

This thesis presents principal components as a useful tool for data dimensionality reduction. In the first part, the basic terminology and theoretical properties of principal components are described and a biplot construction is derived there as well. Besides, heuristic methods for a choice of the optimum number of principal components are summarised there. Subsequently, asymptotical properties of sample eigenvalues of covariance and white Wishart matrices are described and cases of equality of some eigenvalues are distinguished at the same time. In the second part of the thesis, asymptotic distribution of the largest eigenvalue of white Wishart matrices is described, completed with graphic illustrations. A test of the number of significant eigenvalues is suggested on the basis of this limiting distribution, and the connection of this test to the number of suitable principal components is presented. The final part of the thesis provides an overview of advanced computational methods for the choice of an adequate number of principal components. The thesis is completed with graphical illustrations and a simulation study using Wolfram *Mathematica* and R.