**SVKM’s NMIMS**

**Mukesh Patel School of Technology Management & Engineering**

**Computer Engineering Department**

**Program: MBA Tech EXTC**

**Course:  MBA. Tech (EXTC)**

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| Program : MBATech | Division: J |
| Batch: | Date of Experiment: 23/12/2021 |
| Date of Submission: 24/12/2021 | Grade : |

**Aim:** To perform multivariate Statistical analysis on acquired multi-channel EEG data

**Instructions and Objective:**

1. Open the data base of Neuromax Select any subjects between 3-9
2. Set the gain 30 μ V/mm, page speed 30 mm/sec, lower freq. 0.5 and higher 99 Hz enable the notch filter 50 HZ and Mont 3
3. Export the data from in excel for 10 secs, samples 2560 (both filtered and unfiltered)
4. Import the CSVs in Google Colab
5. Remove NaN values if any from the data
6. Perform various statistical analysis (for both dataset)
7. Plot the waveform of all channels in subplots
8. Find the average amplitude of even and odd channels, compare the same by plots
9. Plot the correlation matrix (heat maps) of even and odd channels
10. Add odd no. of channel and even no. of channels perform the z-test

**Statistical analysis:**

1. Plot the waveform of all channels in subplot

|  |  |
| --- | --- |
| **Even channels** | **Odd channels** |
| /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/6BB0FD6B.tmp | /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/D3250195.tmp |

1. Find the average amplitude of even and odd channels and compare the same by plots

|  |  |
| --- | --- |
| **Unfiltered data** | **Filtered data** |
| Average of even channel: -576.54 | Average of even filtered channel: 0.01 |
| Average of odd channel: -7.08 | Average of odd filtered channel: -0.006 |
| /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/468B54FB.tmp | /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/C886B3C1.tmp |

1. Plot the correlation matrix (heat maps) of even and odd channels

Unfiltered data

|  |  |
| --- | --- |
| **Even channels** | **Odd channels** |
| /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/72D76C77.tmp | /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/A652C49D.tmp |

Filtered data:

|  |  |
| --- | --- |
| **Even channels** | **Odd channels** |
| /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/47E8A4AF.tmp | /var/folders/7d/s04s9ccn4r1c5p6xb5cnzyjc0000gn/T/com.microsoft.Word/Content.MSO/1E1AD539.tmp |

**Conclusion:** In this experiment, we performed multivariate statistical analysis on the odd and even channels of filtered and unfiltered EEG data. We may draw the following conclusions from the obtained graphs –

1. Plot the waveform of all channels in subplots – signals from odd channels show greater variations in amplitude as compared to those from even channels.
2. Find the average amplitude of even and odd channels, compare the same by plots – average amplitudes for filtered signals for both the odd and even channels are very small in value; even channel is positive and the odd channel is negative. On the other hand, the value of even channel for unfiltered signals is much larger than that of the odd channel but both the values are negative.
3. Plot the correlation matrix (heat maps) of even and odd channels – odd and even channels for unfiltered data are very strongly correlated. Even channel for filtered data is very weakly correlated while the odd channel shows comparatively stronger correlation.