Matrix Factorizations are Unique only up to an Invertible Transformation

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Here we simply note a trivial observation. Let X be a matrix. Let U, V be a factorization of X,

$$UV^T = X. \tag{1}$$

Let A be any invertible matrix (of the approprate size). Then, $UA, V(A^{-1})^T$ is also a factorization of X,

$$(UA)(V(A^{-1})^T)^T = UAA^{-1}V^T = UV^T = X. \tag{2}$$