Human Neurological Disorders Estimation using Different Machine Learning Techniques: Survey

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Abstract: ***We report the findings of a total population survey of the people are becoming more and more restless and breaking apart with the mental illness called as mental disorders. There is a terrific growth in the number of people suffering and also the types of disorders are also rampaging in the brains of the people. With the growing technology there has been a thorough translation and now we can use the machine learning techniques far more efficient than any other for the prediction of disorders in the people and their conditions. The count has passed through a billion and there are a wide variety of disorders ranging over 600+ types causing several deaths every year. By the incorporation of the ML and DM the rationality of the prediction has increased and the dimensionality has also hiked from the past methods.***

Keywords: Machine Learning, Disorders, Predictions, Data Mining.

I. INTRODUCTION

Human disorders that cause psychological effects which sometimes lead to physical effects but not any physical effects directly are mental disorders [3]. At the pace of the present world there has been a steady increase in the pace of growing of the disorders which by now has reached a percentage of twenty five [10] which means a person from every four persons has a chance of having been effected by a mental disorder.

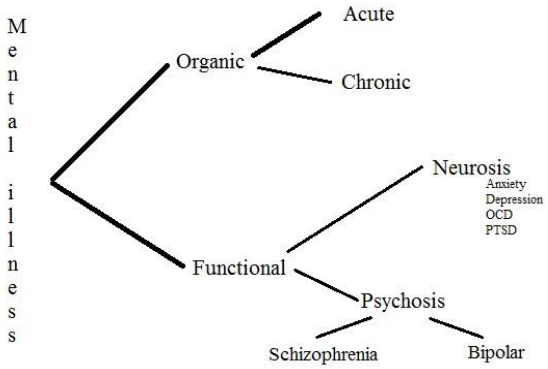

Fig. 1 Classification of Disorders

The common mental disorders in adults (18-55) are as follows [4]

Table. 1 Common Adult Disorders Prevalence

S. No	Mental disorder	Six Month Prevalence (%)
1	Anxiety Disorder	16.4
2	Mood Disorder	7.1
3	Disruptive Behavioral Disorders	5.3
4	Substance use Disorders	1.1
5	Any Disorder	1.3

Also the key note is that the number of persons who can treat mental illness is quite less in comparison with all diseases and disorders [8]. By the various techniques of machine learning there is a chance to learn something of the intelligence and the techniques [1, 5] are the base for the undertaking of the datasets. They are

1.	Supervised Learning
2.	Unsupervised Learning
3.	Semi Supervised Learning
4.	Reinforcement Learning
5.	Evolutionary Learning
6.	Deep Learning

With the implementation of the methods we need a brain computer interface system (BCIS) [2] for the machine learning methodologies to acquire data from the brain of the people. There are 4 phases in the implementation of the BCIS. They are

1.	Getting the signals
2.	Extraction of features
3.	Classification
4.	Control of Interface

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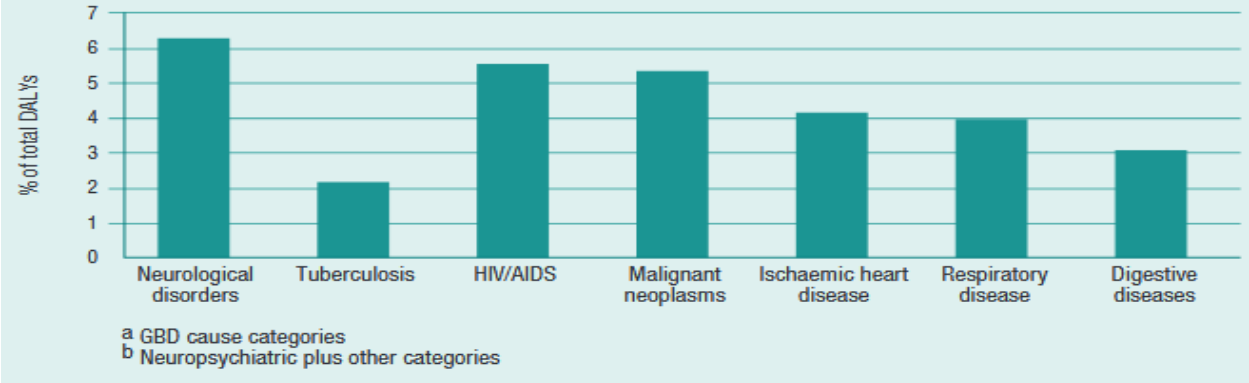
II. LITERATURE SURVEY

From the early 2005, 2015and 2030's project the human disorders there has been a tremendous effort for the amplification of all the predictions regarding the mental disorders for a clear and efficient analysis of estimations which can be more reliable for the people and the doctors. But in the past decade due to the vast changes in the technological aspects and insights of the artificial intelligence and big data the research has taken a huge leap. The usage of brain connectivity for the supervised learning of autism spectrum disordering classification by W. Jamal, S. Das [10] has been a stepping stone for the classifications. The neuroimaging advancement with the machine learning with ski-kit is ingeneously given by the A. Abraham, F. Pedregosa [9].

The anxiety disorder classification in the social issues is by the usage of BCIS by F, Liu, W. Guo and Y. wang with W. Wang has taken the BCIS quite forward [8]. The estimations and predictions in disorders of the autism spectrum for the youth with ANN have forwarded the research from [10] to a whole new level by A. Narzisi, F. Muratori [7]. The whole theory is quite greatly explained along with the pitfalls and guidelines for imaging data of the psychological patients with disorders by the usage of ML id showcased by P. Kassraian Fard, C. Matthis [6].

Cause category	2005		2015		2030	
	No. of DALYs (000)	Percentage of total DALYs	No. of DALYs (000)	Percentage of total DALYs	No. of DALYs (000)	Percentage of total DALYs
Epilepsy	7308	0.50	7419	0.50	7442	0.49
Alzheimer and other dementias	11078	0.75	13540	0.91	18394	1.20
Parkinson's disease	1617	0.11	1762	0.12	2015	0.13
Multiple sclerosis	1510	0.10	1586	0.11	1648	0.11
Migraine	7660	0.52	7736	0.52	7596	0.50
Cerebrovascular disease	50785	3.46	53815	3.63	60864	3.99
Poliomyelitis	115	0.01	47	0.00	13	0.00
Tetanus	6423	0.44	4871	0.33	3174	0.21
Meningitis	5337	0.36	3528	0.24	2039	0.13
Japanese encephalitis	561	0.04	304	0.02	150	0.01
Total	**92392**	**6.29**	**94608**	**6.39**	**103335**	**6.77**

Number Of Daly's For Neurological Disorders As Percentage Of Global Daly's Projected For 2005, 2015,2030



III. METHODOLOGIES OF ML

Bayes quadratic:

The assigning of a class to a feature vector to which the vector belongs to with the greatest possible probability is known as Bayesian classification. The probability of posteriori which is computed by the bayes rule belongs to a given class and is a feature vector.

Multi-Layer Perception:

In this process the class of any given input is determined by the corresponding output. Each of the neurons in the system are connected to the output of the previous neuron as the input. MLP in general consists of various layers basically an input layer, an output layer and several layers hidden in the system.

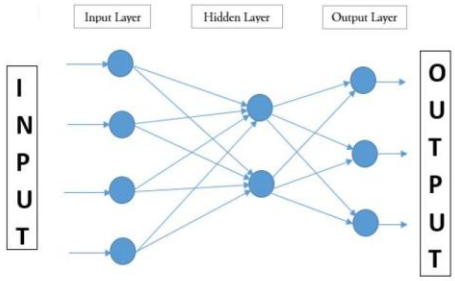


Fig.2 MLP Architecture

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Hidden Markov Model:

HMM is a quite used for the speech recognition field in the dynamic classifiers. This can also be said as automation that is probabilistic for the feature vector observations which are given in a sequence. The modernization of probability is done by the feature vector at each state of the automation.

K – Nearest Neighbor

The most simple classification and most basic classification ever known is called as K-N-N. These methods are used to solve the problems when the given data or the known data is at a minimum quantity. They are far greater than the probability density problem

Comparisons:

Table. 2 Brain Oscillation Characteristics from BCIS.

Wave	Frequency (in Hz)	Condition	Voltage
Theta	3.5 – 7.5	Light sleep, drowsy	Adults:10μV kids: 50 μV
Beta	12.5 – 30	Excited	10 - 20μV
Alpha	7.5 – 12.5	Relaxed	Adults:50μV kids: 75 μV
Delta	0.5 – 3.5	Deep sleep	10mV

Table. 3 Classification results of sleeping data

	Bayes	MLP	HMM	KNN
sensitivity	.606	.629	.653	.648
specificity	.913	.911	.914	.911
precision	.608	.617	.634	.622
F-measure	.595	.62	.637	.625
ROC area	.89	.886	.899	.913
Kappa index	.5112	.5368	.5644	.5566

Table. 4 classification results of neonatal data

	Bayes	MLP	HMM	KNN
sensitivity	.301	.456	.464	.483
specificity	.833	.728	.781	.798
precision	.488	.47	.455	.48
F-measure	.26	.424	.458	.476
ROC area	.654	.685	.687	.716
Kappa index	.1276	.1973	.2493	.2837

IV. CONCLUSION

With the implementation of the ML methodologies [5] for the predictions in the neural disorders and the estimations [4] has made a huge impact for taking radiant measures to reduce the effect of the mental disorders and illness on the people. The BCIS is delivering the data [10] required for the machine learning methodologies to implement and gather the required results for the further implementations and implications [6]. Vast datasets are acquired by the process for fair examining and implicit computations [4]. The effects are minimized and the doctors are taking the help of the ML methodologies for the construction of the expert systems for the data translation and acquire the results.

More and more research is being carried out by the researchers for a more sophisticated and well versed approach which can be better than the present system and are advancing with the resolve to achieve success on the mental disorders and eradicate the spreading as quickly as possible.

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