



Information Theoretic Measures for Representation Learning

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Abstract: Information-theoretic measures have been widely adopted for machine learning (ML) feature design. Inspired by this, we look at the relationship between information loss in the Shannon sense and the operation loss in the minimum probability of error (MPE) sense when considering a family of lossy representations (or encoders). In this talk, we introduce a series of results that show how adequate the adoption of mutual information (MI) is for predicting the operational quality of a representation in classification. Our findings support the observation that selecting/designing representations that capture informational sufficiency (IS) is appropriate for learning. However, we also show that this selection is rather conservative if the intended goal is achieving MPE in classification. We conclude by discussing the capacity of the information bottleneck (IB) method to achieve lossless prediction and the expressive power of digital encoders in ML.



Biography: Jorge F. Silva (Senior Member, IEEE) is an Associate Professor in the Electrical Engineering (EE) Department at Universidad de Chile and Principal investigator with the Advanced Center of Electrical and Electronic Engineering in Valparaiso-Chile. Jorge F. Silva received an M.Sc. and Ph.D. in Electrical Engineering from the University of Southern California (USC), Los Angeles, CA, USA, 2005 and 2008, respectively. Jorge F. Silva was a research assistant with the Signal Analysis and Interpretation Laboratory (SAIL), USC, from 2003 to 2008. He was also a research intern with the Speech Research Group, Microsoft Corporation, Redmond, in 2005. Dr. Silva received the Outstanding Thesis Award 2009 for Theoretical Research of the Viterbi School of Engineering, the Viterbi Doctoral Fellowship 2007-2008, and the Simon Ramo Scholarship 2007-2008 USC. Dr. Silva was Associate Editor for the IEEE Transactions on Signal Processing from 2016 to 2018.

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