

## The Use of Layered Neural Networks for Classifying Hierarchical Scientific Fields of Study

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**Abstract :** Due to the proliferation and decentralized nature of academic publication, no widely accepted scheme exists for organizing papers by their scientific field of study (FoS) to the author's best knowledge. While many academic journals require author provided keywords for papers, these keywords range wildly in scope and are not consistent across papers, journals, or field domains, necessitating alternative approaches to paper classification. Past attempts to perform field-of-study (FoS) classification on scientific texts have largely used a-hierarchical FoS schemas or ignored the schema's inherently hierarchical structure, e.g. by compressing the structure into a single layer for multi-label classification. In this paper, we introduce an application of a Layered Neural Network (LNN) to the problem of performing supervised hierarchical classification of scientific fields of study (FoS) on research papers. In this approach, paper embeddings from a pretrained language model are fed into a top-down LNN. Beginning with a single neural network (NN) for the highest layer of the class hierarchy, each node uses a separate local NN to classify the subsequent subfield child node(s) for an input embedding of concatenated paper titles and abstracts. We compare our LNN-FOS method to other recent machine learning methods using the Microsoft Academic Graph (MAG) FoS hierarchy and find that the LNN-FOS offers increased classification accuracy at each FoS hierarchical level.

**Keywords :** hierarchical classification, layer neural network, scientific field of study, scientific taxonomy

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