Shahid Beheshti University
Faculty of Mathematical Sciences
سخنرانی در دانشکده علوم ریاضی، دانشگاه شهید بهشتی

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Title:
On Cartesian Closed Categories of Domains

Abstract:

Domain theory was introduced by Dana Scott in the late sixties as a mathematical universe within which to define the semantics of programming languages. In this program, one seeks to identify the precise properties of domains that correspond to the language features of interest. Early on it became clear that the ability to define higher-order functions in programming has its counterpart in the formation of function spaces, more precisely, in the requirement that a category of domains be cartesian closed. In 1980, Nasser Saheb-Djahromi considered programs with a probabilistic choice operator and in order to accommodate this in the semantics, introduced the probabilistic powerdomain construction. This was studied more deeply by Claire Jones and Gordon Plotkin, towards the end of that decade and it was shown that the behaviour of the probabilistic powerdomain construction is much more easily understood in the context of continuous domains. This confirmed the experience gained before, namely, that continuous domains allow one to say much more about the workings of domain constructions and their relationship with program constructs. In a nutshell, one can say that the nice properties of continuous domains result from the fact that they are completions of finitary structures.

However, while it is advantageous to have continuous domains as inputs to domain constructions, it is not always guaranteed that one obtains them in the output, too. The most prominent construction which causes a complication is the function space: given two continuous domains D and E, the space $[D \to E]$ of Scott-continuous functions may not itself be continuous. This unfortunate phenomenon will be the topic of my talks and I will report on some of the results we have obtained over the years as well as some of the open problem.

1pm-2pm Ordibehehst 1st, 1394
April 21st, 2015 Tuesday

Place: Lecture Hall of the Faculty of Mathematical Sciences
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