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Two curve Chebyshev approximation and its application to signal clustering.  (English)
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Summary: In this paper, we extend a number of important results of the classical Chebyshev approximation theory to the case of simultaneous approximation of two or more functions. The need for this extension is application driven, since such kind of problems appears in the area of curve (signal) clustering. In this paper, we propose a new efficient algorithm for signal clustering and develop a procedure that allows one to reuse the results obtained at the previous iteration without recomputing the cluster centres from scratch. This approach is based on the extension of the classical de la Vallée-Poussin procedure originally developed for polynomial approximation. We also develop necessary and sufficient optimality conditions for two curve Chebyshev approximation, which is our core tool for curve clustering. These results are based on application of nonsmooth convex analysis.

MSC:
94A12  Signal theory (characterization, reconstruction, filtering, etc.)
41A50  Best approximation, Chebyshev systems
90C47  Minimax problems in mathematical programming
90C90  Applications of mathematical programming

Keywords:
Chebyshev approximation; convex analysis; nonsmooth analysis; linear programming; signal clustering

Software:
clusfind; ElemStatLearn

Full Text: DOI

References:
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