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Detecting Transient Trapping from a Single Trajectory: A Structural Approach

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We introduce a new method to detect transient trapping events within a single particle trajectory, thus allowing the explicit accounting of changes in the particle's dynamics over time. Our method is based on new measures of a smoothed recurrence matrix. The newly introduced set of measures takes into account both the spatial and temporal structure of the trajectory. Therefore, it is adapted to study short-lived trapping domains that are not visited by multiple trajectories. Contrary to most existing methods, it does not rely on using a window, sliding along the trajectory, but rather investigates the trajectory as a whole. This method provides useful information to study intracellular and plasma membrane compartmentalisation. Additionally, this method is applied to single particle trajectory data of $\beta 2$ -adrenergic receptors, revealing that receptor stimulation results in increased trapping of receptors in defined domains, without changing the heterogeneous diffusion of free receptors.

Lanoiselée, Yann, Jak Grimes, Zsombor Koszegi, and Davide Calebiro. 2021. "Detecting Transient Trapping from a Single Trajectory: A Structural Approach" Entropy 23, no. 8: 1044. https://doi.org/10.3390/e23081044

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