AUTOMATIC REMOVAL OF EXTREME ARTIFACT WITHIN POLYSOMNOGRAPHIC DATA

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The extreme artifact module, a component of a three class (extreme, movement, and eye) artifact removal system is presented. Extreme artifacts are characterized by polysomnographic data segments which are so severely corrupted by artifact that no useful information may be recovered.

Three features (absolute amplitude, energy, and power spectral density in the delta band) were evaluated using a K-nearest neighbor (knn) classifier with a k value equal to 5. The knn was trained and tested on data sets manually scored for artifact. Twenty-six minutes each of "clean" and extreme artifact data segments comprised the training set. Quality and usefulness of the extreme artifact module was defined by: Accuracy = ((Sensitivity + Specificity) / 2) x 100. The module was tested on 8 hours previously unseen, raw EEG data, and performance of the automated classifier was compared to manual scoring. Sensitivity was 98.7%, specificity 97.8%, and accuracy 93.6%.

This automated classification system for extreme artifact efficiently identified and removed corrupted segments of data with accuracy approaching visual scoring. Optimization of such systems will allow analysis of large polysomnography datasets for which manual artifact rejection would be prohibitively labor-intensive.