

LITERATURE SURVEY

INTRODUCTION

More than 10 million people are living with Parkinson's Disease worldwide, according to the Parkinson's Foundation. While Parkinson's cannot be cured, early detection along with proper medication can significantly improve symptoms and quality of life. The researchers found that the drawing speed was lower and the pen pressure is lower among Parkinson's patients. One of the indications of Parkinson's is tremors and rigidity in the muscles, making it difficult to draw smooth spirals and waves. It is possible to detect Parkinson's disease using the drawings alone instead of measuring the speed and pressure of the pen on paper. Our goal is to quantify the visual appearance (using HOG method) of these drawings and then train a machine learning model to classify them. In this project, we are using Histogram of Oriented Gradients (HOG) image descriptor along with a Random Forest classifier to automatically detect Parkinson's disease in hand-drawn images of spiral and waves.

ABSTRACT

Parkinson's Disease (PD) is a progressive neuro degenerative disorder, which is characterized by Various symptoms. progressive neuro degenerative disorder affects the nervous system in the elderly, which is characterized by motor symptoms such as tremor, rigidity, slowness of movement and problems with gait. In this work, an attempt has been made to classify the spiral images of healthy control and Parkinson's disease subjects using deep learning neural networks. The Vision based Convolutional Neural Network architecture is used to refine the diagnosis of neuro degenerative disorder disease.

REFERENCES

[1] Early Identification of Parkinson's Disease from Hand-drawn Images using Histogram of Oriented Gradients and Machine Learning Techniques.

Authors:

- Ferdib-Al-Islam (Khulna University of Engineering & Technology, Khulna, Bangladesh)
- Laboni Akter (Khulna University of Engineering & Technology, Khulna, Bangladesh).

Algorithms:

- Decision Tree, Gradient Boosting, K-Nearest Neighbor, Random Forest, and some other classification algorithms with the HOG feature descriptor algorithm was applied.
- The proposed strategy with Gradient Boosting and K-Nearest Neighbors accomplished better execution in accuracy, sensitivity, and specificity as well as in system design flexibility.
- Gradient Boosting algorithm got 86.67%, 93.33%, and 80.33% for accuracy, sensitivity, specificity and KNN got 89.33%, and 91.67% for accuracy, and sensitivity respectively.

[2] Prediction of Parkinson's Disease using Machine Learning and Deep Transfer Learning from different Feature Sets.**Authors:**

- Supriya Kamoji (Fr.Conceicao Rodrigues College of Engineering, Mumbai, India)
- Dipali Koshti (Fr. Conceicao Rodrigues College of Engineering, Mumbai, India)
- Valiant Vincent Dmello (Fr.Conceicao Rodrigues College of Engineering, Mumbai, India)
- Alrich Agnel Kudel (Fr.Conceicaoc Rodrigues College of Engineering, Mumbai, India)
- Nash Rajesh Vaz (Fr. Conceicao Rodrigues College of Engineering, Mumbai, India).

Algorithms:

- The Freezing of Gait dataset was used to predict if there were symptoms related to legs and trunk by analyzing the patient's gait,

the Parkinson Clinical speech dataset to detect deviation in audio frequency and lastly the Parkinson Disease wave and spiral drawing dataset which can help find out impairment in writing due to a tremor in hand or arm.

- The detection of impairment in handwriting seems to be the most convenient method and **Convolutional Neural Network** using Transfer Learning is implemented on this image dataset.

[3] Parkinson's Disease Detection from Spiral and Wave Drawings using Convolutional Neural Networks: A MultiStage Classifier Approach.

Authors:

- Sabyasachi Chakraborty (Department of Computer Engineering/Institute of Digital Anti-Aging Healthcare/u-HARC, Inje University, South Korea)
- Satyabrata Aich (Department of Computer Engineering/Institute of Digital Anti-Aging Healthcare/u-HARC, Inje University, South Korea)
- Jong-Seong-Sim (Department of Computer Engineering/Institute of Digital Anti-Aging Healthcare/u-HARC, Inje University, South Korea)
- Eunyounghan (Department of Neurology, Haeundae Paik Hospital, Inje University, South Korea)
- Jinse Park (Department of Neurology, Haeundae Paik Hospital, Inje University, South Korea)
- Hee-Cheol Kim (Department of Computer Engineering/Institute of Digital Anti-Aging Healthcare/u-HARC, Inje University, South Korea).

Algorithms:

- In this paper, a system design is proposed for analyzing Spiral drawing patterns and wave drawing patterns in patients suffering from Parkinson's disease and healthy subjects

- The system developed in the study leverages two different convolutional neural networks (CNN), for analyzing the drawing patterns of both spiral and wave sketches respectively.
- Further, the prediction probabilities are trained on a meta classifier based on ensemble voting to provide a weighted prediction from both the spiral and wave sketch.
- The complete model was trained on the data of 55 patients and has achieved an overall accuracy of 93.3%, average recall of 94 %, average precision of 93.5% and average f1 score of 93.94% .

[4] An Early Detection of Parkinson's Disease from Geometric Drawings.

Authors:

- Vishal Nandan Medhi
- Kaustav Moni Basumatary
- R Murugan
- TriptiGoel

(Dept.ofECE,Bio-Medical Imaging Laboratory(BIOMIL), National Institute ofTechnology Silchar, Silchar, Assam, India).

Algorithms:

- The methodology uses the Histogram of Oriented Gradients (HOG) as the feature descriptor and proposed the weighted Random Forest (WRF) classifier technique.
- HOG will track the intensity changes in the images, and the WRF works with a small dataset to provide effective results.
- This strategy provides a very good testing accuracy of 93% and 92% on the wave and spiral datasets. This method is a very robust and cost-effective method for the early detection of PD.

[5] Parkinson's Disease Detection Using Voice and Spiral Drawing Dataset.

Authors:

- Korakanchi Madhu Mohan Rao
- Mallavarapu Sai Naveen Reddy

- Vemula Ravi Teja
- Padmaveni Krishnan
- D. John Aravindhar
- M.Sambath

(CSE Hindustan Institute of Technology and Science, Chennai, India).

Algorithms:

- Proposed system is a predictive model that uses the combination of voice data set and spiral drawing dataset and gives the intensity of the Parkinson's disease for affected persons.