

## **Patterns in Calabi-Yau Threefolds**

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Calabi–Yau geometries are crucial for string compactification. We explore the distribution of topological numbers in Calabi–Yau manifolds using the Kreuzer–Skarke dataset of hypersurfaces in toric varieties as a testing ground. In studying Complete Intersection Calabi–Yau (CICY) threefolds, we use neural networks and support vector machines (SVM). An advanced neural network classifier and SVM are employed to (1) learn Hodge numbers and report a remarkable improvement over previous efforts, (2) query for favourability, and (3) predict discrete symmetries, a highly imbalanced problem to which the Synthetic Minority Oversampling Technique (SMOTE) is applied to boost performance. We demonstrate that our approach provides quick diagnostic tools capable of shortlisting quasi-realistic string models based on compactification over smooth CICYs and further supports the paradigm that classes of problems in algebraic geometry can be machine learned.