

You can have it all: Rapid, robust, and reliable solution of bilinear problems in signal processing

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Abstract:

I will first describe how I once failed to catch a murderer (dubbed the "graveyard murderer" by the media), because I failed in solving a blind deconvolution problem. Here, blind deconvolution refers to the following problem: Assume we are given a function y which arises as the convolution of two unknown functions g and h . When and how is it possible to recover g and h from the knowledge of y ? Blind deconvolution pervades many areas of science and technology, including astronomy, medical imaging, optics, and communications engineering. Blind deconvolution is obviously ill-posed and even under additional assumptions this is a very difficult non-convex problem full of undesirable local minima. I will present the first numerically efficient blind deconvolution algorithm that comes with rigorous convergence guarantees. We will also consider more general bilinear problems, such as the case where we are given a mixture of blind deconvolution problems. Here we need to correctly blindly deconvolve and separate (demix) multiple functions at the same time from just a single measured function. I will describe a powerful convex framework for the solution of this problem and discuss its importance for the future Internet-of-Things.

Bio:

Thomas Strohmer is Professor of Mathematics at the University of California, Davis. His research interests are in applied harmonic analysis, numerical analysis, signal- and image processing, high-dimensional data analysis, and mathematics of information. He got his M.S. and Ph.D. in Mathematics in 1991 and 1994 respectively from the University of Vienna, Austria. He spent one year as Erwin-Schrodinger fellow at the Department of Statistics at Stanford University in 1997 before joining the University of California, Davis in 1998. His recent awards include the 2013 IEEE Signal Processing Society Best Paper Award and the 2014 SIAM Outstanding Paper Prize. Dr. Strohmer is on the editorial board of several journals. He also serves as consultant to industry in the areas of telecommunications, bioengineering, and signal- and image processing.