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Deep Multi-task Mining Calabi-Yau Manifolds

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Computing topological properties of Calabi-Yau manifolds is a challenging mathematical task. Recent years have witnessed the rising use of deep learning as a method for exploration of large sets of data, to learn their patterns and properties. This is specifically interesting when it comes to unravel complicated geometrical structures, as well as in the development of trustworthy AI methods. Motivated by their distinguished role in string theory for the study of compactifications, we compute the Hodge numbers of Complete Intersection Calabi-Yau manifolds using deep neural networks. Specifically, we introduce a regression architecture, based on GoogleNet and multi-task learning, capable of mining information to produce highly accurate simultaneous predictions. This shows the potential of deep learning to learn from geometrical data, and it proves the versatility of architectures developed in different contexts.

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