BCI Competition III

Dataset IIIb

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Bayesian Network is a modeling tool that combines directed acyclic graphs with Bayesian probability. Each node of the network in the figure corresponds to a variable and edges represent causality between these events [1]. The graphical model corresponding to our Bayesian network is shown in the figure. Note that the square box in the figure corresponds to the EEG extracted features. The rectangular box corresponds to the Gaussian mixture components. The square and rectangular nodes represent discrete values while the round node in the figure represents continuous values.

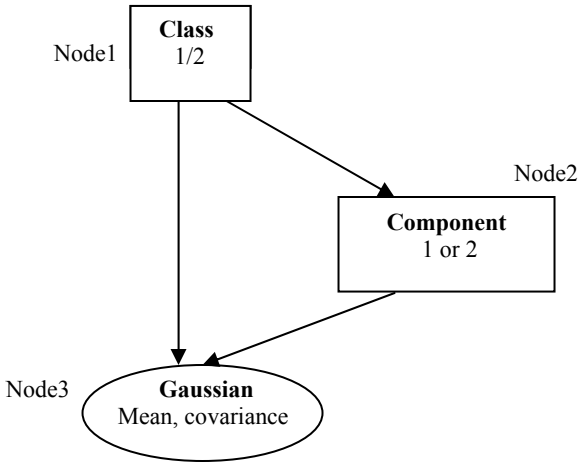

Fig. Gaussian mixture model represented as a simple graphical model.

The graph structure of this model can be represented by the following adjacency matrix: 011, 001, 000. We used Bayesian Network Toolbox (BNT) of Matlab for implementing the classifier [2]. We trained the model using the EM algorithm in two iterations. For features we extracted AAR coefficients of order 6 leading to vectors of length 12 for two channels of EEG signal.

We trained 7 BNT's on windows of length 1 second with overlap of half a second. The test vectors results were averaged on corresponding overlapping windows classifiers. The classifiers output give the difference of the probability of each vector to belong to class 1 or 2. So it is positive for class one and negative for class two and zero for cases were the difference is lower than 1% threshold.

The results are submitted together with trigger points for time>3.5s.

Refrences:

[1] Finn V. Jensen 'Bayesian Networks and decision Graphs' Springer 2001.
[2] Kevin Murphy: http://www.cs.ubc.ca/~murphyk/Software/BNT/bnt.html