Assimilation of functional magnetic resonance imaging data using the Extended Kalman Filter.

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Abstract

On this present work, the Extended Kalman Filter (EKF) was applied to make the data assimilation of Buxton-Friston hemodynamic model in Functional Magnetic Resonance Imaging (FMRI). From the typical values of the parameters of Buxton-Friston hemodynamic model (B-F) and input signals that can generate signals related to physiological changes at the time of brain activation. As the hemodynamic model has no analytical solution, was applied the 4th order of Runge-Kutta method for their numerical approximation. The assimilation of the parameters of the noisy signal by EKF has showed good results for some parameters of the model. It follows that the Extended Kalman Filter has reasonable efficiency for assimilation of fMRI data through the hemodynamic model of Buxton-Friston, therefore, the model has a strong nonlinearity.
Keywords: fMRI; Hemodynamic model; Kalman filter.