
Rapid Diagnosis of Parkinson's Disease Using Voice

Team 16

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Current Status of PD Diagnostics

Method	What It Measures	Current Role & Availability	Key Limitation
Clinical Exam	Motor Symptoms	Gold Standard. Widely available and the basis for all diagnosis.	Late diagnosis; subjective; high early misdiagnosis rate.
DaTscan	Dopamine System Integrity	Ancillary. Helps rule out essential tremor; widely available.	Cannot distinguish PD from other parkinsonisms.
CSF SAA	Pathological α -syn in CSF	Confirmatory. Commercially available; used in specialty centers & research.	Invasive (lumbar puncture).
Skin Biopsy	Pathological α -syn in nerves	Confirmatory. FDA-approved; less invasive; growing availability.	Still requires a biopsy procedure.
Blood SAA	Pathological α -syn in blood	Transformative/Emerging. Now available as an LDT; poised to become first-line.	Still new; clinical integration and insurance coverage are evolving.

Problems to solve in Parkinson's Disease Diagnostics

- Gap between
 - At-risk population : ~ 50-100 million
 - Diagnosed population: ~10 million
- Late diagnostics (the Pre-motor Problem) :
 - the time motor symptoms emerges in clinical diagnostics, a significant portion of neurons have been lost. **Critical therapeutic window missed!**
- Accessibility of rapid early-stage diagnostics for average people will improve diagnostics outcome for PD!

Proof of Concept: Rapid pre-motor diagnostic of PD using voice

- Data set: patients/non-patient with voice measurement
- <https://www.kaggle.com/datasets/vikasukani/parkinsons-disease-data-set>
- Publication using this data

Suitability of Dysphonia Measurements for Telemonitoring of Parkinson's Disease –M. Little, et al, IEEE Transactions on Biomedical Engineering, 56, 4, 2009

Our Method

Machine learning model for classifying PD vs. Non-PD based on voice measurement

- Dataset partitioning

- Training set with cross-validation | independent test set

- Preprocessing

- Principal component analysis (PCA) for feature reduction

- Modeling

- Support vector machine (SVM) for modeling

Our Results

- Our model performs very well with independent test dataset!

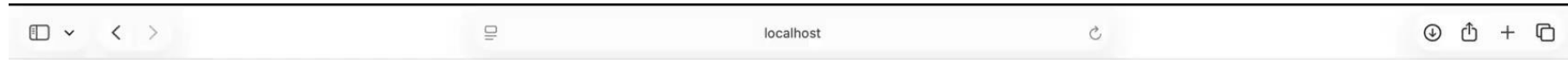


```
=== TEST (HELD-OUT PATIENTS) RESULTS @ threshold=0.650 ===
Accuracy:          0.967
Balanced Accuracy: 0.958
ROC AUC:           0.991
Sensitivity (PD):   1.000
Specificity (Non-PD):0.917
Confusion Matrix:
[[11  1]
 [ 0 18]]
Classification Report:
              precision    recall  f1-score   support

   Non-PD       1.00      0.92      0.96         12
     PD        0.95      1.00      0.97         18

 accuracy          0.97      0.96      0.97         30
  macro avg        0.97      0.96      0.96         30
 weighted avg      0.97      0.97      0.97         30
```

Demo



Deploy ⋮

Parkinson's Voice Screening

Recording tips

- Quiet room, minimal background noise
- Microphone 10–15 cm from mouth
- Keep pitch and loudness steady

Duration

5 seconds

Decision threshold

0.65

Hold the vowel sound “aaa” steadily for ~5 seconds, as described in the Parkinson's sustained phonation protocol.

 Record 5-second “aaa” sample

...or upload a WAV clip

Drag and drop file here

Limit 200MB per file • WAV

Browse files