Abstract: This thesis is concerned with data analysis, especially with principal component analysis and its sparse modification (SPCA), which is NP-hard-to-solve. SPCA problem can be recast into the regression framework in which sparsity is usually induced with ℓ_1-penalty. In the thesis, we propose to use iteratively reweighted ℓ_2-penalty instead of the aforementioned ℓ_1-approach. We compare the resulting algorithm with several well-known approaches to SPCA using both simulation study and interesting practical example in which we analyze voting records of the Parliament of the Czech Republic. We show experimentally that the proposed algorithm outperforms the other considered algorithms. We also prove convergence of both the proposed algorithm and the original regression-based approach to PCA.