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Estimating Calabi-Yau hypersurface and triangulation counts with equation learners. (English) [Zbl 1414.83080](#)

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Summary: We provide the first estimate of the number of fine, regular, star triangulations of the four-dimensional reflexive polytopes, as classified by Kreuzer and Skarke (KS). This provides an upper bound on the number of Calabi-Yau threefold hypersurfaces in toric varieties. The estimate is performed with deep learning, specifically the novel equation learner (EQL) architecture. We demonstrate that EQL networks accurately predict numbers of triangulations far beyond the $h^{1,1}$ training region, allowing for reliable extrapolation. We estimate that number of triangulations in the KS dataset is $10^{10,505}$, dominated by the polytope with the highest $h^{1,1}$ value.

MSC:

83E30 String and superstring theories in gravitational theory

14J32 Calabi-Yau manifolds (algebraic-geometric aspects)

81T30 String and superstring theories; other extended objects (e.g., branes) in quantum field theory

Cited in **3** Documents

Keywords:

[superstring vacua](#); [compactification and string models](#)

Software:

[Calabi-Yau database](#); [PALP](#); [TOPCOM](#)

Full Text: [DOI](#) [arXiv](#)

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