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Finite-type invariants, embedding calculus and Galois symmetries

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Finite-type invariants, also called Vassiliev-Goussarov invariants, are an important class of invariants of knots and, more generally, 3-manifolds. It is not known whether these invariants fully separate knots, but it is known that they are at least as strong as all quantum invariants, and those coming from perturbative Chern-Simons theory. The classification of finite-type invariants rests on the existence of a "universal" finite-type invariant, a construction of which was originally given by Kontsevich using configuration space integrals. But Kontsevich's invariants are rational invariants, and the existence of a geometric, universal invariant which is defined over the integers remains elusive. I will briefly describe a homotopical proposal for such an integer-valued universal invariant, after Goodwillie-Weiss, and explain some recent advances in that direction.