International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

PARKINSON DISEASE PREDICTION USING MACHINE LEARNING AND SPIRAL TEST

Rituparna Choudhary, Satyam Rai, Er. Avadh Kishor Singh

Department of Computer Science and Engineering

Shri Ramswaroop Memorial Group of Professional Colleges, Lucknow

Abstract- *Parkinson disease (PD) is a whole world public health problem of massive measurement. Diagnosis of the Parkinson diseases through machine learning approach provides better understanding from Parkinson disease dataset in the present century. Machine learning based methods is used to classify between healthy people and Parkinson disease (PD) people. The system developed in the study leverages two different Random forest classifiers for analyzing and classification of the drawing pattern for both spiral and wave sketches respectively. This paper presents a comprehensive review for the prediction of Parkinson disease by using machine learning techniques.*

Keywords- Parkinson's disease (PD), Random Forest classification, Machine learning.

I. INTRODUCTION

A. *Overview*

Parkinson's disease (PD) is a nervous system disorder based on dopamine receptors. It can cause a problem for a person to move their body. Parkinson's is a nervous system disorder, which is characterized by both motor (movement) and non-motor symptoms. Apart from many common symptoms each person will experience and demonstrate as an individual. A person with Parkinson's disease may have the following symptoms:

- tremors and movement issues on just one side of the body.
- Loss of balance and movements.
- rigidity affecting each side of the body.

B. *Objective*

To automate the prediction of Parkinson's diseases is an important topic as it may provide the accurate result of prediction on Parkinson's patients.

Objective of this project was to establish a reliable computer based spiral sketching method for assessment of the disease. This study has investigated the dynamics of sketching a spiral and wave sketch to distinguish between healthy and Parkinson's patients with different levels of severity and proposed a new feature with stronger association with the severity of Parkinson's diseases. The previous studies have established that speed and pen-pressure during sketching reduce with the advancement of the disease but did not consider the combination of these two factors. The study used the scalar product of these two features to obtain the Composite Index of speed and Pen-pressure (CISP) of sketching and tested this against the severity of the disease.

II. LITERATURE REVIEW

1) **Title**: A Novel Health System for the Diagnosis and the Treatment of Parkinson's Disease Author: Erika Rovini, Luca Santarelli, Dario Esposito, Carlo Maremmani, Filippo Cavallo. Description: In this paper it's, aimed to put into effect revolutionary and sustainable offerings for the early analysis, for the remedy and for the control of PD with the aid of using the usage of wearable devices, facts and communique technologies (ICTs), inclusive of cell Health (mHealth) apps and Internet of things (IoT) . To one of these degree, DAPHNE correctly proposes an Ambient Assisted Living (AAL) answer that helps the clinicians in early and differential analysis, promotes a precision medication method

with the aid of using allowing an at-domestic tracking provider optimized in accordance the patient's needs, stimulates the self-control of sufferers and caregivers withinside the care path, extensively reduces healthcare fees in phrases of diagnostic examinations/hospitalization and, as primary breakthrough, lets in a PD analysis as much as 7 years in advance than present day methods, so maximizing the drug remedy efficacy

2) **Title**- Multitask Learning for Predicting Parkinson's Disease Based on Medical Imaging Information Author: Aggeliki Vlachostergiou ∗1, Athanasios Tagaris ∗1, Andreas Stafylopatis1, Stefanos Kollias2 Description: Predicting the Parkinson's disorder is crucial as motor and non-motor manifestations arise a few years after the onset of neurodegeneration, subsequently its early control of disorder is a massive mission within side the area of PD . While a part of preceding research with recognize to the prediction of Parkinson's Disease has been initially based specially on mind images, dependencies among extra patients' records have now no longer been taken . This statement indicates that prediction of Parkinson's Disease at the side of extra patients' information with a unified framework have to outperform Machine Learning (ML) algorithms that deal with distinct reassets of patients' records separately. Our offered framework is predicated on Multi-Task Learning (MTL) applied with Deep Neural Networks (DNNs) with shared hidden layers

3) **Title**-Mood, aspect of motor symptom onset and ache proceedings in Parkinson's disease Author: Patrick McNamara, Karina Stavisky, Erica Harris, Orsolya Szent-Imrey, Raymon Durso. Description: Patients with Parkinson's disease (PD) gift with numerous non-motor signs together with sensory proceedings and temper disturbances. In the present-day pilot study, we aimed to discover ache proceedings and the affiliation among temper and ache in PD. We hypothesized that ache scores could be increased in sufferers with PD relative to controls. As PD is lateralized at onset and research has located lateralization of a few non-motor signs in PD, we additionally hypothesized that PD.

III. PROPOSED METHODOLOGY

Our proposed work consists of three major parts i.e., the OpenCV, machine learning techniques and the flask framework.

A. OpenCV

OpenCV (Open Source Computer Vision Library) is an open-source computer vision and machine learning library. using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection. OpenCV was built to supply a standard infrastructure for computer vision applications and to accelerate the utilization of machine perception within the commercial result.

B. Machine learning techniques

Earlier various machine learning algorithms has been used for the work which includes SVM (Support Vector Mechanism), Fuzzy Logic, Artificial Neural Network, Naïve Bayes and K Means Clustering. For our proposed work we used a combination of CNN and Random Forest classifier. A random forest is a meta estimate that fits a number of decision tree classifier on various sub-sample of the dataset and uses averaging to improve the predictive accuracy and control over-fitting.

C. Flask Framework

Flask is a lightweight WSGI web application framework. This was designed to get started quick and straightforward, with the power to proportion to complex applications. It began as a simple wrapper around Werkzeug and Jinja and has become one of the foremost popular Python web application frameworks.

Flask is pretty impressive too with its:

- Built-in development server and fast debugger
- integrated support for unit testing
- RESTful request dispatching
- Jinja2 templating

IV. MODULE DESCRIPTION

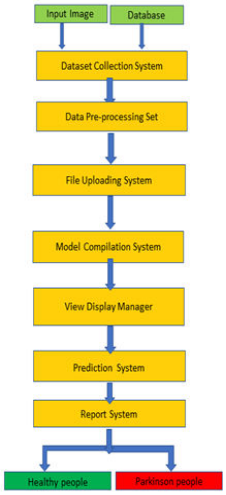

Figure 1: *Module Diagram*

A.) Dataset Collection System: This Module deals with the computer application that facilitates the process of data collection, allowing specific, structured information to be gathered in a systematic fashion, subsequently enabling data analysis to be performed on the information.

B.) Data Pre-processing Set: In this Module it deals with the Pre-processing techniques of data-mining which is used to transform the raw data in a useful and efficient format.

C.) File Uploading System: Upload the files in the repository based on user upload and coverts in into a format useful for OpenCV

D.) Model Compilation System: In this module we will create the model and combine it to perform the task.

E.) View Display Manger: This module manages the code which provide the user interface a better view to the user.

F.) Prediction System: This Module deals with the output of an algorithm after it has been trained on a historical dataset and applied to new data when forecasting the likely of a particular outcome.

G.) Report System: Show report of previously diagnosed patients in the clean tabular manner

V. PROJECT SNAPSHOT

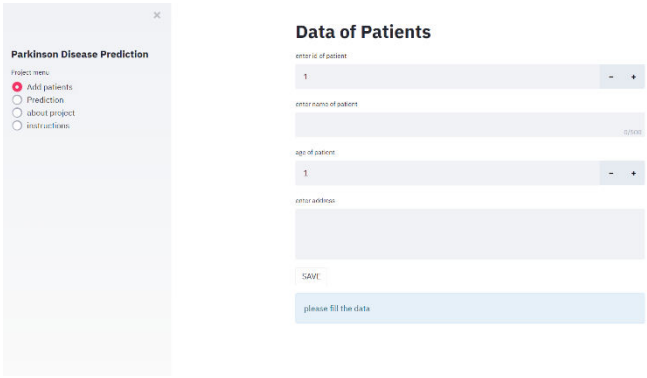

Figure 2: *Home Page*

Above figure 2 is the home page of the final implemented model. In this the first step is to fill the patient details and click on save button to save the data on the Database System.

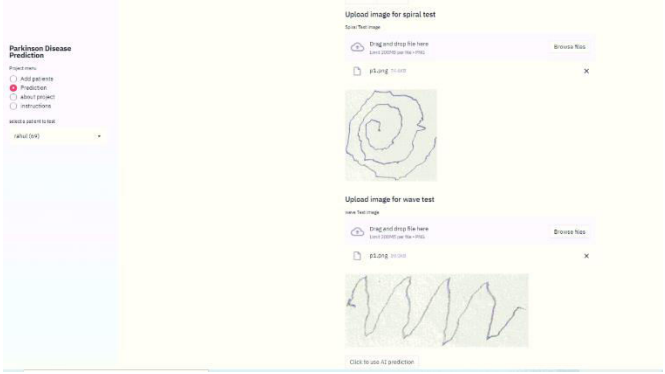

Figure 3: *Browse menu for the selection of the image*

Once the data is filled with the patient then browse the spiral and wave image which was drawn by the patient. After that we need to click on the AI prediction button then the result will be displayed as shown in figure 3, after that, the medical team and doctor can properly diagnose the Parkinson's patient.

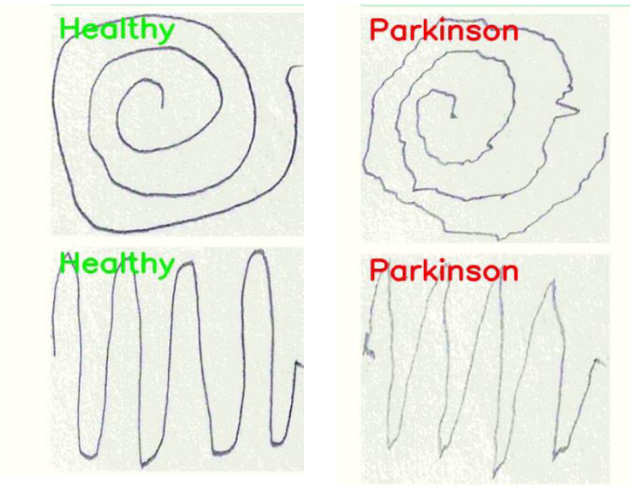

Figure 3: *Result Page*

VI. CONCLUSION

In this paper, a system based on multistage classification is developed by leveraging Random Forest classifiers for the detection of Parkinson's disease from spiral and wave sketches. Initially the patient i.e. The end user draws a spiral on paper and sent a digital image of the spiral paper and the results were shown. The results of this project are to find appropriate features that can identify Parkinson's disease of the patient. Firstly, healthy and diseased images are collected and pre-processed. Then, different features such as shape of spiral and pen pressure are extracted from these images. After that, these images are classified by classifier. The combination of few features is used to evaluate the appropriate features to find distinctive features for identification of Parkinson's disease. The combination obtained from shape of spiral and pen pressure feature extraction results a highest classification accuracy. A combination of shape and pen pressure feature extraction with polynomial kernel results in good classification accuracy. Based on the classified type of disease a text message is displayed to the end user. And then the end user can do the treatment as needed for the patient.

ACKNOWLEDGMENT

This work is an extension to all the past work done regarding this topic. Earlier the work has been carried out using various technologies such as random forest, tensor flow Keras deep neural networks containing voice activity algorithm. We used a random forest model using the streamlit, sqlalchemy, OpenCV, pillow libraries. This work is performed in collaboration with our project guide Mr. Avadh Kishor Singh Assistant Professor of SRMGPC, Lucknow.

REFERENCES

[1] Jankovic J. Parkinson's disease: clinical features and diagnosis. J Neurol Neurosurg Psychiatry (2008) 79(4):368–76. doi:10.1136/jnnp.2007.131045

[2] Politis M, Wu K, Molloy S, G Bain P, Chaudhuri K, Piccini P. Parkinson's disease symptoms: the patient's perspective. Mov Disord (2010) 25(11):1646–51. doi:10.1002/mds.23135

[3] Poluha P, Teulings H-L, Brookshire R. Handwriting and speech changes across the levodopa cycle in Parkinson's disease. Acta Psychol (1998) 100(1):71–84. doi:10.1016/S0001-6918(98)00026-2

[4] Rosenblum S, Samuel M, Zlotnik S, Erikh I, Schlesinger I. Handwriting as an objective tool for Parkinson's disease diagnosis. J Neurol (2013)260(9):2357–61. doi:10.1007/s00415-013-6996-x

[5] Letanneux A, Danna J, Velay JL, Viallet F, Pinto S. From micrographia to Parkinson's disease dysgraphia. Mov Disord (2014) 29(12):1467–75. doi:10.1002/mds.25990