Algorithm 2

max \(i\) -4

\(-2\)

\(0\)

0.5

\(-3\) -2 -1 0 1 2

100

200

500

Accuracy

Accuracy

0.2

0.2

0.4

0.6

0.6

0.8

0.8

0.8

5. Adaptable to other constraint sets

4. Reuse of existing lower order methods

3. No need for discretization at final step

2. Converge in finite number of iterations

1. Convexifying the multilinear form

Multilinear Optimization

For any \(\alpha \geq 3\sqrt{\sum_{i,j,k} F_{ijkl}}\) \(\leq \max_{x,y,z,t} F_{ijkl}(u,v,w)\). \(\forall x,y,z,t \in \mathbb{R}^n\)

\(P_{ijkl}(x,y,z,t) \leq \max_{x,y,z,t} F_{ijkl}(u,v,w)\), \(\forall x,y,z,t \in \mathbb{R}^n\).

The following optimization problems are all equivalent

\[
\max_{x,y,z,t} F_{ijkl}(x,y,z,t) = \max_{x,y,z,t} F_{ijkl}(u,v,w) = \max_{x,y,z,t} F_{ijkl}(u,v,w)
\]

Algorithm 1

1. Update \((x, y, z)\) in cyclic order using BCA.

If no further ascent then

\(u = \arg \max_{u} F_{ijkl}(u, u, u, u)\)

\(x = y = z = t = u\)

Until no possible ascent

Algorithm 2

1. Update \((x, y)\) in cyclic order using BCA.

If no further ascent then

\(u = \arg \max_{x} F_{ijkl}(u, u, u, u)\)

\(x = y = u\)

Until no possible ascent

Attributes

1. Monotonic ascent for \((x, y, z)\) on \(M\)

2. Converge in finite number of iterations

3. No need for discretization at final step

4. Reuse of existing lower order methods

5. Adaptable to other constraint sets

SOURCE CODE

The MATLAB/C code can be downloaded at:

http://www.ml.uni-saarland.de/people/nguyen.htm