# N3MDL: Efficient Multi-Domain Learning with Neurosymbolic Neural Network Ensembles

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### **ABSTRACT**

Current research in neural network architectures, such as the state of the art (SoTA) Transformer architecture, have focused on generating models which specialize to a high degree and are able to out-perform SoTA methods in creating logical conclusions. This paper proposes N3MDL, a neural network architecture and model which takes advantage of adapter-based learning for on-the-fly specialization of model parameters. An encoder/decoder structure, similar to the Transformer architecture, is used with a multi-head attention and positional encoding mechanism. However, the architecture additionally consists of several central subnetworks which each contain a single adapter. Neurosymbolic programming is used to allow for specialization and logical vision and language (VaL) capabilities. The N3MDL model, alongside its architecture, demonstrates either a competitive or statistically significant improvement upon current SoTA methods of neural networks in key metrics such as the Turing Test and Stanford Question Answering dataset.

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## Results

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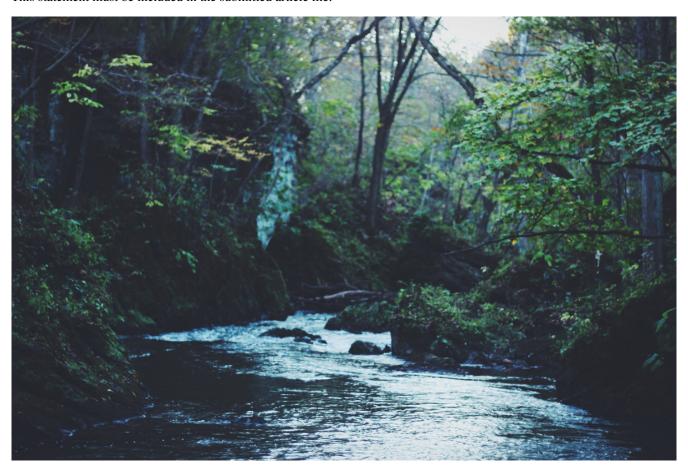
# **Author contributions statement**

Must include all authors, identified by initials, for example: A.A. conceived the experiment(s), A.A. and B.A. conducted the experiment(s), C.A. and D.A. analysed the results. All authors reviewed the manuscript.

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**Figure 1.** Legend (350 words max). Example legend text.

Condition	n	p
A	5	0.1
В	10	0.01

**Table 1.** Legend (350 words max). Example legend text.

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