
Structural Learning in Artificial Neural Networks: A Neural Operator Perspective

Kaitlin Maile¹ Hervé Luga¹ Dennis G. Wilson²

¹IRIT, University of Toulouse, Toulouse, France

²ISAE-SUPAERO, University of Toulouse, Toulouse, France

1 Broader Impact Statement

We believe there are no negative societal impacts from this survey/position paper beyond that of general AI research. By defining this framework that can improve the communication between AutoML-adjacent communities, we hope to reduce computational costs both by avoiding the repetition of ideas as well as generally via AutoML.

2 Submission Checklist

1. For all authors...

- (a) Do the main claims made in the abstract and introduction accurately reflect the paper's contributions and scope? [Yes] The authors and TMLR reviewers agree that the claims are well supported.
- (b) Did you describe the limitations of your work? [Yes] We particularly qualify the limits of our survey scope in Section 2.1 and discuss adjacent domains in Section 5.2.
- (c) Did you discuss any potential negative societal impacts of your work? [Yes] See the Broader Impact Statement above.
- (d) Have you read the ethics author's and review guidelines and ensured that your paper conforms to them? <https://automl.cc/ethics-accessibility/> [Yes] Our paper conforms to all provided guidelines.

2. If you are including theoretical results...

- (a) Did you state the full set of assumptions of all theoretical results? [N/A] No theoretical results included.
- (b) Did you include complete proofs of all theoretical results? [N/A] No theoretical results included.

3. If you ran experiments...

- (a) Did you include the code, data, and instructions needed to reproduce the main experimental results, including all requirements (e.g., requirements.txt with explicit version), an instructive README with installation, and execution commands (either in the supplemental material or as a URL)? [N/A] No experimental results included.
- (b) Did you include the raw results of running the given instructions on the given code and data? [N/A] No experimental results included.
- (c) Did you include scripts and commands that can be used to generate the figures and tables in your paper based on the raw results of the code, data, and instructions given? [N/A] No experimental results included.

- (d) Did you ensure sufficient code quality such that your code can be safely executed and the code is properly documented? [N/A] No experimental results included.
 - (e) Did you specify all the training details (e.g., data splits, pre-processing, search spaces, fixed hyperparameter settings, and how they were chosen)? [N/A] No experimental results included.
 - (f) Did you ensure that you compared different methods (including your own) exactly on the same benchmarks, including the same datasets, search space, code for training and hyperparameters for that code? [N/A] No experimental results included.
 - (g) Did you run ablation studies to assess the impact of different components of your approach? [N/A] No experimental results included.
 - (h) Did you use the same evaluation protocol for the methods being compared? [N/A] No experimental results included.
 - (i) Did you compare performance over time? [N/A] No experimental results included.
 - (j) Did you perform multiple runs of your experiments and report random seeds? [N/A] No experimental results included.
 - (k) Did you report error bars (e.g., with respect to the random seed after running experiments multiple times)? [N/A] No experimental results included.
 - (l) Did you use tabular or surrogate benchmarks for in-depth evaluations? [N/A] No experimental results included.
 - (m) Did you include the total amount of compute and the type of resources used (e.g., type of GPUs, internal cluster, or cloud provider)? [N/A] No experimental results included.
 - (n) Did you report how you tuned hyperparameters, and what time and resources this required (if they were not automatically tuned by your AutoML method, e.g. in a NAS approach; and also hyperparameters of your own method)? [N/A] No experimental results included.
4. If you are using existing assets (e.g., code, data, models) or curating/releasing new assets...
- (a) If your work uses existing assets, did you cite the creators? [Yes] Only use of existing assets is figures, which are all cited.
 - (b) Did you mention the license of the assets? [N/A] No restrictively licensed assets used.
 - (c) Did you include any new assets either in the supplemental material or as a URL? [N/A] No new assets.
 - (d) Did you discuss whether and how consent was obtained from people whose data you're using/curating? [Yes] All existing figures were re-used with consent.
 - (e) Did you discuss whether the data you are using/curating contains personally identifiable information or offensive content? [N/A] No datasets used.
5. If you used crowdsourcing or conducted research with human subjects...
- (a) Did you include the full text of instructions given to participants and screenshots, if applicable? [N/A] No human subjects used.
 - (b) Did you describe any potential participant risks, with links to Institutional Review Board (IRB) approvals, if applicable? [N/A] No human subjects used.
 - (c) Did you include the estimated hourly wage paid to participants and the total amount spent on participant compensation? [N/A] No human subjects used.