

State Space Modeling for Neural Signal Processing and Healthcare Time Series Analysis

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Abstract:

State space models were developed over a half century ago to represent physical systems with hidden states observed in noise. These ideas remain highly relevant today in signal processing and time series analysis problems, among others. My lab studies the phenomenon of anesthesia across a broad landscape, from the influence of anesthetic drugs on neural oscillations, to clinical outcomes related to opioid administration. In this talk I will showcase work employing state space models to characterize time-varying neural oscillations, as well as continuous-time state space models to characterize post-operative opioid requirements.

Reading list:

- [Switching state-space modeling of neural signal dynamics He M, Das P, Hotan G, Purdon PL \(2023\) Switching state-space modeling of neural signal dynamics. PLOS Computational Biology 19\(8\): e1011395.
<https://doi.org/10.1371/journal.pcbi.1011395>](https://doi.org/10.1371/journal.pcbi.1011395)
- [Santa Cruz Mercado LA, Liu R, Bharadwaj KM, et al. Association of Intraoperative Opioid Administration With Postoperative Pain and Opioid Use. JAMA Surg. 2023;158\(8\):854–864. doi:10.1001/jamasurg.2023.2009](https://doi.org/10.1001/jamasurg.2023.2009)