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Conceptual Modelling of Telapathic Network

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Computational platforms are vital for developing an efficient platform in biological researches. Our previous investigation has shown wide apsects of computational services that are highly significant for greater understanding of biomolecular aspects in life science research [1-9]. Telepathic Machine is considered to be the forthcoming wave in the field of peer to peer (P2P) communication services. Several researches have been carried out to investigate all possible ways of establishing a connection between the human brain and computer devices, but with little insight as of now that includes EEG signals as a central criterion for establishing communication [10]. Few handsomely funded projects such as the BrainTalk Project, which aims to allow people with paralysis (especially tetraplegia) to communicate with others, are now showing high significance in terms of their efficiency and functionality. Here we put forward a conceptual model of telepathic network using JXTA mobile network connection protocol [11] in coordination with binary classifier using support vector machine algorithm running on Cloud instances (Figure 1). Cloud services are vital for cost effectiveness, time-dependent load balancing on network and platform independence. Therefore, we have included the Cloud platform to provide high effectiveness of our workflow model. Eucalyptus is a software platform for the implementation of private cloud computing on computer clusters. Hence, we included Eucalyptus Infrastructure as a Service (IaaS) for developing cloud platform running on Ubuntu 11.04 system. Cloud instances will be enriched with Support vector machine (SVM) based classification model to examine the thought patterns of incoming EEG data signals. SVM is a blend of computational and statistical methods that involves a set of supervised learning algorithms to characterize data and recognizes the significant patterns [12]. It takes a set of input data and predicts and characterizes them into their respective classes depending on the pre-trained classifier making it non-probabilistic binary linear classifier. While training, it constructs sets of hyperplanes in infinite-dimensional space, which can be used for classification or regression analysis. For the initial setup, we now aim to train the SVM classifier to characterize EEG signal on the basis of their alpha, beta, gamma, delta, theta and mu wave patterns. Further, we intend to implement multidimensional hybrid classification system to increase the range and specificity of classification. The SVM model generated from training will be accessed through instances running on Eucalyptus Infrastructure as a Service (IaaS) cloud platform. Collection of EEG signals when processed at once in a time-dependent manner provides a dynamic insight into thought patterns of individual. A time dependent processing of thought signals will be helpful in determining their characteristics. A cloud based system that constitutes multiple thought processing domains is implemented in this protocol. The initial signals from human brain can be obtained by using EEG nano-electrode devices, very similar to the approach used by Brumberg et al. [13]. Other option involves use of EMOTIV and EMOKEY application to detect and transfer the EEG wave signal to computer devices. The data can easily be transferred to user mobile device via Bluetooth services. Further the signals can be directly transferred to signal gateway through local wifi network. The screened data signals are transferred to the cloud gateway where cloud virtual instances perform the classification of input EEG signals through pre-trained SVM classifier and redirect it to the specified receiver ID using JXTA wifi data transfer protocol. We aim to collect the EEG signals of large number of patients from various hospitals and diverge locations in order to increase the specificity of classification system. Security constrains are a real threat to the P2P data transfer systems. Therefore, security protocol must meet the requirements of confidentiality and authentication of data transfer. PureTLS, Cryptix ASN.1 Kit and Bouncy Castle Crypto APIs are highly efficient JXTA security protocols and thus become a possible candidate for implementation.

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