

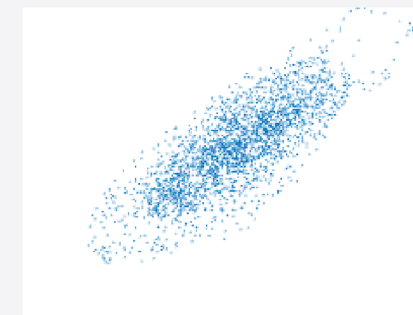
Introduction

- Epileptic seizures are a sudden burst of electrical signals in the brain
- Detected using EEG signals sensed via electrodes
- EEG signals are non-stationary and non-linear making it a challenge to work with

Key Contributions

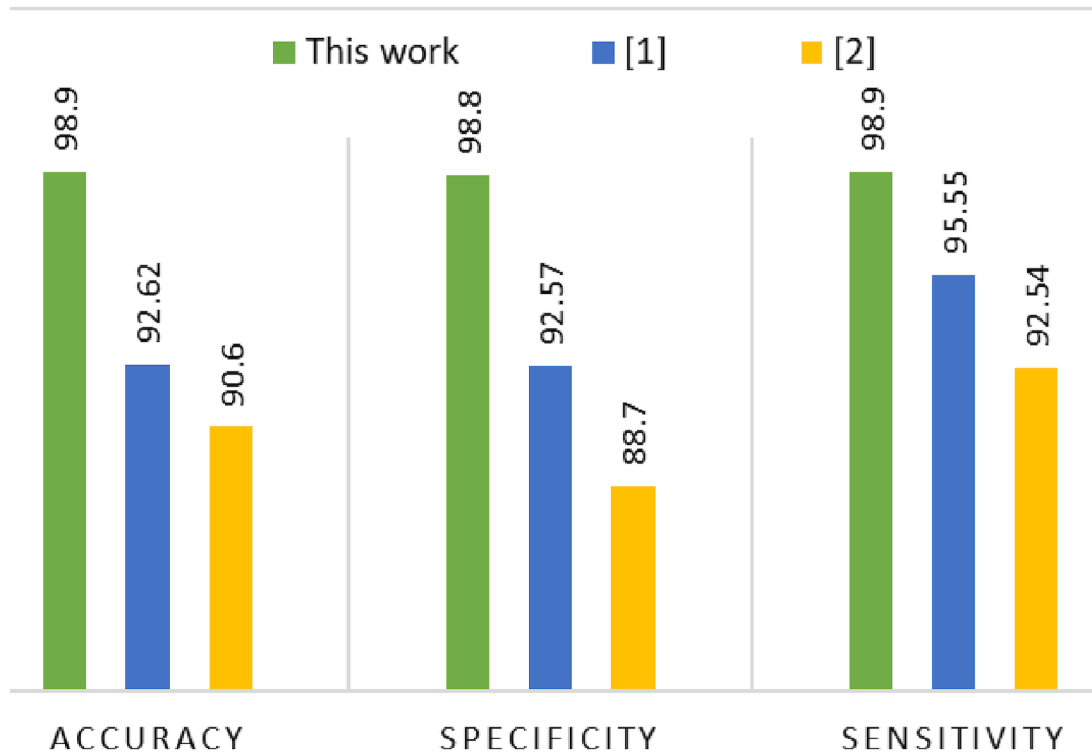
- Improved performance compared to literature: 98.9% ACC, SPEC, SENS
- Proved Efficacy of PSR
- Found ideal preprocessing window size: 10 seconds
- First study to implement PSR on multichannel CHB-MIT dataset

Phase space reconstruction



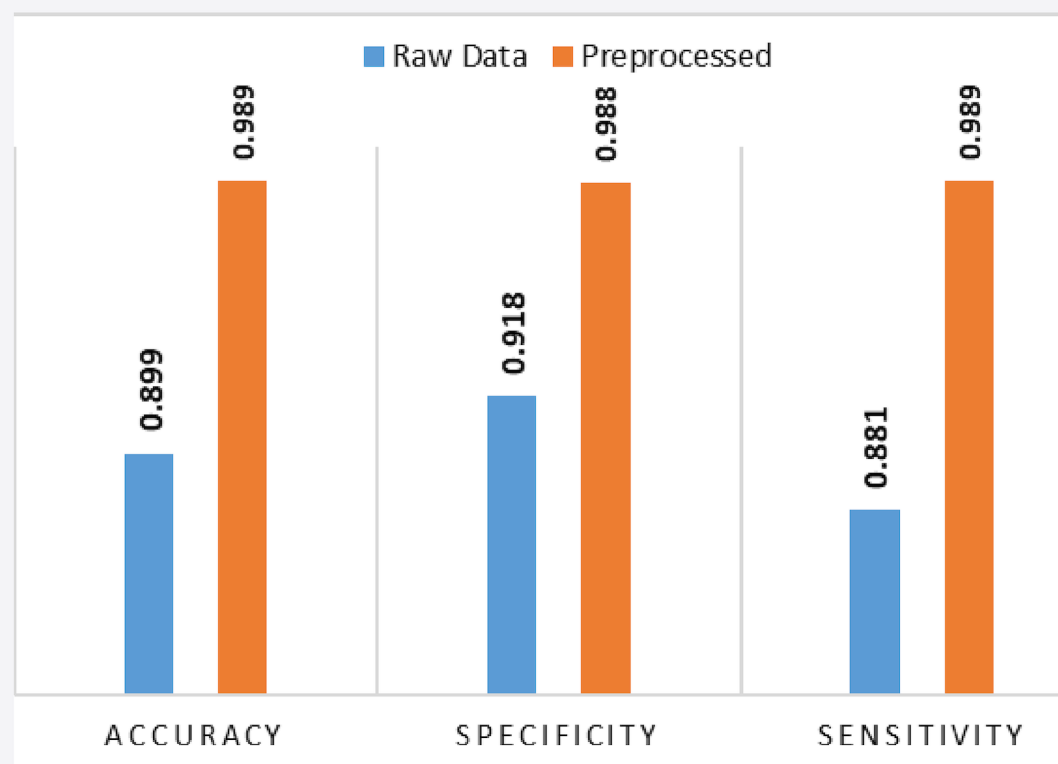
- PSR is a non-linear time-series analysis method
- It enhances the information present in EEG

Comparison with Previous work



Results

Preprocessing with bandpass filtering and Phase space reconstruction improved the performance of RF by 12%



Bandpass Filtering

Bandpass filtering done in frequency range 0.5Hz to 25Hz as most seizures fall in this range

Random Forest (RF)

Out of the six classification algorithms test, random forest classifier performed the best

[1]Guo, Y., Jiang, X., Tao, L., Meng, L., Dai, C., Long, X., Wan, F., Zhang, Y., van Dijk, J., Aarts, R. M., Chen, W., & Chen, C. (2022). Epileptic Seizure Detection by Cascading Isolation Forest-Based Anomaly Screening and EasyEnsemble. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 30, 915–924.

[2] Aayesha, Qureshi, M. B., Afzaal, M., Qureshi, M. S., & Fayaz, M. (2021). Machine learning-based EEG signals classification model for epileptic seizure detection. *Multimedia Tools and Applications*, 80(12), 17849–17877. <https://doi.org/10.1007/s11042-021-10597-6>