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Representation of functions on big data: graphs and trees. (English) Zbl 1329.62033


Summary: Many current problems dealing with big data can be cast efficiently as function approximation on graphs. The information in the graph structure can often be reorganized in the form of a tree; for example, using clustering techniques. The objective of this paper is to develop a new system of orthogonal functions on weighted trees. The system is local, easily implementable, and allows for scalable approximations without saturation. A novelty of our orthogonal system is that the Fourier projections are uniformly bounded in the supremum norm. We describe in detail a construction of wavelet-like representations and estimate the degree of approximation of functions on the trees.

MSC:
62-07 Data analysis (statistics) (MSC2010)
05C90 Applications of graph theory
41A63 Multidimensional problems
42C40 Nontrigonometric harmonic analysis involving wavelets and other special systems
62H30 Classification and discrimination; cluster analysis (statistical aspects)
05C82 Small world graphs, complex networks (graph-theoretic aspects)

Keywords:
big data; wavelet-like representation; analysis on graphs and trees; function approximation on big data

Full Text: DOI

References: