



Tensor Completion for Estimating Missing Values in Visual Data

Ji Liu, Przemyslaw Musalski, Peter Wonka, Jieping Ye

Tensor Completion for Estimating Missing Values in Visual Data

IEEE Transactions on Pattern Analysis & Machine Intelligence (PAMI), 35(1):208-220, January 2012.

Content:

- [Information](#)
- [Abstract](#)
- [Additional Files and Images](#)
- [BibTeX](#)

[Edit Publication](#) | [Delete Publication](#) | [Import from BibTeX](#) | [Create Replacement](#)

- Publication Type: Journal Paper (without talk)
- ISSN: 0162-8828
- Month: January
- Note: to be appeared in Jan 2013
- Weblink: <http://www.computer.org/portal/web/csdl/doi/10.1109/TPAMI.2012.39>
- Keywords: matrix completion, trace norm, tensor completion

In this paper we propose an algorithm to estimate missing values in tensors of visual data. Our methodology is built on recent studies about matrix completion using the matrix trace norm. The contribution of our paper is to extend the matrix case to the tensor case by proposing the first definition of the trace norm for tensors and then by building a working algorithm. First, we propose a definition for the tensor trace norm, that generalizes the established definition of the matrix trace norm. Second, similar to matrix completion, the tensor completion is formulated as a convex optimization problem. We developed three algorithms: SiLRTC, FaLRTC, and HaLRTC. The SiLRTC algorithm is simple to implement and employs a relaxation technique to separate the dependant relationships and uses the block coordinate descent (BCD) method to achieve a globally optimal solution; The FaLRTC algorithm utilizes a smoothing scheme to transform the original nonsmooth problem into a smooth one; The HaLRTC algorithm applies the alternating direction method of multipliers (ADMM) to our problem. Our experiments show potential applications of our algorithms and the quantitative evaluation indicates that our methods are more accurate and robust than heuristic approaches.

Additional images and videos:



[image](#)

[Download BibTeX-Entry](#)

```
@article{liu-2012-tcvd,
  title = "Tensor Completion for Estimating Missing Values in Visual
Data",
```

```

author =      "Ji Liu and Przemyslaw Musalski and Peter Wonka and Jieping
              Ye",
year =        "2012",
abstract =    "In this paper we propose an algorithm to estimate missing
              values in tensors of visual data. Our methodology is built
              on recent studies about matrix completion using the matrix
              trace norm. The contribution of our paper is to extend the
              matrix case to the tensor case by proposing the first
              definition of the trace norm for tensors and then by
              building a working algorithm. First, we propose a definition
              for the tensor trace norm, that generalizes the established
              definition of the matrix trace norm. Second, similar to
              matrix completion, the tensor completion is formulated as a
              convex optimization problem. We developed three algorithms:
              SiLRTC, FaLRTC, and HaLRTC. The SiLRTC algorithm is simple
              to implement and employs a relaxation technique to separate
              the dependant relationships and uses the block coordinate
              descent (BCD) method to achieve a globally optimal solution;
              The FaLRTC algorithm utilizes a smoothing scheme to
              transform the original nonsmooth problem into a smooth one;
              The HaLRTC algorithm applies the alternating direction
              method of multipliers (ADMM) to our problem. Our experiments
              show potential applications of our algorithms and the
              quantitative evaluation indicates that our methods are more
              accurate and robust than heuristic approaches.",
pages =       "208--220",
month =       "jan",
number =     "1",
note =        "to be appeared in Jan 2013",
issn =        "0162-8828",
journal =    "IEEE Transactions on Pattern Analysis & Machine
              Intelligence (PAMI)",
volume =     "35",
keywords =   "matrix completion, trace norm, tensor completion",
URL =        "http://www.cg.tuwien.ac.at/research/publications/2012/liu-2012-tcfd/",
}

```

Computer Graphics Group / Research / Publications / 2012 / liu-2012-tcfd

Maintained by **webmaster**.

Last update on **4. Dec 12**.

Comments to webmaster (at) cg.tuwien.ac.at.



Favoritenstrasse 9-11 / E186, A-1040 Wien, Austria

Tel. +43 (1) 58801-18602, Fax +43 (1) 58801-18698

<http://www.cg.tuwien.ac.at>