

Sparse Matrix Normal Approximations

Alfred Hero, Université du Michigan (Etats-Unis)

The sparse matrix normal approximation to a random tensor valued variable is a sparse low rank approximation to the population covariance matrix. The approximation fits low dimensional kronecker factors that can be interpreted as modal covariances of each mode of the tensor. The approximation has been formulated for approximating the covariance matrix and for approximating its inverse with both Kronecker products and Kronecker sums of factors. After introducing and illustrating the general framework, we will present a new approximation that is based on a generalized Sylvester representation that is exact for spatio-temporal random fields whose spatial component obeys a Poisson equation and whose temporal component obeys an auto-regressive (AR) model. These approximations will be illustrated for the application of predicting the spatio-temporal evolution of solar active regions (sunspots) and flares from NASA SDO image sensor data.