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63

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Title : INTELLIGENT LEARNING STYLE CLASSIFICATION MODEL AND CROSS-RELATIONAL STUDY WITH INTELLIGENCE QUOTIENT

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The electroencephalogram is an effective approach for measuring brainwaves and has been widely used to study mental performance such as learning and intelligence. Conventional assessment methods are exposed to reliability issues which stems from cultural and language barriers. Alternative approach based on electroencephalogram has since been proposed; indicating correlation between resting brainwaves and learning styles. Validity of the findings however, was based on unconfirmed theories. Moreover, a systematic approach for learning style assessment based on brainwaves and advanced modelling technique as yet to be studied. Therefore, this research proposes an intelligent learning style classification model via brainwave features and artificial neural network. Eighty samples from various universities are segregated into four learning style groups based on Kolb's Learning Style Inventory. Twenty samples are identified as Divergers, twenty-two as Assimilators, twenty-one as Convergers and seventeen as Accommodators. Resting electroencephalogram is then recorded from the prefrontal region. Spectral centroid features from theta and alpha bands are then extracted for independent pattern analysis. Meanwhile, k-nearest neighbour is used for feature selection purposes. An intelligent learning style classification model is then constructed using spectral centroid features and multi-layered perceptron network. An independent dataset of fifty samples with varying levels of intelligence is used for a cross-relational mapping by the model. The pattern of features for each learning style group has shown correlation with the Neural Efficiency Hypothesis of intelligence. Subsequently, the fully developed model has attained excellent classification accuracy of 98.8% with mean squared error of 0.07. Moreover, the network has fulfilled all correlation requirements in classifying learning styles. The cross-relational analysis revealed that brighter individuals are predicted to be either Assimilative or Convergent. Meanwhile, the less brilliant ones are predicted to be either Divergent or Accommodative. Therefore, high level of intelligence is linked to excellent analytical skills, whereas low level of intelligence is associated with reliance on intuition rather than cognitive abilities. Conclusively, this thesis has proven that spectral centroid features from the resting brainwaves are suitable descriptors for characterising learning styles. The systematic approach established by the intelligent model provides an alternative for assessing the behaviour via electroencephalogram. Furthermore, the study has also confirmed that brainwaves from the prefrontal region are adequate for classification of learning styles.