Partial evaluations

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Abstract: Monads are categorical constructions which can be interpreted as encoding formal operations in the sense of universal algebra. Algebras for monads come equipped with an algebra map which evaluates each formal expression to produce a result. The partial evaluation construction, as the name suggests, formalises the idea that such evaluations can be performed partially. For example: 3+7 can be obtained as a partial evaluation of (1+2)+(3+4), while the total evaluation of the two expressions is 10.
This is a rich concept which can be generalised for other monads and it provides an operational interpretation of the well known bar construction, which was initially introduced by MacLane as a way of constructing resolutions suitable for computing homotopy colimits. It can also be related to probabilistic concepts, such as conditional expectations and martingales, and to computational constructs such as staging and partially static data. In this talk I will focus on illustrating the compositional properties of the partial evaluation relation and the simplicial constructions which arise as a result.