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Fishnets: Mapping Information Geometry with Robust, Scalable Neural Compression

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Data compression to informative summaries is essential for modern data analysis. Neural regression is a popular simulation-based technique for mapping data to parameters as summaries over a prior, but is usually agnostic to how uncertainties in information geometry, or data-summary relationship, changes over parameter space. We present Fishnets, a general simulation-based, neural compression approach to calculating the Fisher information and score for arbitrary data structures *as functions of parameters*. These compression networks can be scaled information-optimally to arbitrary data structures, and are robust to changes in data distribution, making them ideal tools for cosmological and graph dataset analyses.

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