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New system NAT (Neuronal Activity Topography) for assisting differential diagnosis of dementia

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The EEG signals are recorded for five minutes with 21 electrodes and analyzed via the Internet. From the normalized power spectrum of each of the recorded signals, the normalized power spectrum $NPS_{j,m}$ is derived referring to signal channel j and frequency binmf0 where m is an integer and f_0 (=1.56Hz) which equals an inverse of the signal segment length 0.64 sec. A pair of markers, sNAT and vNAT which have 210 sub-markers each, is derived for characterizing EEG power partitions across the 10 frequency bins and power ratios between the adjacent frequency bins respectively. The likelihood between the template markers and a pair of markers of an unknown subject derives information of differential diagnosis concerning several dementias. The NAT pattern of a patient gives us information about the local cerebral impairment. Severity of the impairment can be on a differential-likelihood diagram and this diagram enables detection of dementia in the early stage. VCI and DLB can be separated from the normal control (NL) at 90~95% and AD from NL at 80%. Moreover, improvement of impaired cerebral activities can be numerically monitored after a proper intervention. NAT will serve to prevent the increase of demented senior population wherever the internet system is available.

Biography

Toshimitsu Musha was born in 1931 in Tokyo, Japan. He received his Graduation and PhD degrees from the Department of Physics, the University of Tokyo in 1954 and 1964. He was with the Electrical Communications Lab of NTT (1954-1965), the Research Lab of Electronics, Mass Institute of Technology (USA) as a Fulbright Exchange Scholar (1964-1965). In 1966-1992, he was Professor of Tokyo Institute of Technology and founded a series of the International Symposia (ICNF). He summarized his work as "Theoretical background of 1/ffluctuations of energy partition among harmonic oscillators in equilibrium" (*International Journal of Physical Sciences)*.

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