The main goal of this thesis is to describe Golub-Kahan iterative bidiagonalization and its connection with Lanczos tridiagonalization and Krylov space theory. The Golub-Kahan iterative bidiagonalization is based on short recurrencies and when computing in finite precision arithmetics, the loss of orthogonality often occurs. Consequently, with the aim to reduce the loss of orthogonality, we focus on various reorthogonalization strategies. We compare them in numerical experiments on testing matrices available in the MATLAB environment. We study the dependency of the loss of orthogonalization and computational time on the choice of the method or the attributes of the matrix.