

Domain theory and measurement

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Abstract

Domains were introduced in computer science in the late 1960's by Dana Scott to provide a semantics for the lambda calculus (the lambda calculus is the basic prototype for a functional programming language i.e. ML). The study of domains with measurements was initiated in the speaker's thesis: a domain provides a qualitative view of information expressed in part by an 'information order' and a measurement on a domain expresses a quantitative view of information with respect to the underlying qualitative aspect. The theory of domains and measurements was initially introduced to provide a first order model of computation, one in which a computation is viewed as a process that evolves in a space of informatic objects, where processes have informatic rates of change determined by the manner in which they manipulate information. There is a domain of binary channels with capacity as a measurement. There is a domain of finite probability distributions with entropy as a measurement. There is a domain of quantum mixed states with entropy as a measurement. There is a domain of spacetime intervals with global time as a measurement. In this talk, we will introduce domains and measurements, and then review some of the area's standard results.

References

- [1] Martin K. *Domain Theory and Measurement*. In *New Structures for Physics*, Lecture Notes in Physics, Volume 813, p. 491-591, 2010. Springer, Berlin, Heidelberg.