**Cross Entropy-based Automatic Thresholds Setting-Up Method for Sleep Staging System**

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***Abstract***

Sleep staging is a fundamental step in diagnosis and treatment of sleep disorders. In current sleep staging systems, normally a set of thresholds should be set up to determine the boundaries in differentiating different linguistic or symbolic features. However, as far as we know, there are no fully satisfying automatic method to do this task. Thresholds are mostly set up manually. In this paper, an automatic thresholds setting-up method based on Cross Entropy is proposed. Person-dependent thresholds can be provided automatically by using Cross Entropy and used in personalized sleep staging analysis while considering individual variability. The feasibility of Cross Entropy has also been evaluated, computational results exhibit that the Cross Entropy-based method is an efficient, convenient and applicable stochastic method for automatically setting-up thresholds in sleep staging system. Compared with manual method, average F-Measures are improved more than 10% for all the stages and up-to 74% for stage N3 by using proposed method.