

PREDICTION OF PARKINSON'S DISEASE AND SEVERITY OF THE DISEASE USING MACHINE LEARNING AND DEEP LEARNING

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ABSTRACT

Parkinson's disease is a neurodegenerative disease which worsens over time. People have trouble vocally, writing, strolling, or completing other simple tasks when dopaminegenerating neurons in parts of the brain become impaired or expire. These symptoms worsen over time, increasing the severity of the condition in patients. We have suggested a methodology in this article for the prediction of Parkinson's disease severity using deep neural networks on UCI's Parkinson's Telemonitoring Vocal Data Set of patients. We have created a neural network to predict the severity of the disease and a machine learning model to detect the disorder. Classification of Parkinson's Disease is done by Neural network, Random Forest Classifier.

1. INTRODUCTION

Parkinson's disease (a neurodegenerative disorder) that causes the patients' motor abilities to degrade over time due to the damage caused to the dopamine-generating brain cells. Shaking, trouble moving, behavioral disorders, dementia ,and depression are some of the results of this disorder. The primary motor conditions are referred to as "Parkinsonism," or a "Patient with Parkinson's Disease." One of the most common symptom that can be recognized by studying the patients' voice data is changes in their voice. The patient's speech stutters and becomes increasingly impacted as the disease progresses. Deep learning has risen in importance as a method for analysing unstructured data such as speech anaudio signals. Multiple layers of neurons are often used I deep neural networks, these layers are stacked as a single unit for classification and feature selection models. Deep learning is being used in this paper to classify the patient's voice.

2. Literature Survey

A Comparison Of Multiple Classification Methods For Diagnosis of Parkinson Disease: AUTHORS: ResulDas

In this paper, different types of classification methods are compared for effective diagnosis of Parkinson's diseases. The reliable diagnosis of Parkinson's disease is notoriously difficult to achieve with misdiagnosis reported to be as high as 25% of cases. The approaches described in this paper purpose to efficiently distinguish healthy individuals. Four independent classification schemas were applied and a comparative study was carried out. These are Neural Networks, DM neural, Regression and Decision Tree respectively. Various evaluation methods were employed for calculating the performance score of the classifiers. According to the application scores, neural networks classifier yields the best results. The overall classification score for neural network is 92.9%. Moreover, we compared our results with the result that was obtained by kernel support vector machines [Singh, N., Pillay, V., & Choonara, Y. E. (2007). Advances in the treatment of Parkinson's disease. Progress in Neurobiology, 81, 29–44]. To the best of our knowledge, our correct classification score is the highest so far.

3. IMPLEMENTATION STUDY EXISTING SYSTEM:

The primary motor conditions are referred to as "Parkinsonism," or a "Patient with Parkinson's Disease." One of the most common symptom that can be recognized by studying the patients' voice data is changes in their voice. The patient's speech stutters and becomes increasingly impacted as the disease progresses. Deep learning has risen in importance as a method for analysing unstructured data such as speech and audio signals. Multiple layers of neurons are often used in deep neural networks, these layers are stacked as a single unit for classification and feature selection models.

Disadvantages:

- A huge number of methodologies of available algorithms are not appropriate to aid professionals under the different area, highly depends on the employed statistics, therefore, struggle to maintain recitation with the variation of data properties.
- The majority of the algorithms intended to accomplish only a specific task hence does not fit for the real-time scenario where the cost is one of the primary factors

Proposed System & algorithm:

the proposed work, there are four different classification algorithms were selected along with the two feature compressing methods as CFS with best-first search and Gain ratio with ranker mechanism. As described in the literature survey each algorithm is designed with an obtainable process in an optimized form, such a selected process may not be utilized to build a more competent method. The proposed method investigate and analyze four chosen method such as Hidden Markov Model (HMM), Artificial Neural Network (ANN), Support Vector Machine (SVM) and Decision Tree (J48) along with two other feature compressing methods.

4.1 Advantages:

- **1.** The comparative values show that the proposed method obtains higher accuracy when compared with other existing methods.
- **2.** The efficiency and suitability of the proposed approach are compared with other suggested methods.



Fig:3.1 System Architecture

IMPLEMENTATION

MODULES:

User:

The User can register the first. While registering he required a valid user email and mobile for further communications. Once the user register then admin can activate the user. Once admin activated the user then user can login into our system. User can upload the dataset based on our dataset column matched. For algorithm execution data must be in float format. Here we took parkinson's disease dataset for testing purpose. User can also add the new data for existing dataset based on our Django application. User can click the Classification in the web page so that the data calculated Accuracy based on the algorithms. User can click Prediction in the web page so that user can write the review after predict the review That will display results depends upon review like postive, negative or neutral

Admin:

Admin can login with his login details. Admin can activate the registered users. Once he activate then only the user can login into our system. Admin can view the overall data in the browser. Admin can click the Results in the web page so calculated Accuracy based on the algorithms is displayed. All algorithms execution complete then admin can see the overall accuracy in web page.

5 RESULTS AND DISCUSSION Home Page



Fig: 5.1

User Register Form

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 Selection & Training The Model This step serves as a baseline. Since the output of the prediction of Parkinson's disease is a class, it is a classification problem. For the detection part we are calculating the UPDRS value and the corcluding the severity of the disease, so its a regression problem. Study is carried on the below mentioned classifier and regression algorithm which are as follows: N SeBoostir Neural Network for regression In machine learning the dataset is partitioned into three subsets namely training set, testing set, and validation set. The author trains the classifier using 'training dataset' and tune the parameters using validation dataset'. The parformance to testing of the classifier is checked on the previously unseen test dataset. 	User Registration Form User Name Login ID Password Mobile emai Locality Address City State Register Register
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Fig: 5.2

Admin Login Form



Fig: 5.3





Fig: 5.4

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	M	odel Results	
S.No	Model Name	Accuracy	
1	XGBoost	89.74358974358975	
2	ExtraTreesClassifier	92.3076923076923	
3	Ada Boost	84.61538461538461	
4	Support Vector Machine	84.61538461538461	
5	Random Forest	92.3076923076923	
6	ANN	82.05128205128204	
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User login form



Fig: 5.7



Fig: 5.8

User view Dataset

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1	0.626	0.03134	0.04518	0.04368	0.09403	0.01929	19.085	1	0.458359	0.819521	2.486855	0.368674		
2	0.482	0.02757	0.03858	0.03590	0.08270	0.01309	20.651	1	0.429895	0.825288	2.342259	0.332634		
з	0.517	0.02924	0.04005	0.03772	0.08771	0.01353	20.644	1	0.434969	0.819235	2.405554	0.368975		
4	0.584	0.03490	0.04825	0.04465	0.10470	0.01767	19.649	1	0.417356	0.823484	2.332180	0.410335		
5	0.456	0.02328	0.03526	0.03243	0.06985	0.01222	21.378	1	0.415564	0.825069	2.187560	0.357775		
6	0.140	0.00779	0.00937	0.01351	0.02337	0.00607	24.886	1	0.596040	0.764112	1.854785	0.211756		
7	0.134	0.00829	0.00946	0.01256	0.02487	0.00344	26.892	1	0.637420	0.763262	2.064693	0.163755		
8	0.191	0.01073	0.01277	0.01717	0.03218	0.01070	21.812	1	0.615551	0.773587	2.322511	0.231571		
9	0.255	0.01441	0.01725	0.02444	0.04324	0.01022	21.862	1	0.547037	0.798463	2.432792	0.271362		
10	0.197	0.01079	0.01342	0.01892	0.03237	0.01166	21.118	1	0.611137	0.776156	2.407313	0.249740		
11	0.249	0.01424	0.01641	0.02214	0.04272	0.01141	21.414	1	0.583390	0.792520	2.642476	0.275931		
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	1	XGBoost		89.743589743	358975					
	2	ExtraTreesClassifier		94.871794871	79486					
	3	Ada Boost		84.615384615	538461					
	4	Support Vector Machine		84.615384615	538461					
	5	Random Forest		94.871794871	79486					
	6	ANN		82.051282051	28204					
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RPDE					0 to 1	
DFA					0 to 1	
PPE					0 to 1	
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Prediction Results

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6. CONCLUSION AND FUTURE WORK CONCLUSION

Detection of Parkinson's Disease

- 1. The research area for Parkinson's Disease is significant, early stage detection of it can improve patient's health
- 2. This solution was capable of differentiating among early stage Parkinson disease subjects and controls with a tolerance of 92 to 100 %, a specificity of 95 to 100
- 3. % and an AUC(Area Under Curve) in the range of 0.97 and 1.00.
- 4. It was found that Parkinson's disease was detected positive in people above the age of 55 years.
- 5. According to the study, females are more likely to have Parkinson's than males

7. REFRENCES

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