IMPROVEMENT OF EPSILON COMPLEXITY ESTIMATION AND AN APPLICATION TO SEIZURE PREDICTION

A thesis presented to the faculty of
San Francisco State University
In partial fulfilment of
The Requirements for
The Degree

Master of Arts
In
Mathematics

by

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August 2017

CERTIFICATION OF APPROVAL

I certify that I have read *IMPROVEMENT OF EPSILON COMPLEXITY ESTIMATION AND AN APPLICATION TO SEIZURE PREDICTION* by Nathanael Aff and that in my opinion this work meets the criteria for approving a thesis submitted in partial fulfillment of the requirements for the degree: Master of Arts in Mathematics at San Francisco State University.

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2017

The ε-complexity measures the amount of information needed to reconstruct a continuous function with an error not larger than ε. For Hölder class functions, the ε-complexity is characterized by a pair of real numbers, the complexity coefficients. The complexity coefficients have been shown to be useful features for the segmentation and classification of time series. In this work, we extend the set of approximation methods used to estimate the complexity coefficients and test these methods on a set of simulations. In addition, we test the conjecture that, for a given generating mechanism, the mean of the complexity coefficients is constant. For our set of simulations, we find that the mean of the estimated complexity coefficients is constant on a constant Hölder class of functions. Finally, we apply the ε-complexity coefficients to the prediction of seizures in epileptic mice. We use this technique to identify which EEG signal preceded a seizure with over 80% accuracy.

I certify that the Abstract is a correct representation of the content of this thesis.

Chair, Thesis Committee Date

ACKNOWLEDGMENTS

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