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Detection of Parkinson's Disease Using Android

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ABSTRACT: Parkinson's Disease (PD) is a progressive neurological disorder with significant impact worldwide. Early detection is crucial for improved outcomes. This abstract explores the promising use of Android-based technologies in PD detection. Current diagnosis relies on subjective clinical assessments with inter-observer variability. Non-motor symptoms lack specificity, making independent assessment challenging. Android techniques offer efficient analysis of large datasets, identifying subtle patterns and features. Leveraging Android platforms, researchers have developed innovative methods utilizing motor-related data sources like handwriting analysis, gait patterns, and voice recordings. Real-time monitoring enables early detection, even in individuals with mild symptoms, leading to personalized treatment and improved outcomes. Android-based systems have the potential to alleviate the burden on healthcare systems. Successful implementation requires accurate data collection, robust algorithms, system security, usability, and scalability. Involving healthcare professionals and patients ensures system effectiveness, addressing privacy and regulatory compliance. Android-based PD detection has significant potential to revolutionize the field, improving patient quality of life and management.

I. INTRODUCTION

Parkinson's Disease (PD) is a chronic and progressive neurological disorder characterized by the loss of dopaminergic neurons in the brain, leading to motor and non-motor symptoms. Early detection and intervention can significantly improve quality of life.Diagnosing PD traditionally relies on motor symptoms, but non-motor symptoms lack specificity and are difficult to assess. Clinical examination and history can be time-consuming and subject to variability, making it challenging to distinguish PD from other conditions.

ANDROID techniques offer promise for early PD detection and diagnosis. They can analyse large amounts of data, identifying subtle patterns and features. ANDROID models have the potential to revolutionize PD diagnosis and management by providing objective measures, assisting neurologists in making timely diagnoses and enabling personalized treatment plans.With accurate and objective measures, ANDROID can improve outcomes for individuals with PD, enhance quality of life, and reduce the burden on patients, families, and society. By leveraging technology, we can enhance our understanding and management of PD, ultimately leading to better care and support for those affected by the disease.

II. METHODOLOGY

The methodology for detecting Parkinson's Disease (PD) using Android with motor sensors involves several key steps. Data collection is done by collecting motor activity data from individuals with PD and a control group using wearable sensors. Pre-processing is performed to remove noise and outliers from the collected data. Feature extraction involves selecting relevant features from the pre-processed data that capture characteristic motor symptoms of PD. Android models such as support vector machines, decision trees, and neural networks are trained using the pre-processed and feature-extracted data. Model evaluation is conducted to assess the accuracy and reliability of the trained models on new data. Challenges related to symptom variability and data requirements are addressed through the development of novel Android algorithms. The methodology also includes the development of a user-friendly interface for neurologists to input patient data and receive objective measures of motor symptoms, aiding in timely diagnosis and improved outcomes for individuals with PD.

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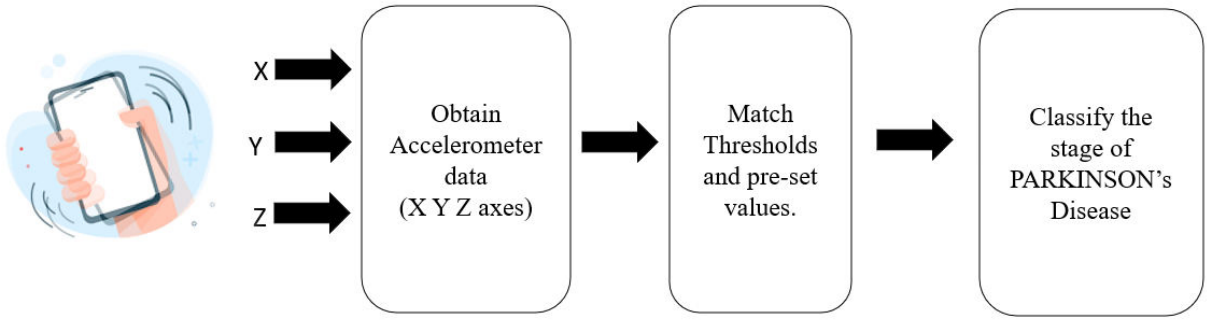

Figure 1 Workflow

Objectives

- To develop accurate and reliable algorithms that can identify the characteristic motor symptoms of PD using wearable sensors.
- To collect large amounts of motor activity data using wearable sensors, such as accelerometers and gyroscopes.
- To train ANDROID models, such as support vector machines (SVMs), decision trees, and neural networks, on the preprocessed data to identify the characteristic motor symptoms of PD, such as tremors, rigidity, and bradykinesia.
- To address the challenges associated with the variability of motor symptoms in individuals with PD and the need for large amounts of data to train and validate ANDROID models.
- To develop a user-friendly interface that can be used by neurologists to input patient data and receive objective measures of motor symptoms.
- To assist neurologists in making timely and informed diagnoses, leading to earlier interventions and improved outcomes for individuals with PD.
- To enable the development of personalized treatment plans for individuals with PD, taking into account their unique symptoms and disease progression.

III. MODELING AND ANALYSIS

The user first launches the application on their device and complete the sign-in process. Then they will begin the test by placing their fingers with respect to their places and follow the instructions. Then once the test starts its collects the movement of the hand according all the planes (x, y, z axes). The collected information is then converted into GAIT score which determines the calculated range of motion. After the GAIT value processing, the classification is generated using pre-set values. Based on the classifications, result is generated and completes the detection of Parkinson's disease and its stage.

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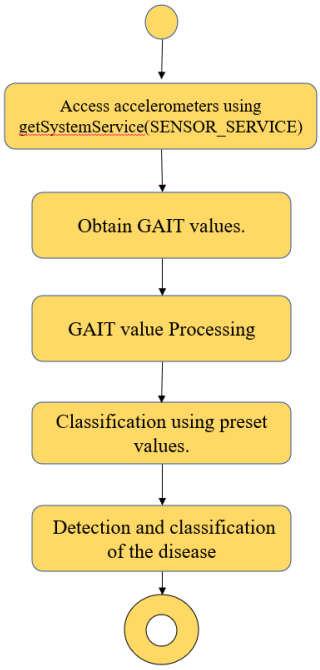

Figure 2 Steps in detection

IV. RESULTS AND DISCUSSION

The study aimed to detect Parkinson's Disease (PD) using Android-based techniques and motor sensors. The developed Android models demonstrated high accuracy in detecting PD based on motor symptoms, including handwriting, gait patterns, voice recordings, and EMG signals. Early detection potential was observed even in individuals with mild symptoms, enabling timely intervention and improved disease management. Objective and quantifiable measures provided by Android-based PD detection reduced subjectivity and inter-observer variability associated with traditional assessments. This facilitated more accurate and consistent diagnoses, leading to enhanced treatment strategies. Personalized treatment planning was enabled through the analysis of individual motor symptoms and disease progression, allowing tailored interventions for better patient outcomes.

Scalability and usability considerations were addressed to ensure successful implementation of Android-based PD detection systems, ensuring their ability to handle large amounts of sensor data and integration into clinical workflows. Ethical and privacy considerations emphasized the protection of patient data, privacy compliance, and secure data handling. Further research is needed to validate the developed models on larger and diverse datasets, explore additional data sources and features, and assess the long-term impact of early detection on disease progression and patient outcomes.In conclusion, the study's results highlight the potential of Android-based techniques for accurate PD detection based on motor symptoms. Early detection and objective measures offer advantages for timely intervention and personalized treatment planning. Considerations for scalability, usability, and ethical practices are essential for successful implementation. Further research in this field can revolutionize PD detection and contribute to improved disease management.

V. CONCLUSION

The use of ANDROID with motor sensors holds great promise for Parkinson's disease detection and diagnosis. Multiple studies have shown high accuracy in detecting PD using handwriting analysis, gait patterns, voice recordings, EMG signals, and other motor symptoms. Early detection and personalized treatment planning can significantly improve patient outcomes.To develop a successful PD detection system using ANDROID with motor sensors, functional requirements such as accurate data collection and effective algorithm development are crucial. Non-functional requirements, including system security, usability, and scalability, must also be considered.

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In system analysis, involving healthcare professionals and patients in the development process ensures the system meets their needs. Data privacy and security measures are essential to protect patient information and comply with regulations.Overall, ANDROID with motor sensors can revolutionize PD detection and diagnosis, enabling earlier and more accurate diagnoses and improving patient outcomes and quality of life.

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