Weighted locally gentle quivers and Cartan matrices

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We study weighted locally gentle quivers. This naturally extends gentle quivers and gentle algebras, which have been intensively studied in the representation theory of finite-dimensional algebras, to a wider class of potentially infinite-dimensional algebras. Weights on the arrows of these quivers lead to gradings on the corresponding algebras. For the natural grading by path lengths, any locally gentle algebra is a Koszul algebra.

Our main result is a general combinatorial formula for the determinant of the weighted Cartan matrix of a weighted locally gentle quiver. This determinant is invariant under graded derived equivalences of the corresponding algebras. We show that this weighted Cartan determinant is a rational function which is completely determined by the combinatorics of the quiver, more precisely by the number and the weight of certain oriented cycles. This leads to combinatorial invariants of the graded derived categories of graded locally gentle algebras.