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Parkinson's disease detection system using Support vector machine

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Abstract -*Parkinson's is a neural disease that most of the people are unaware of and they don't get to know of the thing that they are suffering from it in the initial stages. It is a kind of disorder that affects humans' nervous system. It's symptoms at starting are that slight that people are not being able to detect that they are suffering from Parkinson. In some cases, even doctors aren't able to detect the disease at early stages. Its symptoms are like tremor in hand, shivering, change in facial expression or no facial expression at all, fever, stiffness etc. In our project, we are making a Parkinson disease detection that will detect the disease at initial stages. We have trained a big dataset that will detect the disease at its utmost efficiency*.

Key Words: **Parkinson's, SVM, Dataset, Disease, System etc**

1. INTRODUCTION

Parkinson is a disease associated with human's Nervous System. It's a kind of disorder that is difficult to identify in early stages. It is affecting life of a lot of people. It mostly affects the Nervous System. The first symptom is barely noticed in this disease, it starts with a tremor in hand. There are more symptoms that may later show on like being slow, changing in voice and speech etc. Thinking too much i.e., depression can also be a symptom. The cause of Parkinson disease can be genetical and environment triggering our nervous system.

The main idea behind our research is to detect the Parkinson disease at early stages. So, we are creating a model which people can access easily and by which they can detect the starting of disease.

2. LITERATURE REVIEW

A. Timeline of the reported problem

Parkinson's disease was firstly detected in 1817 by Dr. James Parkinson. It is a non-acute continuous brain-degenerative disease with movement and non-movement features. There is a very striking medical impact on people which are suffering from Parkinson's Disease. Movement symptoms in PD have been imputed because of decrement in striatal dopaminergic neurons, however the existence of non-movement symptoms also result in decrement of non-dopaminergic regions.

The parkinsonism word here depicts as a syndrome used to explain the movement characteristics of PD, including tremors in palm, bradykinesia, and muscle inflexibility. Generally, PD is the reason of Parkinson's disease, but there are also many other causes existing that can copy PD and Drug-prompting causes.

According to previous studies, the physiological changes associated with PD may begin before movement characteristics and can also comprise many non-movement manifestations, such as nap disturbances, depression, and rational changes. Affirmations in premedical stage has fasten eagerness for new researches focused on defensive or preventative treatments.

Now a days, PD has become one of the most typical brain-degenerative diseases. The report of PD Foundation says that around 1M Americans are presently suffering from this disease.

There are about 0.02% people suffering from PD every year, and the beginning age of this is nearly of 60 years. The generality of PD is around 0.01 people in 10000 people age of 60 and above, increasing from 0.01 to 0.03 in people who are age of above 80. An foremost caution cognate with the numbers mentioned, however, is that they do not show unidentified cases.

The variable incidence of the Parkinson's Disease all over the world suggests that ecological and hereditary factors, as well as racial differences, can also play a role in the development of the disease. Some previous biomedical researches in Parkinson's patients resumes and can also help in identifying other risk factors and upcoming direct avoidance and treatment decisions.

B.Existing Solutions

When recounting the history of Parkinson's disease treatment, there are several methods responsible for the invention of treatment based on data obtained from randomized observations of controlled clinical trials of specially designed drugs. But still there is no any particular and successful method is found till now to cure this disease, these methods help in realizing the symptoms of disease and to relieve pain to some extent.

Basic Categories of these methods are mentioned below:

- Therapies
- Medication
- Surgery

During the early stage of Parkinson's Disease, Patient doesn't require any treatment as the symptoms of their disease are too mild and they don't consider it seriously and even don't try to get a good treatment to overcome this disease.

C.Bibliometric analysis

The observation of James Parkinson's unique description of disease resulted in the exploration of an alternate technique to assess the state-of-the-art research features of Parkinson's disease internationally, using relevant literature from the Knowledge Database on Internet technologies from the Medical Records Institute (ISI) for the period 1991-2006.The articles were designed to assess the frequency of use of technical output characters, global collabs, and use of creator key phrases. Expanding regression was implemented to make the strong link between the increasing number of articles and 12 months. In recent years, articles on international cooperation have been more extensive than in previous years, due to the sharing of ideas and workload, the increase in international cooperation can lead to more effective articles, while China, Italy, Spain, and Austria have greatly benefited from international cooperation. Finally, a benchmarking analysis of the author's keywords provides search trends and current hotspots.

D.Review Summary

In the above literature review we discussed how existing detection model used by the users in recent years with different updated technologies. We are going to create a user interface which make interaction easy for users to detect their disease.

E.Problem Definition

Even though module of feasible Parkinson disease may be determined in initial documents. In 1817, the first clear medical interpretation was written by using James Parkinson. During mid-1800s, Jean-Martin Charcot became mainly dominant in rarefying and increasing this initial illustration and in spreading records all over the world about Parkinson's illness. He segregates Parkinson's ailment from a couple of trembling and different issues distinguish through tremor, and he diagnosed instances that after some time might be labelled among the syndromes of Parkinsonism-plus. Initial remedies of PD had been depending totally on observed statement, and deliriants capsules had been used earlier because the 1900s. The detection of dopaminergic deficits in Parkinson's illness and the artificial trail of dopamine caused the first trials of levodopa on humans. In addition, previously crucial anatomical, biochemical, and physiological studies diagnosed extra pharmacological and neurosurgical objectives for Parkinson's disorder and permit current clinicians to offer an array of healing procedures geared toward improving characteristic in this nevertheless incurable ailment

F.Goals/Objectives

Now a days, everyone got updated towards the new techniques used in different fields. Same is with the field of Healthcare, Doctors uses different new and advanced technology to predict the disease and to Cure the disease.

Our this model helps in detecting the Parkinson's disease by using the Support Vector Machine, we analyse the vocal data of the patient and on the basis of that vocal data we analyse the stage of the Parkinson's disease

G.Objectives

➢Objective of our this model is to detect the accurate disease level so that patient can treat himself/herself very well.

➢We also attach the database in future so that doctor can easily get the previous data of the patient and also the timeline of the Patient's disease level.

3.DESIGN AND METHODOLOGIES:

COMPONENT 1:

- Collection of data

COMPONENT 2:

- Splitting data into test and train.

COMPONENT 3:

- Apply SVM

COMPONENT 4:

- Prediction of data.

4..IMPLEMENTATION:

- ER-DIAGRAM
- ARCHITECTURE DIAGRAM
- DATA-FLOW DIAGRAM
- SEQUENCE DIAGRAM

ER DIAGRAM:-

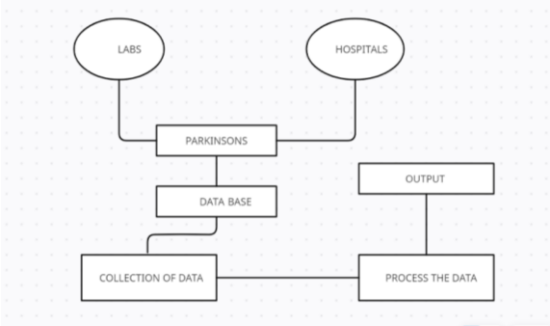

Fig1. ER diagram

ARCHITECTURE DIAGRAM:

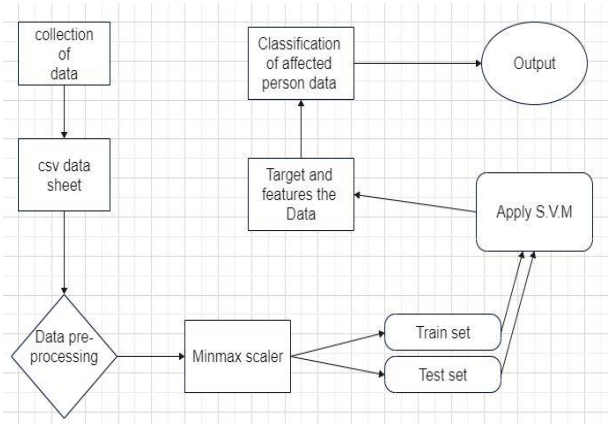

Fig 2 .ARCHITECTURE DIAGRAM

DATA- FLOW DIAGRAM:

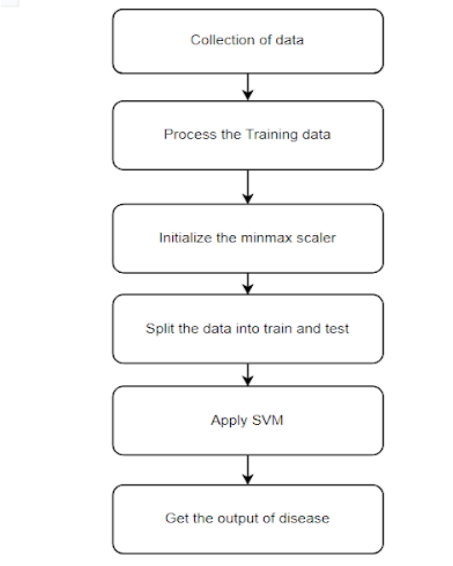

Fig 3.DATA FLOW DIAGRAM

SEQUENCE DIAGRAM:

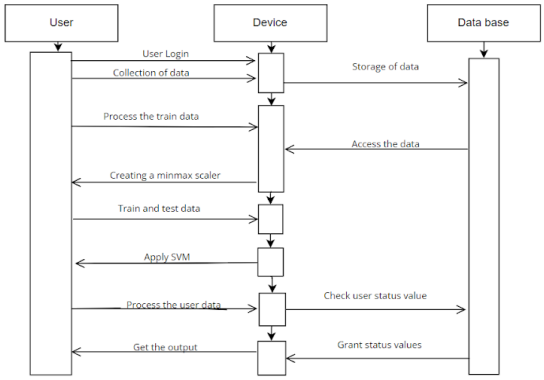

Fig 4.SEQUENCE DIAGRAM

4. DESIGN CONSTRAINTS:

In this we are going to explain how the interaction takes place between modules and components to get the functioning of the system in the model. This system design is developed for achieving the requirement of the user with our algorithm and statistical data. The design will also capture the key functions in the building necessary to understand the system's construction process.

Adding new data: A user can either add new data to our model or he can edit the previous data of the user whose data is already saved in the database.

Analyze the frequency from vocal data: A user provides his voice as an input in our model and by using some algorithm our model accepts the frequency from vocal data.

Detection of parkinson disease: Using the frequency rate of vocal data our model predicts whether a user is affected by parkinson disease or not.

5. INPUT AND OUTPUT

SCREENSHOTS

	A	B	C	D	E	F
1	name	MDVP:Fo(	MDVP:Fhi	MDVP:Flo	MDVP:Jitt	MDVP:Jitt
2	phon_R01	119.992	157.302	74.997	0.00784	0.00007
3	phon_R01	122.4	148.65	113.819	0.00968	0.00008
4	phon_R01	116.682	131.111	111.555	0.0105	0.00009
5	phon_R01	116.676	137.871	111.366	0.00997	0.00009
6	phon_R01	116.014	141.781	110.655	0.01284	0.00011
7	phon_R01	120.552	131.162	113.787	0.00968	0.00008
8	phon_R01	120.267	137.244	114.82	0.00333	0.00003
9	phon_R01	107.332	113.84	104.315	0.0029	0.00003
10	phon_R01	95.73	132.068	91.754	0.00551	0.00006
11	phon_R01	95.056	120.103	91.226	0.00532	0.00006
12	phon_R01	88.333	112.24	84.072	0.00505	0.00006
13	phon_R01	91.904	115.871	86.292	0.0054	0.00006
14	phon_R01	136.926	159.866	131.276	0.00293	0.00002
15	phon_R01	139.173	179.139	76.556	0.0039	0.00003
16	phon_R01	152.845	163.305	75.836	0.00294	0.00002
17	phon_R01	142.167	217.455	83.159	0.00369	0.00003
18	phon_R01	144.188	349.259	82.764	0.00544	0.00004
19	phon_R01	168.778	232.181	75.603	0.00718	0.00004
20	phon_R01	153.046	175.829	68.623	0.00742	0.00005
21	phon_R01	156.405	189.398	142.822	0.00768	0.00005
22	phon_R01	153.848	165.738	65.782	0.0084	0.00005
23	phon_R01	153.88	172.86	78.128	0.0048	0.00003
24	phon_R01	167.93	193.221	79.068	0.00442	0.00003

Fig 5. DATASET

```
# checking for missing values in each column
parkinsons_data.isnull().sum()
```

```
name              0
MDVP:Fo(Hz)       0
MDVP:Fhi(Hz)      0
MDVP:Flo(Hz)      0
MDVP:Jitter(%)    0
MDVP:Jitter(Abs)  0
MDVP:RAP          0
MDVP:PPQ          0
Jitter:DDP        0
MDVP:Shimmer      0
MDVP:Shimmer(dB)  0
Shimmer:APQ3      0
Shimmer:APQ5      0
MDVP:APQ          0
Shimmer:DDA       0
NHR               0
HNR               0
status            0
RPDE              0
DFA               0
spread1           0
spread2           0
D2                0
PPE               0
dtype: int64
```

Fig6.Checking missing values

6. SUPPORT VECTOR MACHINE:-

It is a machine learning algorithm used for classification and regression problem and mainly used for classification problem. for separation of n dimensional space into classes so that we can group our new data, and the boundary is used for to classify the data is known as decision boundary and also called hyperplane.

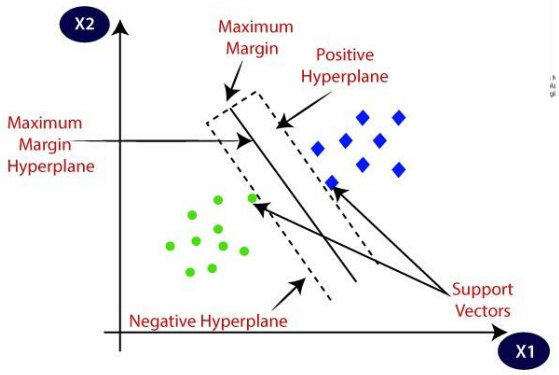

Fig 7.S.V.M

So here in our research we have used SVM model to classify the data and to train the data as per our model and we have try to get best accuracy from it .

Here before going on model training we have to pre process our data .

A. Data pre processing

It is a technique in machine learning used for preparation of our data before train it with our model .So that it get cleaned and in formatted way and should not contains any garbage value there are few steps in data pre processing we are discussing it according to our research.

1.Separating the features and target

In this system we have separated the features and target value as per our model .So when we are talking about features and targets then the first question comes in our mind that what is feature and target in the language of data in machine learning. **Feature** is that value in our data which is taken as input for getting a result from our model so it is very necessary condition for our model .And the output we have got after the feature that is called as **Target**

Separating the features & Target

```
X = parkinsons_data.drop(columns=['name','status'], axis=1)
Y = parkinsons_data['status']
```

Fig 8. Separating the data

2 .Splitting the data set

Here we are separating the whole data set into ratio for training and testing purpose for our model

```
[ ] X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=2)

print(X.shape, X_train.shape, X_test.shape)

(195, 22) (156, 22) (39, 22)
```

Fig 9.Splitted data

3. Data standardization

In data standardization the data will changes to best and standard format to understand for the computer and model .

```
Data Standardization

[ ] scaler = StandardScaler()

scaler.fit(X_train)

StandardScaler
StandardScaler()

[ ] X_train = scaler.transform(X_train)

X_test = scaler.transform(X_test)
```

Fig 10.Data standardization

B. MODEL TRAINING

Model training in machine learning is to develop a system that will predict and process with the data on some algorithm and gives best output according to whatever the model learned from the data .

1. S.V..M Model Training

So here we are using support vector machine to train our model for getting best accuracy and also used linear kernel for reduction of our dimensionality of data for classification.

```
Model Training

Support Vector Machine Model

[ ] model = svm.SVC(kernel='linear')

[ ] # training the SVM model with training data
    model.fit(X_train, Y_train)

SVC
SVC(kernel='linear')
```

Fig 11.SVM model

2. Evaluation of our model

Here we are using some evaluation for to get the working result of our model as you can also say that performance of the model is evaluated in this system. we have used accuracy for evaluating it means the best accuracy having best model .

```
Accuracy Score

[ ] # accuracy score on training data
    X_train_prediction = model.predict(X_train)
    training_data_accuracy = accuracy_score(Y_train, X_train_prediction)
```

Fig 12. Accuracy on train data

```
# accuracy score on testing data
X_test_prediction = model.predict(X_test)
test_data_accuracy = accuracy_score(Y_test, X_test_prediction)
```

Fig 13. Accuracy on test data

3.Building a predictive system

We have developed a predictive system where we get our result from it .on what basis we are getting our result the main condition are developed here .in our project we have changed our input data to numpy array then reshaped numpy array accordingly . and again standardized the data.

```
Building a Predictive System

input_data = (120.55200,131.16200,113.78700,0.00968,0.00008,0.

# changing input data to a numpy array
input_data_as_numpy_array = np.asarray(input_data)

# reshape the numpy array
input_data_reshaped = input_data_as_numpy_array.reshape(1,-1)

# standardize the data
std_data = scaler.transform(input_data_reshaped)

prediction = model.predict(std_data)
print(prediction)
```

Fig 14. Building a predictive system

3. CONCLUSIONS AND FUTURE WORK

In this research we have developed and used a machine learning model and algorithm in which we have predicted a parkinson's disease through the best model of machine learning support vector machine .And will try to improve many things in future with connection of microphone in devices to predict the system and get a good interface for interaction of user with the system and one more the affected patient or person can directly contact and search for doctor from given link

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REFERENCES

1. Pahuja, Gunjan, and T. N. Nagabhushan. "A comparative study of existing machine learning approaches for Parkinson's disease detection." *IETE Journal of Research* 67.1 (2021): 4-14..
2. Moro-Velazquez, L., Gomez-Garcia, J. A., Arias-Londoño, J. D., Dehak, N., & Godino-Llorente, J. I. (2021). Advances in Parkinson's disease detection and assessment using voice and speech: A review of the articulatory and phonatory aspects. *Biomedical Signal Processing and Control*, *66*, 102418
3. Moro-Velazquez, Laureano, et al. "Advances in Parkinson's disease detection and assessment using voice and speech: A review of the articulatory and phonatory aspects." *Biomedical Signal Processing and Control* 66 (2021): 102418
4. Moro-Velazquez, L., Gomez-Garcia, J.A., Arias-Londoño, J.D., Dehak, N. and Godino-Llorente, J.I., 2021. Advances in Parkinson's disease detection and assessment using voice and speech: A review of the articulatory and phonatory aspects. *Biomedical Signal Processing and Control*, *66*, p.102418
5. Naranjo, Lizbeth, Carlos J. Perez, Yolanda Campos-Roca, and Jacinto Martin. "Addressing voice recording replications for Parkinson's disease detection." *Expert Systems with Applications* 46 (2016): 286-292
6. Lahmiri, S., & Shmuel, A. (2019). Detection of Parkinson's disease based on voice patterns ranking and optimized support vector machine. *Biomedical Signal Processing and Control*, *49*, 427-433
7. Naranjo, L., Perez, C. J., Campos-Roca, Y., & Martin, J. (2016). Addressing voice recording replications for Parkinson's disease detection. *Expert Systems with Applications*, *46*, 286-292http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/.
8. Pahuja, G., & Nagabhushan, T. N. (2021). A comparative study of existing machine learning approaches for Parkinson's disease detection. *IETE Journal of Research*, *67*(1), 4-14

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