

COMBINED APPLICATION OF INDEPENDENT COMPONENT ANALYSIS AND PROJECTIVE FILTERING TO FETAL ECG EXTRACTION

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The maternal abdominal signals contain a few components: the dominant maternal ECG, various types of noise and the signal of the primary interest - the fetal ECG. In order to obtain the fetal ECG, the maternal signal should first be suppressed. In the paper, we propose a combined application of the independent component analysis and projective filtering of the time-aligned beats to solve the problem of the fetal ECG extraction from multi channel abdominal signals, when the number of the channels is low. The independent component analysis performs spatial decomposition of the signals. It often leads to a successful separation of the maternal and the fetal ECG. When the separation is not complete, projective filtering can be applied to enhance the partially separated maternal ECG. Then the maternal ECG contained in the respective channels can be reconstructed and subtracted from the original composite signals. This operation leads to the extraction of the fetal ECG in the respective channels. The signal can still be enhanced by the second application of the independent component analysis. The developed system operation is illustrated, and the results of its application are compared to the results achievable by application of the independent component analysis.

Keywords: independent component analysis, projective filtering, fetal ECG

