

# Improved majorization for weighted least-squares decomposition models

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## Abstract

For many least-squares decomposition models efficient algorithms are well known. A more difficult problem arises in decomposition models where each residual is weighted by a nonnegative value. A special case is principal components analysis with missing data. Kiers (1997) discusses an algorithm for minimizing weighted decomposition models by iterative majorization.

In this paper, we propose a more efficient algorithm called weighted majorization for computing a solution. We show that the algorithm by Kiers is a special case of our algorithm. In addition, we apply weighted majorization to weighted principal components analysis. A simulation study is presented showing that weighted majorization is generally faster than the method by Kiers by a factor two to three and obtains the same or better quality solutions.

## References

Kiers, H.A.L. (1997). Weighted least squares fitting using iterative ordinary least squares algorithms. *Psychometrika*, 62, 251–266.