SUPERVISOR MODULE

ALGORITHMS FOR MINIMALLY INFORMED SIGNAL SEPARATION

Details Studenten

One of the core problems in data science is the splitting of a data set into meaningful components. The most well-known instance of this is probably the cocktail party problem: at a party we succeed in understanding the words spoken to us, while actually several people are speaking at the same time. Signal separation is of importance in application areas as music, image processing, telecommunications (OFDM, CDMA, . . .), array processing, biomedical problems (EEG, ECG, fMRI, . . .), data mining, chemometrics, econometrics, bioinformatics, astrophysics, and so on.

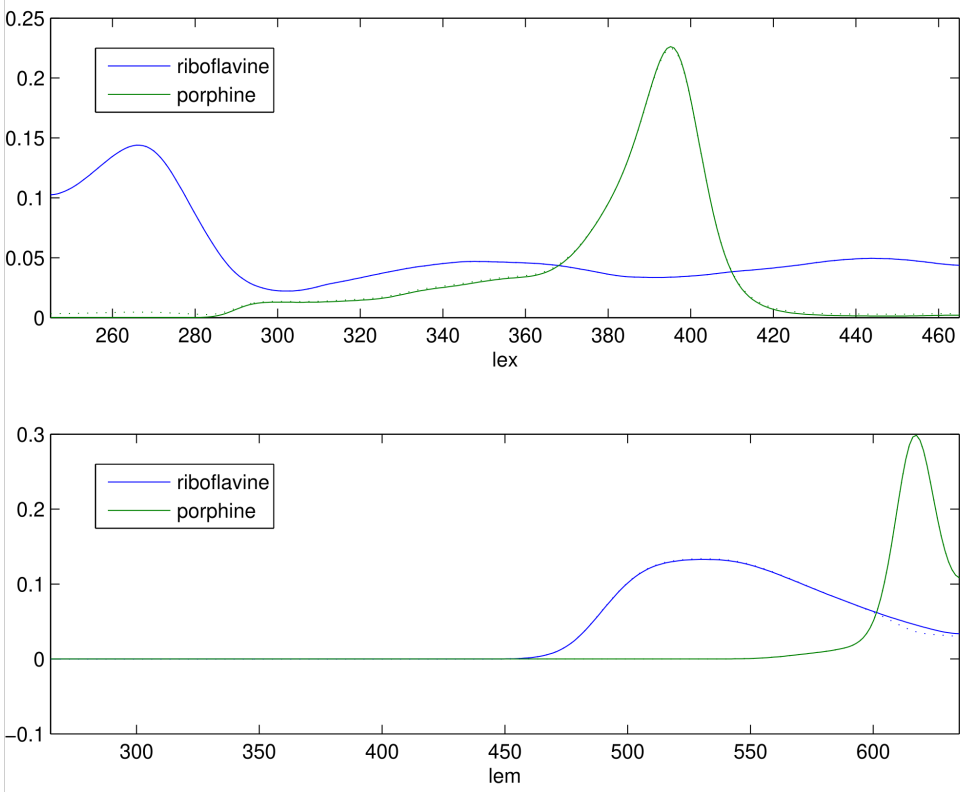
One of the most important tools for signal separation is the Canonical Polyadic Decomposition (CPD) of a higher-order tensor. Higher-order tensors are “matrices in more than two dimensions” and CPD is their decomposition in rank-1 terms. In this thesis we introduce minimal modelling of the factors in CPD-based signal separation.

By way of example, the signals in the bottom figure are excitation-emission spectra of components in a chemometrics application. CPD considers the consecutive signal values as unrelated numerical values. It is however clear that the factors have typical signal characteristics (such as smoothness). For the modelling of factors, we will consider sums of powers, sums of exponentials and damped sinusoids, sums of radial basis functions, etc. This is likely to significantly improve separability, accuracy, robustness against noise, etc., and may have great impact on applications.

Contact moments are both possible on Campus Leuven (ESAT) and Campus Kortrijk (Kulak).



Alex Katz, *The Cocktail Party*.



Excitation-emission spectra.

Bijlagen

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