**NEUROPYPE IN BRAIN COMPUTER INTERFACING**

In electroencephalograph (EEG) signals interpretation, the understanding of neural substrates of the EEG signals associated with particular brain activity, indicative of the state of the human body at time of detection of these neural substrates has of no doubt increased the level of understanding of the brain structure, and is aiding the development of brain computer interfacing systems for medical and non-medical purposes, but interpretation of these signals without use of intelligent algorithms and engineered signal processing methods can be erroneous.

The understanding of these neural substrates alone is not enough in development of brain computer interfacing systems as each neural substrate might not be a one to one encoded mapping to the activity of the human body, but a one to many mapping. This presents an issues as brain computer interfacing systems is often interested in identifying one body (brain) activity at a time.

Another problem with interpreting neural substrates by sight is the domain in which the neural substrate is to be found. Neural substrates of EEG signals indicative of brain activity can be found in any of the time, frequency or spatial domain or a combination of any two or all. The EEG signal acquired is naturally found in the time and spatial domain, and thus requires mathematical transformation techniques to be taken into the frequency domain or combinations of domains from which spectral neural substrates can be detected and extracted. The required mathematics is tedious, and time-wasting if it is to be computed by hand-written methods, rather there exists algorithms for implementing these mathematical transformations in optimized time unnoticeable by the human mind.

The non-stationary nature of EEG signals makes the statistical parameters of the EEG signals in all domains vary in a random way, not following a definite pattern. The non-stationary nature of the EEG signals implies that the frequency content of the EEG signals are very dynamic so is their time domain content, i.e. the frequency content and time period of the EEG signals class changes with time. The change of the frequency content with time implies change in rhythmicity of the EEG signals and such change cannot be measured precisely without the aid of algorithms designed for that purpose. Also measurement of gradient, fractal dimensions, hjorth parameters within the time-domain is easily implemented using algorithms.

The algorithms needed for efficient processing and classification of brain signals at the stage of development are expressed mathematically. During implementation of brain computer interfacing systems, the mathematics of the algorithms are implemented using programming languages such as python, C, C++, Java, etc. A disadvantage for using a programming language is the need to implement the mathematics of every algorithm for every use. The development of software programs tailored for brain computer interfacing , provides access to already implemented versions of these algorithms flexible to user specification, some of such software are BCI2000, MNE tools etc. But a downside to these existing software is that they are designed for offline processing, thus the can only be used with recorded EEG data and not live-streaming EEG data. Another downside is the abstraction and hiding of the implementation of these algorithms. This makes it difficult to troubleshoot each algorithm in cases of error due to algorithm usage, edit algorithms in cases that need engineering of existing algorithms or add new custom designed algorithms designed for specific cases of BCI development. The neuropype software has the advantage of being able to perform offline and online processing and the advantage of its algorithms being adjustable also with addition of new algorithms. Another advantage of neuropype over previous software’s is its graphical programming style.