PARKINSON'S DISEASES DETECTION

MINOR PROJECT SYNOPSIS

Of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE & ENGINEERING

By

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INTRODUCTION

ABOUT THE PROJECT

Diagnosis of Parkinson's disease is commonly based on medical observations and assessment of clinical signs, including the characterization of a variety of motor symptoms. However, traditional diagnostic approaches may suffer from subjectivity as they rely on the evaluation of movements that are sometimes subtle to human eyes and therefore difficult to classify, leading to possible misclassification. In the meantime, early non-motor symptoms of disease may be mild and can be caused by many other conditions. Therefore, these symptoms are often overlooked, making diagnosis of disease at an early stage challenging. To address these difficulties and to refine the diagnosis and assessment procedures of disease, machine learning methods have been implemented for the classification of disease and healthy controls or patients with similar clinical presentations.

The project based on health care and biomedical devices. It is a real-time outbreak monitoring machine learning application developed to predict Parkinson's disease with the help of voice Dataset which helps to treat the people in early stages. It helps in Prediction of Parkinson's Disease with the help of voice Dataset which helps to treat the people in early stages by using Machine learning algorithms like SVM, Xgboost, Random Forest, Artificial Neural Networks and Some techniques like reverse engineering and Hyperparameter tuning, which makes it to predict more accurately.

This project will analyze the voice sets of the patients and will compare it will the data sets already available in the database with the help of many algorithms for maximum accuracy and low level of errors. Data will be properly extracted in a tabular for in the format of css file. This project will help healthcare workers to diagnose the Parkinson's disease at a very early stage and cure it accordingly

TECHNOLOGY USED

Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding; make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance.

Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Jupyter Notebook

The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

JupyterLab is a web-based interactive development environment for Jupyter notebooks, code, and data. JupyterLab is flexible: configure and arrange the user interface to support a wide range of workflows in data science, scientific computing, and machine learning. JupyterLab is extensible and modular: write plugins that add new components and integrate with existing ones.

Python PIP

Pip is a package manager for Python. That means it's a tool that allows you to install and manage additional libraries and dependencies that are not distributed as part of the standard library.

Package management is so important that pip has been included with the Python installer since versions 3.4 for Python 3 and 2.7.9 for Python 2, and it's used by many Python projects, which makes it an essential tool for every Pythonista.

The concept of a package manager might be familiar to you if you are coming from other languages. JavaScript uses npm for package management; Ruby uses gem, and .NET use NuGet. In Python, pip has become the standard package manager.

MODELS AND ALGORITHMS USED

- **XGBOOST:**
  XGBoost is a gradient boosting library. It helps to implements machine learning algorithms under the Gradient Boosting framework. XGBoostis a parallel tree boosting which solves many Machine Learning problems in a fast and simple way. The same code runs on distributed environment and solves many machine learning problems.

- **CATBOOST:**

CatBoost is a recently open sourced machine learning algorithm developed by Yandex. It Reduce time spent on parameter tuning, because CatBoost provides great results with default parameters. It helps to improve your training results that allow you to use non-numeric factors, instead of having to pre-process your data or spend time and effort turning it to numbers.

- **RANDOM FOREST:**
  Random forest is the ensemble technique that works on the large numbers of decision trees. Each individual tree in the random forest gives a class prediction and the class with the most votes becomes our model's prediction.

Hyperparameter Tuning:

The aim of hyperparameter tuning is to get the best possible parameter for our model. We did Hyperparameter tuning with the help of GridSearchCVcauseit searches for best set of hyperparameters from a grid of hyperparameters values.

THE FIELD OF THE PROJECT

Machine Learning

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.

The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

But, using the classic algorithms of machine learning, text is considered as a sequence of keywords; instead, an approach based on semantic analysis mimics the human ability to understand the meaning of a text.

OBJECTIVE

The objective of this project is to:

- Provide a systematic evaluation of machine learning algorithm for Parkinson disease prediction.

- Enhance the prediction level to diagnose the disease at earlier stage.

- Artificial Neural Networks and Some techniques like reverse engineering and Hyperparamter tuning we will build a model which is able to predict more accurately.

- Save the time of doctor in decision, increasing accuracy and yield of diagnoses.

FEASIBILITY STUDY

1. FINANCIAL FEASIBILTY

Since the system doesn't consist of any multimedia data transfer, bandwidth required for the operation of the application is very low.

2. TECHNICAL FEASIBILTY

Project is a complete web based application and main technology and tools associated are:

- Python
- Machine Learning
- Python PIP

Each of the technology are freely available and the technical skills required and manageable. Time limitations of the product development and the ease of the implementing using these technologies are synchronized.

3. RESOURCES AND TIME FEASIBILITY

Resources that is required for the project includes:

- Programming device (personal computer)
- Hosting space (freely available)
- Programming tools (freely available)
- Programming individuals

This states that the project has the required resource feasibility.

4. SOCIAL/LEGAL FEASIBILTY

This project will design for all the health organization and themed under heath care and biomedical devices so it will be accessed by healthcare workers and organizational workers. This is not an open source project.

NEED OF PROJECT

The purpose of this project is to predict Parkinson's disease in early stages as it will be beneficial for patient's health if it will be treated as early as possible. Parkinson's disease is a brain disorder that leads to shaking, stiffness, and difficulty with walking, balance, and coordination.

METHODOLOGY/ PLANNING OF WORK

PROBLEM STATEMENT

- Detection of Parkinson Disease

SOFTWARE REQUIREMENTS

- An operating system browser: windows, mac, Linux
- Web browsers : Google , Firefox, Internet Explorer
- Scripting Language : Python
- Dataset

HARD WARE REQUIREMENTS

- A personal computer
- Minimum Intel i3 processor
- 2 GB RAM or above
- Hard disk 100 GB or above
- Keyboard

BENEFITS OF THE PROJECT FOR THE SOCIETY

Parkinson's disease is the second most common age-related neurodegenerative disorder after Alzheimer's disease. An estimated seven to 10 million people worldwide have Parkinson's disease. Parkinson's disease is a progressive nervous system disorder that affects movement.

This project focuses on the development of novel technical approaches to be used in the diagnosis of Parkinson's disease as it will help in detection of this disease, as symptoms of this disease are not shown at the very first stage. The types of clinical, behavioral and biometric data are extracted, that could be used for rendering more accurate diagnoses by the doctors. Early detection of this disease will benefit the patient up to a very large extent. Machine learning approaches therefore have the potential to provide clinicians with additional tools to screen detect or diagnose Parkinson's disease.

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