and their output was almost as great as domain specialists with skill set obtained from medical professionals. The main reason for their failure was their bad user interface and absence of fresh information. Different bodily detectors and surveillance devices are used nowadays to track people's cognitive reactions. It consists primarily of two parts: an integrated sensor for bodily signal transformation into digital ones and information handling unit for storage and handling of these signals [12].

International AI society has developed a number of expert systems related to various physiological and psychological diseases which are a subset of distributed artificial intelligence. Psychiatric treatment, biotechnology assessments, vector space analysis of DNA, knowledgebase management are some of the fields related to it. The underlying idea behind these frameworks is simply the ability that is transferred from person to device. The knowledge generated by these systems is stored on the computer server and can be requested by people when necessary. It is not always possible to deduce a final answer from the machine. It provides advice and explains as a natural counselor the reasoning behind the decision [2].

A discipline that arises in psychological disorders, psychopathology uses radiation imaging techniques. Brain scans have been able to develop gradually in the last 20 years of knowledge of disease and the effect of neurology medication. Thanks to such advancements, the use of these innovations in longitudinal diagnostics and individually tailored patient care choice for certain psychiatric disorders have become extremely important for radiologists. The above transition from analysis to medical research is the start of psychopathology development. Experiments of major mental disorders include bipolar disorder and anxiety show the prospective medical usefulness of the use of brain organizational and workable image processing to examine cerebral changes of mental illnesses. Depending on these advancements in psychological brain imaging science, increasing enthusiasm has been shown in the development of clinical diagnostics, predictions and medication management technologies. The clinical assessment of unknown and superposing psychological disorders has often been identified as diagnostic procedures in neuroscience. Such characteristics of psychiatrist diagnosis are distinct from many other medical fields that identify illnesses based on biological and patho psychological steps [13].

Significantly over the past 10 years, NLP has attained quite enough interest. The pursuit of positive results for mental illnesses is a concern to the application of natural language technologies in psychological disorders. For evaluating NLP based techniques, there are different types of methods available nowadays. The implementation of NLP based technologies within medical field is made also possible through machine learning and big data analysis. Medical NLP may be used in medical texts or is intended to produce a clinical result. Electronic Health Records incorporates data processing in medical practice to facilitate decision-making. For the diagnosis of diseases, natural language processing uses a number of texts, like notes from physician's prescriptions, and processes it. In different fields related to psychological disorders, technology can be useful to indicate the severity of the disease [14].

Recognizing similar patterns through computer trained software has shown potential for the identification and diagnosis of clinically identified mental disorders. SVM is commonly used to solve various testing of specific mental disorders. It has shown brain disorders trends that discriminate between individuals. In a variety of mental conditions such as OCD, bipolar disorder, and schizophrenia, this approach has been used for functional brain imaging. More sophisticated techniques such as deep learning have also been progressively used in previous years to study the brain imaging characteristics of neural and psychological disorders. These techniques diverge in their ability to analyze the ideal autonomy of the brain from raw data via sequential linear evolutions

from traditional machine learning techniques. Deep learning can reach ever more conceptual and abstract levels, in order to identify patterns of slight and dispersed changes. So, it is a valuable tool for diagnosing mental illness [13].

The diagnosis of psychological illnesses is a convoluted and technically advanced operation by its very nature. The development of the support structure for psychological disease diagnosis is also an extremely complex task. Cloud computing is generally used for cognitive information storage and distribution. It saves and uses the information of patients for future reference when they are visiting the hospital again. The safe storage of patient information from unauthorized access is a challenging task. There is also an increased cost and time to hospitalize patients, so the Internet of things based healthcare services deserve more publicity. But, it's very complex to develop a consistent support system for diagnosis of psychological disorders with a view to reduce clinical timing and enhance diagnostic preciosity [15].

Artificial intelligence has the capacity to reinterpret our treatment and mental disorder comprehension. The social, psychological and physiological profile of a person is suitable to describe his mental wellbeing entirely. Other than enhancing the identification and treatment of mental health, the use of artificial intelligence provides some other benefits too. Such AI-enabled systems can be used to derive context from a wide source of data which makes the disease and patient's conditions more understandable. The prediction or diagnosis of mental health diseases is very essential because algorithms do not raise the risk for patients, and they are precise. Such algorithms may be trained by software engineers using high-level datasets that have sufficient data to conduct evaluations or predictions. It is because medical professionals may be unable to handle the complexity of the concentrated data received from datasets or they are not satisfied with the decision produced by artificial intelligence algorithm [6].

A healthcare practitioner finds it very complicated to continuously determine the situation of an individual in order to achieve better solutions. There is no such problem with computer systems and smart devices. It enables data to be collected and analyzed in real-time that may help doctors to comprehend mental illnesses to treat patients efficiently and effectively. This data will be available on the clinician's device. All this is connected with the help of IoT enabled centralized servers. Ubiquitous computing can help healthcare professionals to collect data without intervention of the patient. Such devices have a tremendous ability to help with medical practice, setting aside for the moment concerned safety issues. The data collected between treatments will allow clinicians to comprehend patterns of personal indicators in patients. It will not eliminate the physician from the care of an individual but rather encourage the patient to track their wellness closer and leave the physician with more critical decisions. We collect data from the atmosphere in front of us and preserve it in our brain via sensory nervous channel. We often learn how to read more complicated types of info. Our brain also couldn't grow in complete without such a process of interpreting and storing huge volumes of knowledge. The way information is transmitted electronically is an important aspect which is influenced by big data analytics and machine learning techniques for healthcare industry. Wearable devices for the assessment and review of genuine time-based data that give medical professionals and patients clinical insight will also redefine healthcare services [16].

2. RELATED WORK

Baig and Hosseini [11] found that the proposed system was educated offline with medical ordinary threshold scores and roughly unusual quality datasets were used for performance evaluation purposes. Once the least required mistake was reached, the learning of the model was halted. Ben Harrison et. al. [17] indicated that neuronal equates of social consciousness coincided partially with brain areas of overall concern to patho physiological designs of OCD disease in individuals. Razzouk et. al. [18] described the impact of the model development and the program assessment depending on one specialist. It is also essential to test the legitimacy of the specialist's convictions on schizophrenia. Chen, Zhang and Guizani [12] clarified that unsanitary conduct surveillance attracts considerable exposure. A new deep-level wellness surveillance and guidance system must be created to fix the above-mentioned issue. Mohammad Alibakhshikenari et. al. [19] addressed a full-layer moving pulse antenna that can be used to track and preserve critical health data from patients with portable medical sensing devices [20]. Dwyer, Falkai and Koutsouleris [10] acknowledged that machine learning involves as much as a collection of particular techniques to solve issues. Caution should be applied carefully to resolve positive prejudices and always represent the greatest wishes.

Mintz and Chinman [21] explained a mechanism for a software system which support chronic diseases with an aim to improve clinical diagnosis and assist joint effort. Mohammad Alibakhshikenari et. al. [22] explained Personal Mobile Units that use Wi-Fi, Bluetooth and Navigation to communicate between the computer and the database [23]. Egilmez et. al. [24] measured the stress by human voice recorded through a microphone, acknowledging voice modifications such as pitch, jitter and talking speed. Various language tests were performed with 80% precision. Gilbet et. al. [25] studied Thalamic problem related with obsessive compulsive disorder with a case study of pediatric abnormality. Shusaku Tsumoto [15] has developed smart guidance framework for decision governance in telemedicine that supports web-based disease diagnostic. Vasios et. al. [26] proposed a model comprising two fundamental categories of the result: schizophrenia for the first event and no schizophrenia signs. Beitinger, Kissling and Hamann [27] clarified that common decision-making represents a non-

paternalistic and extremely relevant notion of connectivity between clients and clinicians. The clinician's opinion and experience with OPD clients in Bipolar disease therapy was qualitatively studied by Fisher et. al. [28] and the findings were satisfying. Lingren et. al. [29] noted the ability to detect co morbidity Autism Spectrum Disorder to operate empirical programs on big cohorts.

Mohammad Alibakhshikenari et. al. [30] found a new form of antenna that could create contact at a positive speed between both the computer and the system [31]. The Galatean psychological ranking model was introduced by Buckingham [4] to show how medical practitioners can exaggerate such unusual occurrences as suicide. Deckersbach et. al. [32] shown testimony for neuro cognitive deficiency not only during depression moments but also for being euthymical is present in people with bipolar disorder. Casado-Lumbreras et. al. [5] concluded that Web Ontology Language allows an expandable structure to be developed to readily add fresh knowledge, statistics, and evidence into fresh psychological disorders. Anil Kamath et. al. [14] derived a natural language processing algorithm to detect bipolar disorder in patients with psychological disorders A transmitter based on the leaky wave light scanning methodology was developed by Mohammad Alibakhshikenari [33] which aids in sending and receiving information between a non-insulated medical sensor and its parent device [34].

In the decision-making mechanism relying on AI Nunes, Pinheiro and Pequeno [1] indicated that many smart techniques were integrated. However, the automation of this strategy is very important, particularly when a multi-criteria assessment is required. Damiaan et. al. [35] had done a study whose results showed that the bilateral cell accumbens arousal can be successful and secure therapy in highly adjuvant OCD patients. Koposov et. al. [2] gave a systemic analysis of CDSS and its advantages and deficiency in the fields of kid and teenage psychology. Valenza and Nardelli [36] launched a new wearable device consisting of fabric innovation and body signal processing capable of identifying the mood state of individuals with bipolar symptoms. Galanter and Patel [3] affirmed that in their day-to-day diagnostic decision support procedures, psychiatrists of children and teens should adopt current techniques and should not be scared to see their judgments substituted by those techniques. Hina, Imtiyaz and Harleen [37] done a descriptive analysis of the software architectures for efficient and intelligent medical care and also for psychological research purposes. S. Jahar et. al. [38] acknowledged inherent issues with the Psychological diseases and concluded that there appear to be early continuing critiques about the indicative differentiation between effective psychosis and schizophrenia. Mohammad Alibakhshikenari et. al. [39] defined electromagnetic band gap which allows end-users to communicate better to improve the performance of the model [40]. Gerald Nestadt et. al. [41] said the obsessive-compulsive disorder was ancestral. Phobias are much more common to the neurological dysfunction's creepiness factor than impulses. One Hundred Forty-Four patients with sleep disorders were examined by Ives Cavalcante Passos et. al. [7] and risk of suicide was identified.

Dickel et. al. [42] had determined the association in between early obsessive compulsive disorder with genotypes in SLC1A1 region. In people with obsessive-compulsive disorder, the rate of suicide of any mental health facility is 83.4% and median number of TS is 0.9 as stated by Hirschtritt et. al. [43]. Jun Soo Kwon et. al. [44]have got neuro cognitive and brain imaging outcomes with hypothesized anterior and pyramidal neurons lobe participation in OCD pathogenesis. Moberget et. al. [45]explained that strong connections to mental health conditions underline the cerebellum as a central gene expression to experience severe mental illnesses. Ives Cavalcante Passos et. al. [16] studied impact of Deep Learning Analytics for various wellness care studies and became successful to explain its impact on people's lives. Huang et. al. [13] discussed Psychoradiology as an area of research that applicants technology for radiation image analysis to psychological illnesses.

Sarah Graham et. al. [6] gave an overview to the role of Artificial Intelligence in treatment of Mental Health Illnesses. They said that AI has become more and more a virtual therapy and medical practice on mental wellbeing. Kim Yong-Ku and Na Kyoung-Sae [46] explained personality changes as a very common group of psychological disorders that cause significant economic and social burdens. Qiu Sun et. al. [47] designed a ML based CNN Model and a genetic hereditary variable from the DNA-wide study was also used to differentiate patients from healthy people. Ricardo Buettner et. al. [48]done installation of an extremely flexible, quick and accurate discriminator that removes healthy people from schizophrenia. Angela Radulescu and Yael Niv [49] have investigated scientific proof on how government bodies in strengthening education may change throughout the bipolar and schizophrenia continuum. Pierrefeu de A et. al. [50] implement an evolutionary computation model that uses large amounts of data to provide an intuitive neural signature. The predictive characteristic of treatment and illness length was also tested by the use of an external first series dataset.

3. PSYCHOLOGICAL DISORDERS

A psychological disorder is a cognitive or emotional paradigm that creates disturbance or disability in a person's mind. Such characteristics may be continuous or recurring or may happen as a separate event [5].

A wide variety of psychological illnesses including hyperactivity, schizophrenia, dyslexia, bipolar disorder, OCD, suicidal thoughts, and anxiety disorders are reported in recently published findings. Although most

circumstances are conceived as a developmental disorder, the importance of the cerebellum in psychiatric research has been aimed at adult communities in many other findings. Therefore the presence of cerebellar alterations in puberty as the main symptoms in the patient's condition is largely unknown. Personal cerebellar genetic changes in young adults indicate unspecific deficiencies correlated with specific unclear domains of symptoms. We do not recognize how well the cerebellar connections in other brain areas correlate with the mental health conditions of adulthood [45].

In order to promote early detection of psychological diseases, the proposed psychological disease support model (PDSM) aims at endorsing the decision-making process for Schizophrenia, Bipolar Disorder (BPD) and Obsessive Compulsive Disorder (OCD). Psychological Disease Support Model (PDSM) is a significant effort in diagnosing psychological illnesses, which enables the assessment of professional clinical indications and their impact on the decision-making method for screening tests.

A. Schizophrenia

This is a persistent and profound psychiatric condition which impacts a person's way of thinking, feeling and acting. It might seem that someone with schizophrenia has missed contact with truth. Schizophrenia, albeit not as prevalent as other psychological illnesses, can be very impaired. Schizophrenia symptoms generally appear from 15 to 32 years of age. Kids also have schizophrenia in unusual instances [26]. Schizophrenia is characterized by fever dream, magical thinking, thought disturbances, disturbances of mobility, lowered speech, reduced fun emotions in day-to-day existence. Experts think that many chromosomes can boost the danger of schizophrenia, but that none of the chromosomes alone cause the disease. The psychiatrist needs precise patient-specific data and comprehensive information on the disease that will help to improve communication with the patient for a better diagnosis of schizophrenia. It is still not feasible to forecast who will acquire schizophrenia with mitochondrial DNA [27].

Schizophrenia is a neurobiologically and genetically modified pathological mental illness. Depressive symptoms, such as lack of willpower and wrong expression of feelings, often reflect schizophrenia. Although schizophrenic situations are not so common in most nations as anxiety, the strain of schizophrenia is enormous on youth. Schizophrenia comes under the world's top 10 major mental disorders. The costly bungling of this psychological disorder and incorrect medical treatment because of human error is a big challenge in front of psychologists and healthcare professionals [48].

Schizophrenia is a dysfunctional psychiatric mental condition with different symptoms, including paranoia, perceptions, and intellectual functional disabilities. Recent developments in machine based learning and accessibility of huge datasets made it possible to auto detect neurological disorders such as schizophrenia [50]. Scientific facts have been presented to indicate that differentiation could not be made amongst functioning insanity, either on medical or molecular genetics developments. Practically, mental conditions themselves have been shown to be a spectrum, with little difference between cognitive disorder and schizophrenia [38].

B. Bipolar Disorder (BPD)

The Bipolar Disorder is a brain disorder that produces extraordinary swings in mood, stamina and the capacity to perform daily duties. These moods vary from highly energetic times to desperate times. The earlier one is called as manic episode and the later one is called as depressive episode [28]. A manic episode delineated Bipolar I Disorder takes a few days to a couple of weeks. It contains both depression and manic signs. Delineated by distressed events, the Bipolar II Disorder extends between a few weeks and a few months. It involves phases of intense emotion, alterations in behavior and sleep habits. There are also some side effects of treatment of this disease [36].

There is confirmation of neuro cognitive impairments, known as bipolar disorder, not just when mood disturbances are present, or even when hypomanic symptoms are there. Deterioration of auditory episode recall is one of the common neurological problems documented in euthymic bipolar individuals. The ability of persons to coordinate verbal knowledge during the training is dependent upon their verbal capability and memory. Bipolar disorders are generally described with anxiety or hypomania periods, which often cause major functional impairments. Neuropsychological research suggests psychological disruptions in mood seasons, including adulation, and imagination disorders. Human beings with bipolar disorder may experience loss of concentration, learning, and control when they are chronically fatigued. Such behavioral impairs are linked between those mood moments with recurrent psychological and social deficiency. Failure to clearly recall information is generally the most frequently reported outcome of euthymic people with bipolar disorder. Such events must be coded, saved and reorganized over time and also can be recovered from storage in order for an incident to be recalled. Encryption is a method that translates a perceived incident into a lasting cognitive depiction. Retrieval is the mechanism that permanently enables a stored image which leads to the specific memory of the specific event. The encryption, saving, and regeneration of various regions of the brain leads to it [32].

Bipolar disorder still lacks proper diagnoses, but there's always a high prevalence of medical error and malignancy. The exact causative agents of the bipolar disorder remain unclear but recent research has found that it is strongly inherited and caused by behavioral and

phenotypic traits, and therefore many experiments have been performed with the help of machine learning. Perturbations in thoughts and actions often accompany bipolar disorder with clinical characteristics such as deceptions and nightmares [47].

Throughout vulnerable people, bipolar disorder is especially prominent and carries a major risk of suicidal death. In the depressive state instead of manic state people affected with bipolar disorder are inclined to seek medication. Behavioral mood speculations have concentrated mostly on anxiety, which is easily misdiagnosed as a schizoid personality disorder [49].

C. Obsessive Compulsive Disorder (OCD)

A type of mental illness or a precise outline of psychiatric disorder where individuals can either have irrational ideas and desires or are compelled to have repeated conduct is termed as Obsessive Compulsive Disorder. Some people are obsessed or compulsive or both. This disease is not much of an individual's practices, rather about the individual's ideas and behavior. The individual has uncontrolled, recurrent ideas and actions that make him feel urged to repeated time after time. It is a prevalent, acute and long-lasting disease. Persons with teenage years if encountered any physical injury or emotional violence are at enhanced danger of this disorder. In certain instances, it may grow because of a streptococcal infection called PANDAS [17].

The OCD psychological disease is a state which can be described as recurrent thoughts, known as obsessions as well as monotonous ritualistic deeds, known as compulsions. The pervasiveness is estimated to be 3% both in both the genders. It can annihilate the ability of an individual to function culturally and socially when left untreated. Particular OCD therapies such as CBT and pharmacological treatments have been developed in last few years. The average decrease in symptoms in 50% of the patients is estimated to be between 45% and 65%. Nonetheless, nearly 15% of patients remain seriously impacted by OCD even when the good recovery therapies are applied [35].

Deep brain stimulation may be adequate for a small percentage of therapeutic hematologic patients. The therapy involves electrodes which transmit electrical pulses to certain areas in the brain, chosen by the type of illnesses to be treated. It is a transplantation medication procedure. Deep brain stimulation is shown to be efficient when it is directed to the front extremity of the internal shell or nucleus accumbens of the brain while treating in patients with intractable OCD Psychological Disease. Deep brain imaging can encourage medication in the core incumbent because the Obsessive Compulsive Disorder system shows a dysfunction. In seriously impaired patients with refractory OCD psychological disease, the efficacy and clinical outcomes of bilateral brain stimulation in functional acumbens is thoroughly assessed [35]. Reports from neuro cognitive and neurobiology research have asserted prefrontal and locus coeruleus brain region activity in OCD signs and symptoms, with few reports of behavioral impairment in OCD patients being attributed to the disorder. The differential diagnoses of obsessive compulsive disorder include a diverse range of neuronal disorders [44].

4. PROPOSED – PSYCHOLOGICAL DISEASE SUPPORT MODEL (PDSM)

There are three different types of models for psychological decision making: i) Illustrative models portray how individuals believe, ii) Reductionist models explains how individuals should believe, iii) Colloquial models are the norms that elaborate proper practices to meet the objectives of the thinker.

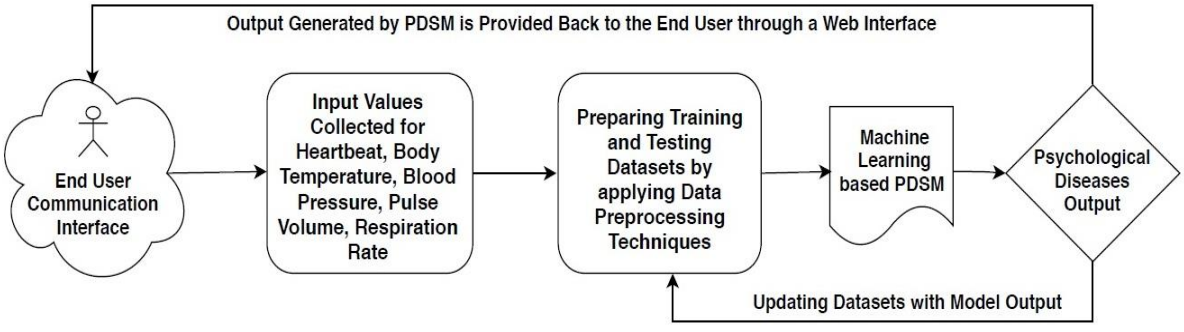

Figure 2. General Architecture of Proposed Psychological Disease Support Model (PDSM)

The proposed psychological disease support model (PDSM) comprises of two layers: acquisition layer and classification layer. On the basis of the computation of the automotive predictor variables, the first layer is a feature vector, whilst the second one has a neural network. The suitable functions are obtained, analyzed and subsequently supplied to the classification layer by the acquisition layer. The psychological condition is often evaluated from following five parameters, i) heartbeat ii) body temperature iii) blood pressure iv) pulse volume v) respiration rate. Performance of Proposed PDSM is

evaluated by comparing it with other similar types of models.

As shown in figure 2, there are five different phases of Proposed Psychological Disease Support Model (PDSM). The first phase of the Proposed Psychological Disease Support Model is an end user communication interface which is provided to the patient in the form of a web interface for bi-directionally communication with the model. We can also develop an android based application for communication of end user with the proposed model. User can give his/her input through this interface, which is a user friendly communication channel, and also get the output results through this interface. After this first phase, second phase of Proposed PDSM is data acquisition layer which takes five input values given by user, including, Heartbeat, Body Temperature, Blood Pressure, Pulse Volume and Respiration Rate. These input values are pre-processed as per the requirement of the proposed system and added to a large repository of primary and secondary dataset collected through UCI repository.

In the next phase of PDSM we divide the available dataset into training and testing datasets. It is regularly updated with the output results received from PDSM. After this third phase, we forward these datasets to the classification layer which consists of proposed model implemented in python programming language based on machine learning classifier. This is the fourth phase of the proposed model. Here the primary data provided by the patient or secondary data obtained through repository is processed and disease diagnosis recommendations are generated to forward it to the user. In the last phase, model generates output and displays it to the end user through available web interface. The generated output recommendations are added back to the datasets to improve model accuracy in the future.

The input values required to train and test the model and to prepare datasets are collected from UCI online repository. A dataset of 2596 patients was acquired by applying the techniques of knowledge harvesting and data anticipation. The full dataset was divided into two parts. 75% of data items were trained by the proposed model and 25% of data items were used for testing the developed system. During the preprocessing phase, noise and other artifacts' were removed from the available data, sampling of data was done, outliers were inspected and deleted from the dataset, missing values were removed and normalization was performed through statistical procedures.

Initially, training on a secondary data set garnered from the UCI archive was provided to the proposed PDSM model. The secondary and primary data sets were used for testing purposes after training. The model gives output, whether the patient has Schizophrenia, Bipolar Disorder or Obsessive Compulsive Disorder Disease or he/she is Normal.

5. EXPERIMENTAL RESULTS

The Proposed Psychological Disease Support Model (PDSM) was implemented by using Scikit Learn Module in Python Variant 3.0 package, constructed on the bottom of the scipy database. Scikit Learn is a software database that relies on information patterns, classification, clustering, and regression analysis techniques; including the Python NumPy and SciPy numerical and scientific databases. The following libraries were used for research work: "NumPy" relies on the grid set in n dimensions. "SciPy" is the basic science computation library.

The enhanced multimedia console is used by "IPython". "Sympy" offer us the benefit of emblematic math. "Python 3.0" coded the actual implementation. Table 1 shows the accuracy measurement of Proposed PDSM with other similar models developed, namely, PsyDis, SPHA and UStress.

TABLE I. ACCURACY COMPARISON OF PROPOSED MODEL WITH OTHER SIMILAR MODELS

Model Developed	Technique Implemented	Type of Data Used	Accuracy Measured
Proposed PDSM	Recurrent Neural Network	Medico-Clinical Data	98.36 %
PsyDis [5]	Fuzzy Logic Rules	Psychological Assessments	85.62 %
SPHA [12]	Density Based Clustering	Electrocardiographic Signals	79.34 %
UStress [24]	Neuro-Fuzzy Expert System	Physiomatic Facets	91.78 %

It is clear from Table 1 that accuracy of Proposed Psychological Disease Support Model (PDSM) is much better than other similar types of models. The technique used in this model is Recurrent Neural Network which uses Medico-Clinical Data obtained through primary and secondary data sources. It gives us the accuracy of 98.36%, which is highest among all other models of similar type. The PsyDis model had given accuracy of 85.62%, which is less than PDSM. It used Fuzzy Logic Rules as the technique to implement and Psychological Assessments as the type of data used. In SPHA model Density Based Clustering technique is used and provides 79.34% accuracy to predict the psychological disease. This model used Electrocardiographic Signals as the type of data used and its accuracy is lowest among all other models. The UStress model provided accuracy of 91.78% which is higher than PsyDis and SPHA but less than Proposed PDSM. It used Neuro-Fuzzy Expert System as the technique to implement its algorithm and used Physiomatic Facets as the type of data used. By considering the accuracy of all these models, we can deduce that the proposed psychological disease support model gives highest accuracy among all psychological disease diagnostic models.

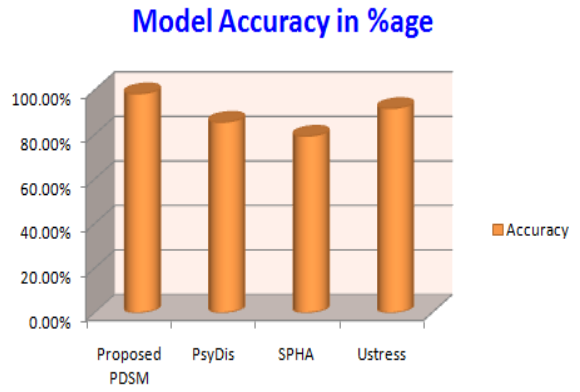

Figure 3. Graphical Representation of Accuracy Comparison

The accuracy comparison of Proposed - Psychological Disease Support Model (PDSM) with PsyDis, SPHA and Ustress models is shown with the help of cylinder column chart in Figure 3. It is a graphical representation of the accuracy (in percentage) obtained by different models developed so far for psychological diseases diagnosis decision support process. As we see in the graph that proposed model has highest value of 98.36% so its bar has highest length in the graph. As SPHA has minimum accuracy of 79.34% so its bar has lowest length in the graph. The bar length of PsyDis and UStress falls in between PDSM and SPHA models. So, we can finally say that the Proposed Psychological Disease Support Model (PDSM) is much better than other similar types of models.

6. OBSTACLES IN DIAGNOSTIC DECISION MAKING PROCESS

- There are some obstacles which psychiatrist faces during Decision Making Process [28]:
- Most of the medical practitioners attributed to the adverse effects of psychological disease symptoms on the therapeutic decision-making process. Limited likelihood of having the right choices was correlated with schizoid diseases [4].
- Nearly half of healthcare professionals have reported possibly unsuitable clinician behavior which adversely affects the diagnostic decision-taking process. It involves an absence of accessible and frank communication on medicines, insufficient clinician knowledge, and customer confidence, as well as very restricted patient feedback [5].
- Most clinicians have indicated people's attitudes towards the diagnostic process that harm decision taking ability. The approach that was most frequently articulated towards the diagnostic process is that the patient rejects the diagnosis and misunderstood the need for medication. Such approaches of patients and their families have led to a reluctance to begin therapy or to stop medications early or to less success in applying psychological treatments [2].
- There were some psychiatrists that observed system-specific decision taking obstacles, including bad availability and cost-effectiveness of experts. In examination, there were also some time boundaries. There was also an absence of multidisciplinary mutual aid amid many medical practitioners who have distinct skilled experience [27].
- There was an overall absence of published data related to psychological disorders and also the patient comprehension about mental disorders and drug impacts among them [10].

7. CONCLUSION AND FUTURE SCOPE

From the above mentioned results and research work done so far, we can conclude that Proposed - Psychological Disease Support Model (PDSM) can be a useful tool to provide decision support for psychological diseases specially, Schizophrenia, Bipolar Disorder, and Obsessive Compulsive Disorder. The proposed model has been trained by using assorted medical records which are received through UCI Online Repository for Machine Learning Datasets. These datasets helped to examine the accuracy of the proposed psychological disease support model. The quantity of epochs selected for learning the model was determined depending on the precision required in each situation. After the learning assignment, the proposed model was evaluated with big sample size records received from primary and secondary datasets. It was done mainly to improve precision and stabilization of proposed model. Results obtained from experiments show that 98.36 % accuracy of the proposed model is very good in contrast to previous findings. So, in coming future it can be a successful model to diagnose psychological diseases. The future research direction for this proposed work is to design an Android based Application for Diagnosis of Psychological Disease. We can also make it online over internet either through desktop website or through mobile application. At last, we can say that the impact of Proposed - Psychological Disease Support Model designed with the help of Recurrent Neural Network (RNN) is very fruitful for psychological diseases diagnosis. The health care sector in India and other under-development nations will take benefit from this research finding in order to efficiently handle the diagnosis of psychological diseases.

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