Characterization of stratified $L$-topological spaces by convergence of stratified $L$-filters

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$L$-sets over a base set $X$ are generalizations of classical sets where subsets are not specified by characteristic functions from $X$ to $\{0,1\}$ but rather by functions from $X$ to a lattice $L$. For an $L$-set $a \in L^X$ and an element $x \in X$, $a(x)$ is interpreted as the grade of membership of $x$ in $a$. Stratified $L$-topological spaces are generalizations of topological spaces to the $L$-set case [1]. In [2], stratified $L$-generalized convergence spaces (analogous to classical convergence spaces) are defined, with the underlying lattice $(L, \leq, \wedge)$ being a frame. The resulting category $\text{SL-GCS}$ is topological over Set and is Cartesian-closed [2]. $\text{SL-TOP}$, the category of stratified $L$-topological spaces, is isomorphic to a reflective subcategory of $\text{SL-GCS}$ [2]. In [3] various subcategories of $\text{SL-GCS}$ are investigated. The results of [2] and [3] are now extended to more general enriched lattices $(L, \leq, *, \otimes)$. Finally axiom schemes for $L$-topological spaces based on $L$-filters (which lead to isomorphic categories in the frame case [4]) are investigated in the more general case and conditions for isomorphism between their categories are explored.

References