Lauren N Crider* (lcrider@asu.edu). Stochastic filtering on the grassmannian. Preliminary report.

The problem of estimating a $K$-dimensional subspace of an $N$-dimensional vector space from $M > K$ noisy measurement vectors arises in numerous multi-sensor remote sensing applications, including multistatic radar and electronic surveillance. This work regards developed subspace estimators (in any context) as elements of the Grassmannian $G(K,N)$. This work further assumes the subspace of interest evolves on $G(K,N)$ in time according to a discrete-time dynamical system, i.e., the subspace at time $t+1$ is obtained from the subspace at time $t$ by action of an element of $\text{SO}(N)$ that is comprised of a fixed, known element and a perturbation element that is distributed in a small neighborhood of the identity. At each time, an estimate of the subspace is formed from $M$ noisy measurement vectors observed at that time. A stochastic filter that combines the estimate from data collected at time $t$ and estimates from times $t-1$, $t-2$, $\ldots$, 0 is proposed. The performance of this proposed filter is examined as a function of the measurement noise and the noise in the system dynamics. It is shown to provide substantially better estimation accuracy at time $t > 0$ than an estimator that uses only data collected at time $t$. (Received September 25, 2018)