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A Non-Topological View of Dcpos as Convergence Spaces (Extended Abstract)

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Abstract

Abstract The category TOP of topological spaces is not cartesian closed, but can be embedded into the cartesian closed category CONV of *convergence spaces*. "It is well-known that the category DCPO of dcpos and Scott continuous functions can be embedded into TOP, and so into CONV, by considering the Scott topology. We propose a different, " *cotopological* embedding of DCPO into CONV, which, in contrast to the topological embedding, preserves products. If X is a cotopological dcpo, i.e. a dcpo with the cotopological CONV-structure, and Y is a topological space, then $[X \to Y]$ is again topological, and conversely, if X is a topological space, and Y a cotopological complete lattice, then $[X \to Y]$ is again a cotopological complete lattice. For a dcpo D, the topological and the cotopological convergence structures coincide if and only if D is a continuous dcpo. Moreover, cotopological dcpos still enjoy some of the properties which characterise continuous dcpos. For instance, all cotopological complete lattices are injective spaces (in CONV) w.r.t. topological subspace embeddings.

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