Proposed Research Area:

1. Features Importance according to the bands (alpha, beta, theta, delta, gamma or Slow wave/Fast wave)
2. Statistics property analysis for all bands.
3. Statistical Changes in REM and NREM.
4. Accuracy Performance Dependency.

Dataset Distribution

NREM	72631
REM	16480
TOTAL	89111

Data Set: ALL

	Precision	Recall	F1-Score	Support
NREM	0.89	0.97	0.93	23930
REM	0.78	0.47	0.58	5472
Accuracy			0.88	29402
Macro AVG	0.83	0.72	0.75	29402
Weighted AVG	0.88	0.88	0.86	29402

Data Set: Delta (Slow Wave)

	Precision	Recall	F1-Score	Support
NREM	0.86	0.92	0.89	23930
REM	0.51	0.34	0.41	5472
				29402
Accuracy			0.82	29402
Macro AVG	0.68	0.63	0.65	29402
Weighted AVG	0.79	0.82	0.80	29402

Data Set: Theta (Slow wave)

	Precision	Recall	F1-Score	Support
NREM	0.83	0.97	0.87	23930
REM	0.50	0.15	0.23	5472
Accuracy			0.81	29402
Macro AVG	0.67	0.56	0.56	29402
Weighted AVG	0.77	0.81	0.77	29402

Data Set: Alpha (Fast Wave)

	Precision	Recall	F1-Score	Support
NREM	0.84	0.96	0.90	23930
REM	0.55	0.23	0.33	5472
Accuracy			0.82	29402
Macro AVG	0.70	0.59	0.61	29402
Weighted AVG	0.79	0.82	0.79	29402

Data Set: Beta (Fast Wave)

	Precision	Recall	F1-Score	Support
NREM	0.85	0.97	0.91	23930
REM	0.66	0.24	0.35	5472
Accuracy			0.84	29402
Macro AVG	0.76	0.61	0.63	29402
Weighted AVG	0.81	0.84	0.80	29402

Data Set: Gamma (Ultra)

	Precision	Recall	F1-Score	Support
NREM	0.84	0.88	0.86	23930
REM	0.35	0.28	0.31	5472
Accuracy			0.77	29402
Macro AVG	0.60	0.58	0.59	29402
Weighted AVG	0.75	0.77	0.76	29402

Data Set: Slow Waves (Delta and Theta)

	Precision	Recall	F1-Score	Support
NREM	0.86	0.96	0.90	23930
REM	0.62	0.31	0.42	5472
Accuracy			0.84	29402
Macro AVG	0.74	0.64	0.66	29402
Weighted AVG	0.81	0.84	0.81	29402

Data Set: Fast Wave (Alpha and Beta)

	Precision	Recall	F1-Score	Support
NREM	0.85	0.97	0.91	23930
REM	0.68	0.45	0.40	5472
Accuracy			0.84	29402
Macro AVG	0.78	0.62	0.65	29402
Weighted AVG	0.83	0.84	0.81	29402

Significant Features:

Data Set: ALL

	Specs	Score
9	PeakF_Beta_F4	5974.560792
6	MedianF_Beta_F4	1901.689469
2	MeanF_Alpha_F4	1444.310230
3	Spectral Edge_Alpha_F4	1063.080293
4	PeakF_Alpha_F4	989.711468
23	Spectral Edge_Gamma_F4	810.752567
8	Spectral Edge_Beta_F4	808.041290
22	MeanF_Gamma_F4	736.238414
19	PeakF_Delta_F4	645.529310
21	MedianF_Gamma_F4	412.540933

Data Set: Alpha

	Specs	Score
2	MeanF_Alpha_F4	1444.310230
3	Spectral Edge_Alpha_F4	1063.080293
4	PeakF_Alpha_F4	989.711468
1	MedianF_Alpha_F4	54.860001
0	MeanP_Alpha_F4	3.045533

Data Set: Beta

	Specs	Score
4	PeakF_Beta_F4	5974.560792
1	MedianF_Beta_F4	1901.689469
3	Spectral Edge_Beta_F4	808.041290
2	MeanF_Beta_F4	326.889481
0	MeanP_Beta_F4	2.016815

Data Set: Delta

	Specs	Score
3	Spectral Edge_Delta_C4	401.853100
2	MeanF_Delta_C4	189.413357
4	PeakF_Delta_C4	147.339009
0	MeanP_Delta_C4	41.274128
1	MedianF_Delta_C4	7.200691

Data Set: Theta

	Specs	Score
3	Spectral Edge_Theta_F4	259.200732
2	MeanF_Theta_F4	95.298308
1	MedianF_Theta_F4	34.706292
0	MeanP_Theta_F4	6.034046
4	PeakF_Theta_F4	4.923289

Data Set: Gamma

	Specs	Score
3	Spectral Edge_Gamma_F4	810.752567
2	MeanF_Gamma_F4	736.238414
1	MedianF_Gamma_F4	412.540933
4	PeakF_Gamma_F4	40.268168
0	MeanP_Gamma_F4	2.296915

Data Set: Slow- Wave (Delta and Theta)

	Specs	Score
9	PeakF_Delta_F4	645.529310
8	Spectral Edge_Delta_F4	299.216699
3	Spectral Edge_Theta_F4	259.200732
7	MeanF_Delta_F4	233.506408
6	MedianF_Delta_F4	107.909279
2	MeanF_Theta_F4	95.298308
5	MeanP_Delta_F4	42.617009
1	MedianF_Theta_F4	34.706292
0	MeanP_Theta_F4	6.034046
4	PeakF_Theta_F4	4.923289

Data Set: Fast-Wave (Alpha and Beta)

	Specs	Score
9	PeakF_Beta_F4	5974.560792
6	MedianF_Beta_F4	1901.689469
2	MeanF_Alpha_F4	1444.310230
3	Spectral Edge_Alpha_F4	1063.080293
4	PeakF_Alpha_F4	989.711468
8	Spectral Edge_Beta_F4	808.041290
7	MeanF_Beta_F4	326.889481
1	MedianF_Alpha_F4	54.860001
0	MeanP_Alpha_F4	3.045533
5	MeanP_Beta_F4	2.016815

Sectors Of Improvement:

1. Process to make the data ratio stable
2. Visual Presentation
3. Neural Network Model
4. Explainable
5. Co Relation between the features
6. Convenient statistical analysis
7. Do machine learning with different significant value