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Aspects of algebras of KZ-monads

We investigate interesting categories between the Kleisli category and the Eilenberg-Moore category for a Kock-Zöberlein monad on an order-enriched category, namely, the idempotent split completion and the (weighted) limit completion of the free algebras, for an appropriate base category. The first completion was shown to be equivalent to the category of split Eilenberg-Moore algebras in [2], and we give a characterization of those split algebras which are indeed free algebras. Numerous examples of KZ-monads have algebras characterized by a colimit-construction. In [1], the authors introduced the notion of completion KZ-monad for capturing this typical behaviour. The downset monad over posets, whose algebras are posets with all suprema and maps preserving them, is a simple example of a completion KZ-monad. In contrast, the filter, the proper and the prime filter KZ-monads over topological spaces are not; however, their algebras have a certain completion behaviour. For these special three monads we give a concrete description of the idempotent split and the limit completions. For that we make use of the notion of regular cogenerator in an order-enriched sense. In any order-enriched category the existence of a such cogenerator and weighted limits assures the existence of weighted colimits. In particular, for the filter monad, the idempotent split completion of the Kleisli category has as objects the algebraic lattices whose subposet of compact elements form a frame.

REFERENCES:

[1] Marta Bunge and Jonathan Funk, *Singular coverings of toposes*, Springer Lect. Notes in Math. 1890 (2006).

[2] Robert Rosebrugh and Richard J. Wood, Split structures, *Theory and Applications of Categories* 13 (2004) 172–183.

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