

A Graph-Theoretic View on Vector-Matrix Multiplication

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Many graph algorithms depend on the computation of paths. These paths are mostly built step-wise, where the steps necessary can be expressed via a multiplication of a vector with a matrix. This view originates in a relation-algebraic approach and is well-known in the context of algebraic graph theory. We show how these multiplications can be generalised in a modular fashion to obtain an “outer” operation of matrices on vectors. We present a simple implementation in the functional programming language Haskell and provide some applications.