PREDICTING PARKINSON'S DISEASE PROGRESSION USING TELEMONITORING DATA

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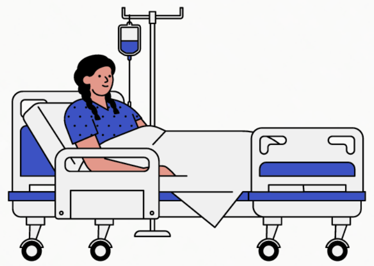
Problem Statement

The progression of Parkinson's disease is difficult to monitor remotely using traditional methods.



Regular examinations require frequent hospital visits, which is inconvenient and not always feasible for patients.

There is a need for remote, non-invasive, and automated approaches to support telemedicine.

Actuality & Relevance

Parkinson’s disease is a chronic and progressive neurological disorder affecting millions of people worldwide.

Remote monitoring:

- reduces the need for hospital visits
- supports telemedicine and home-based care
- improves patient quality of life

Research Objectives

- Predict Parkinson’s disease severity using voice measurements
- Identify important biomarkers related to disease progression
- Reduce data dimensionality while preserving key information
- Build and evaluate a machine learning model for telemonitoring support

Data Preprocessing

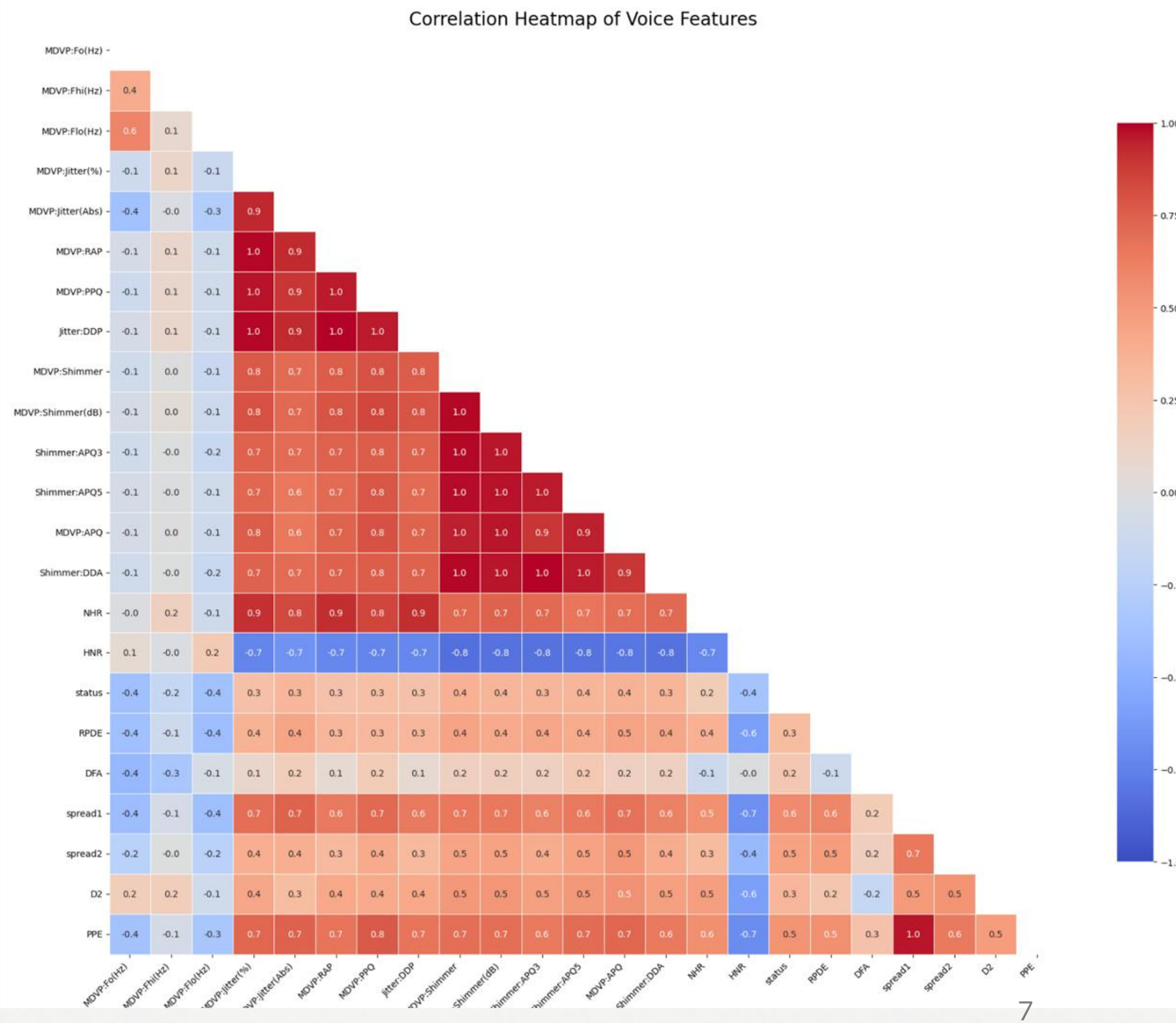
Several preprocessing steps were applied:

- Feature scaling using StandardScaler
- Selection of numerical features only
- Splitting data into training and test sets
- Handling non-informative and non-numeric columns

Dimensionality Reduction (PCA)

Principal Component Analysis (PCA) was applied to:

- reduce the number of features
- remove redundancy and noise
- preserve 95% of the original variance



Model and Methods

A Neural Network model was used for prediction.

Model architecture:

- fully connected dense layers
- ReLU activation functions
- sigmoid output layer (for prediction)

The model was trained using:

- Adam optimizer
- binary cross-entropy loss
- early stopping to prevent overfitting

Evaluation Metrics

The model was evaluated using:

- accuracy
- loss on validation data

These metrics allow us to measure how well the model predicts disease severity and generalizes to unseen data.

Results

The trained model demonstrated stable learning behavior.

The results confirm the feasibility of voice-based Parkinson's monitoring.

Key observations:

- dimensionality reduction improved training stability
- the model successfully captured patterns related to disease progression
- telemonitoring data proved to be informative for prediction tasks

Limitations & Future Work

Limitations:

- LIMITED DATASET SIZE
- LACK OF LONGITUDINAL PATIENT HISTORY
- MODEL INTERPRETABILITY COULD BE IMPROVED

FUTURE WORK:

- APPLY EXPLAINABLE AI METHODS
- INTEGRATE TIME-SERIES ANALYSIS FOR PROGRESSION TRACKING

The End

THANK YOU FOR LISTENING