

Novelty, information and surprise

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Abstrak

The book offers a new approach to information theory that is more general than the classical approach by Shannon. The classical definition of information is given for an alphabet of symbols or for a set of mutually exclusive propositions (a partition of the probability space) with corresponding probabilities adding up to 1. The new definition is given for an arbitrary cover of, i.e. for a set of possibly overlapping propositions. The generalized information concept is called novelty and it is accompanied by two new concepts derived from it, designated as information and surprise, which describe "opposite" versions of novelty, information being related more to classical information theory and surprise being related more to the classical concept of statistical significance. In the discussion of these three concepts and their interrelations several properties or classes of covers are defined, which turn out to be lattices. The book also presents applications of these new concepts, mostly in statistics and in neuroscience.