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Inference for single molecules[1]

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Bursts in experimental progress have helped drive the punctuated development of successive fields of Mathematics and Statistics. Most recently, the development of new imaging methods – that often exploit fluorescence probes to enhance contrast – have provided data at length and time scales previously inaccessible. While modeling fluorescence data has contributed to bringing data-driven methods into the mainstream of the physical sciences, more complex systems, such as live cells, demand model adaptability and improvements brought to commonly used data-driven methods (such as Hidden Markov Models) have reached a point of diminishing returns. Here I discuss some recent work in my lab, both parametric and nonparametric, toward gaining deeper insight from indirect observations of microscopic processes, often through fluorescent probes.

[1]NSF, IUPUI Startup