



## **Where is the “Information” in an image, and can it be learned?**

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### **Abstract**

The traditional notion of "information" as entropy or coding length of the data, as developed by Wiener, Shannon, and Kolmogorov, is tailored to applications of transmission and storage of the data themselves.

But if we want to use the data for visual inference, rather than just storing it or transmitting it, then most of the complexity arises from nuisance factors that have little to do with the task at hand, and entropy or coding length of the data turns out to be a very poor correlate of what a reasonable person would define as "information" that the image contains about the scene. I will describe an alternate notion of information, proposed by J. J. Gibson in the Fifties. While Gibson's ideas have had a profound impact in cognitive psychology and philosophy, they have so far failed to penetrate more quantitative branches of science and engineering, owing to the difficulty in formalizing these concepts and turning them into useful algorithms. I will describe a first attempt in this direction. Now, if a representation of the data could be devised that "contains all the information", what does it take to learn it?

*Syllabus: Visual representation, learning, invariance, sufficient statistics, entropy, coding length.*