**[1], Early detection of Parkinson’s disease using machine learning:**

* A recent study by Liu et al. focuses on enhancing PD detection through a novel combination of feature extraction techniques and ML algorithms.
* The methodology involves collecting audio data from diverse sources, including both clinical and home environments, to capture a broader spectrum of PD-related symptoms.
* Feature extraction methods such as Mel-frequency cepstral coefficients (MFCCs) and wavelet transform extract relevant features from the audio signals.
* The features are then fed into ML algorithms including convolutional neural networks (CNNs), long short-term memory (LSTM) networks, and ensemble methods for classification.
* The study explores Parkinson’s disease classification using vowel phonation data, revealing the Random Forest classifier's accuracy of 91.835% and sensitivity of 0.95.
* Similarly, the SVM model, post-PCA, achieves an accuracy of 91.836% and sensitivity of 0.94, indicating its robustness in handling outliers. The absence of false positives enhances the models' reliability. While the KNN model also performs well for balanced datasets, the recommendation leans towards the Random Forest due to its simplicity, accuracy, and non-invasiveness, potentially offering long-term relief to individuals with Parkinson’s disease (PWP) globally.
* Overall, the study underscores the efficacy of machine learning, especially the Random Forest model, in Parkinson's disease classification, with implications for improved diagnosis and management globally.

**[2], Automatic and Early Detection of Parkinson’s Disease by Analyzing Acoustic Signals Using Classification Algorithms Based on Recursive Feature Elimination Method**

The literature review provides a comprehensive overview of the promising approach outlined in the abstract for early diagnosis of Parkinson's disease (PD) using voice analysis and machine learning (ML) techniques. Here's a summary of the key points:

1. \*\*Voice Analysis for PD Diagnosis:\*\* Studies have consistently shown a high prevalence of voice disorders in PD patients, making voice analysis a valuable diagnostic tool. Previous research has successfully utilized various ML algorithms such as SVM, KNN, and Random Forest to diagnose PD based on voice features.

2. \*\*Feature Selection and Optimization:\*\* The review emphasizes the importance of feature selection and optimization techniques such as Recursive Feature Elimination (RFE) and Synthetic Minority Oversampling Technique (SMOTE) to enhance model performance and address class imbalance issues within the dataset.

3. \*\*Dimensionality Reduction Techniques:\*\* The use of dimensionality reduction techniques like t-Distributed Stochastic Neighbor Embedding (t-SNE) and Principal Component Analysis (PCA) is highlighted for visualizing high-dimensional data and improving ML model efficiency.

4. \*\*Performance Comparison:\*\* The abstract claims superior performance compared to existing studies, with Random Forest and Multilayer Perceptron achieving high accuracy, precision, recall, and F1-score.

Additional relevant literature is cited, including studies exploring deep learning techniques, the use of specific voice features like mel-frequency cepstral coefficients (MFCCs), and hybrid approaches combining acoustic and linguistic features for improved PD detection.

The review suggests avenues for further research, including the exploration of larger and more diverse datasets for better generalizability, the integration of other modalities such as movement analysis for enhanced accuracy, and the adoption of explainable AI techniques to understand the model's decision-making process.

Overall, the literature review provides a solid foundation for understanding the state-of-the-art methods in PD diagnosis using voice analysis and ML, while also highlighting areas for future investigation and improvement.