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Symbolic expression generation via VAE

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There are many problems in physics, biology, and other natural sciences in which symbolic regression can provide valuable insights and discover new laws of nature. A widespread Deep Neural Networks don't provide interpretable solutions. Meanwhile, symbolic expressions give us a clear relation between observations and the target variable. However, at the moment, there is no dominant solution for the symbolic regression task, and we aim to reduce this gap with our algorithm. In this work, we propose a novel deep learning framework for symbolic expression generation via VAE. In a nutshell, we suggest using a variational autoencoder to generate mathematical expressions, and our training strategy forces generated formulas to fit a given dataset. Our framework allows encoding apriori knowledge of the formulas into fast-check predicates that can speed up the optimization process. We compare our method to modern symbolic regression benchmarks and show that our method outperforms the competitors on most of the tasks.

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