

An Introduction to Time Series Analysis with Reservoir Computing



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Theme 2

2021-09-10

Virtual - Researchers Catch-up hosted online from University of WA

Reservoir computing is a framework for supervised machine learning tasks. The underlying idea is to take some time series and inject it into a high dimensional recurrent network in order to construct a representation of the data in what we call the reservoir space. Up to this point, research has focused on ways of training this reservoir space to desired outputs or labels, and has done so with impressive results across many tasks and data sets. However, the reservoir space in and of itself is rich with information that can inform us about the original data stream without the need for training. The ability to use the reservoir in such an unsupervised way opens the way to new potential tasks, particularly ones where we don't have labels or targets to train to. Here, I'll introduce in more detail what reservoir time series analysis is and discuss a couple of simple methods within this scope. I'll focus on the critical task of signal distinction, highlighting the performance of these methods with respect to current approaches used for such tasks. Finally, we'll motivate the use of reservoir time series analysis in application by discussing tasks and data sets where we expect these methods to offer the most benefits.