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Making monads from actegories

In algebraic topology and related fields, functor calculi are used to associate towers of functors to a given functor in a manner analogous to that of a Taylor series for real-valued functions. Such functor calculi are constructed in a variety of ways, using standard tools of homotopy theory, homological algebra, and category theory. In this talk, we will focus on the comonads and monads that form the key building blocks for one particular calculus, the discrete calculus, and its dual. Our primary goal will be to show that the processes by which these comonads and monads are constructed inspire a very general framework for transforming certain combinations of actegories and lax linear morphisms of actegories into monads and comonads. This is part of an ongoing project to generalize the construction of the discrete calculus and its dual to produce new calculi and cocalculi in a wide range of contexts. This is joint work with Kristine Bauer, Robyn Brooks, Kathryn Hess, Julie Rasmusen, and Bridget Schreiner.