1106-62-295 **Yann Ollivier*** (yann.ollivier@lri.fr), Laboratoire de recherche en Informatique, Université Paris-Sud, Bât. 660, 91405 Orsay, France. *Statistical Learning from Invariance Principles: Robust Algorithms from Information Theory and Riemannian Geometry.*

Statistical learning is the art of discovering complex patterns in data and is an obligatory step towards artificial intelligence. This requires finding good probabilistic models of data and is algorithmically difficult. Moreover, the learning algorithms are often not invariant under simple changes in the representation of data or of intermediate variables of the model, even though this does not change the information present in the data. This lack of invariance introduces many arbitrary choices and makes the results more sensitive to slight changes.

Here we start from invariance principles in a differential-geometric setting, and build Riemannian metrics akin to Fisher's information metric, but more algorithmically scalable. Invariance leads to new learning algorithms which detect more complex patterns and use fewer training samples. We give the example of training recurrent neural networks for detecting grammar-like structures in sequential symbolic data. (Received August 20, 2014)