

Kalman Filter Gain Elimination in Linear Estimation

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Abstract : In linear estimation, the traditional Kalman filter uses the Kalman filter gain in order to produce estimation and prediction of the n-dimensional state vector using the m-dimensional measurement vector. The computation of the Kalman filter gain requires the inversion of an m x m matrix in every iteration. In this paper, a variation of the Kalman filter eliminating the Kalman filter gain is proposed. In the time varying case, the elimination of the Kalman filter gain requires the inversion of an n x n matrix and the inversion of an m x m matrix in every iteration. In the time invariant case, the elimination of the Kalman filter gain requires the inversion of an n x n matrix in every iteration. The proposed Kalman filter gain elimination algorithm may be faster than the conventional Kalman filter, depending on the model dimensions.

Keywords : discrete time, estimation, Kalman filter, Kalman filter gain

Conference Title : ICCISE 2020 : International Conference on Computer and Intelligent Systems Engineering

Conference Location : Prague, Czechia

Conference Dates : March 19-20, 2020