Mathematical Principles of Information Sciences, I: The Laws of Information

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Time: 11:00-12:00 (Time in Beijing)
15:00-16:00 (Time in Auckland)
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Venue: Coffee Beanery (宾诺咖啡)

Abstract: Shannon 1945 and 1948 started the mathematical studies of cryptography and of communication, respectively.

In 1945, Shannon proposed an information theoretical protocol for data security, leading to the mathematical theory of data security. In 1948, Shannon proposed the metric of entropy embedded in a random variable, solving the problem of data compression, and the notion of mutual information and the notion of channel capacity, solving the problem of data transmission through a channel defined by a conditional probability. Shannon's theory shows that the amount of uncertainty embedded in a random variable can be measured; that the uncertainty of a data can be eliminated or reduced through a communication channel; and that information, that is, the amount of uncertainty that has been eliminated by a receiver, can be used to decode the original data of the transmitter. The current understanding of the notion of information has been restricted to that defined by Shannon more than 70 years ago. However, we have no reason to take for granted that only the uncertainty in a random variable can be measured, and that information can only be acquired through a communication channel. The challenges are: What is the definition of the information as a scientific notion (instead of a notion of communication, or security)? What are the laws of information? What roles does information play in science? In this talk, I will introduce my theory, solving the challenges.

Speaker Bio: 李昂生，北京航空航天大学教授，国家杰出青年基金获得者，中国科学院百人计划入选者。李昂生教授的主要研究方向为网络空间的信息与计算理论，结构信息论与网络算法，并取得一系列原始创新成果。2016年，他提出结构信息的度量，创立结构信息论，创建信息处理的数学理论。成果解决Brooks2003提出的计算机科学重大挑战性问题，并同时解决Shannon 1953年提出的建立信息的结构理论的重大科学问题。

Chengdu Algorithms and Logic Seminar is a series of online seminars organized by School of Computer Science and Engineering, University of Electronic Science and Technology of China, and School of Computer Science, University of Auckland that aims to promote collaborations in a broad range of topics in algorithms and logic.

Organizers: Bakhadyr Khoussainov, Jiamou Liu, and Mingyu Xiao
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