

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

Dean Jordan<sup>1,\*</sup>, Bob Author<sup>2</sup>, Christine Author<sup>1,2,+</sup>, and Derek Author<sup>2,+</sup>

<sup>1</sup>University of Michigan, Artificial Intelligence, South Lyon, 48178, United States

<sup>2</sup>Affiliation, department, city, postcode, country

\*corresponding.author@email.example

+these authors contributed equally to this work

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

Condition	n	p
A	5	0.1
B	10	0.01

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

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