

Reservoir Computing using Active Matter Model Systems: A Physics Viewpoint

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Spatio-temporal prediction of chaotic systems is a challenging problem that is relevant for many fields (weather, finance, energy, and other dynamic systems). Recurrent neural networks and specifically neuron-based reservoir computing were previously used to approach this problem [1, 2]. However, these learning systems are typically treated as black boxes, and do not incorporate reasoning or analysis in terms of physical laws and dynamics. Here we study the non-equilibrium dynamics of simple active matter models serving as reservoir computing substrates [3]. This allows us to determine and interpret the state of our reservoir and relate the learning problem to other generic phenomena in statistical physics. With this knowledge we aim to understand optimal conditions for learning in relation to critical states and physical constraints.

References

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