

IEEE Transactions on Neural Networks and Learning Systems (IEEE TNNLS)

Special Issue on: Deep Learning: When and How?

Introduction

The research area of deep learning is evolving at an ever-increasing pace with new algorithms being developed on a continuous basis. Though their merits have been clearly demonstrated in certain settings, it is not always clear when and how they add value and to which tasks. New deep learning techniques are often compared against an ad-hoc handpicked selection of baseline methods using a limited amount of data sets, sometimes with little hyperparameter tuning. Moreover, given the complexity and typically high parametrization degree, the reproducibility of many of these techniques is becoming a key concern.

When benchmarked against baseline methods some researchers found that deep learning algorithms offer limited to no added value for certain tasks. Also, the reproducibility of existing methods was found to be a key concern. Given the pervasive use of machine learning in today's world, it would be interesting to know when deep learning techniques add value and how. The when question can relate to the type of task (e.g., supervised, unsupervised, semi-supervised, etc.), the data set characteristics (e.g., structured versus unstructured, low quality versus high quality data) or the environment (e.g., real-time or not). The how question tackles the optimization mechanics, the hyperparameter tuning and also the evaluation criteria considered such as predictive power, interpretability, computational efficiency or ecological footprint. This special issue calls for original and innovative methodological contributions to address the research question of when and how deep learning methods add value.

Scope of the Special Issue

Topics of interests include, but are not limited to:

- the development and thorough empirical evaluation against baseline methods of new deep learning algorithms for existing tasks and/or applications;
- the development and thorough empirical evaluation against baseline methods of new deep learning algorithms for innovative tasks and/or (frontier) applications;
- the development of innovative (e.g. Bayesian) optimization or innovative hyperparameter tuning procedures which boost existing or new deep learning techniques above baseline methods;
- the development of innovative statistical frameworks and/or software workbenches to thoroughly evaluate and contrast (new or existing) deep learning techniques against baseline methods;
- an in-depth evaluation of existing deep learning algorithms featuring comparisons with baseline methods in terms of predictive power, interpretability, computational complexity and/or ecological footprint;
- other innovative contributions related to, e.g., AutoML, XAI, ethics & deep learning, etc.

Timeline

Manuscript submission: 15th April 2023

Preliminary decision: 15th July 2023

Revisions due: 1st October 2023

Final decision: 15th December 2023

Guest Editors

Bart Baesens, KU Leuven, Belgium

María Óskarsdóttir, Reykjavik University, Iceland

Davide Bacciu, Università di Pisa, Italy

Hugo Jair Escalante, INAOE, Mexico

Rohitash Chandra, UNSW, Australia

Submission Instructions

- Read the Information for Authors at <http://cis.ieee.org/tnnls>
- Submit your manuscript at the TNNLS webpage (<http://mc.manuscriptcentral.com/tnnls>) and follow the submission procedure. Include the following instructions in the header of the first page of your manuscript and cover letter: "Please submit the manuscript to the Special Issue on Deep Learning: When and How"