ON D-POSETS

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Let I be the closed unit interval [0,1] carrying the usual algebraic structures and sequential convergence. An ID-**poset** is a subset of I^X which is a D-poset with respect to the inherited pointwise D-poset structure and carrying the pointwise sequential convergence. If $\mathcal{X} \subseteq I^X$ is an ID-poset, then $(X, \mathcal{X})$ is said to be an ID-**measurable** (or simply a measurable) space. Let $\mathcal{X} \subseteq I^X$ and $\mathcal{Y} \subseteq I^Y$ be ID-posets. A map f of Y into X is said to be $(\mathcal{X}, \mathcal{Y})$-**measurable** (or simply measurable) if $\mathcal{X} \circ f \subseteq \mathcal{Y}$. Let ID be the category of ID-posets and sequentially continuous D-homomorphisms, and let MID be the category of ID-measurable spaces and maps.

We show that two distinguished properties of ID-posets, sobriety and sequential closedness, give rise to distinguished subcategories of ID and MID. The properties are important in applications to probability. In particular, sobriety leads to duality between generalized random variables and generalized observables, and sequential closedness generalizes σ-completeness of fields of events.

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