Entropy and information are the answers, not the questions

[*Entropy is not the question, it is the answer; "how many bits?" is the question*]

Information theory as initiated by Shannon – and, to a large extent, as it is still being practiced today – is a discipline defined by an ever growing body of specific problems. The problems are operational, and the models describing the physical aspects to which these problems correspond are clearly, simply and uniquely defined. The tools of our trade are mostly probabilistic, but they are by no means restricted to this area. In fact, over the past 60 years or so, not only have the models been evolving, but also techniques and ideas from many different areas of mathematics have been employed to facilitate our analyses.

The quest of information theory is to answer questions of the form "how much can we hope to compress data with these characteristics?" or "how many errors can we correct when transmitting messages through a channel that introduces errors at a given rate?" We are not in the business of defining notions such as *information*, *randomness* and *entropy*. Instead, our (more modest and the same time more ambitious) goal is to precisely quantify, in a sense as general as possible, the rate at which data can be efficiently transmitted and stored, in a variety of physically relevant scenarios.

The many connections of our fundamental notions, such as the entropy, to other areas, like physics, offer intuition, which sometimes can be a powerful catalyst in understanding and solving particular problems. But we do not wish to give an all-encompassing definition of information or of entropy. These quantities are not our focus, they simply turn out to be the fundamental answers to many of our basic questions.

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