

Bilinear and multilinear approximation of functions

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We are interested in approximation of a multivariate function $f(x_1, \dots, x_d)$ by linear combinations of products $u_1(x_1) \cdots u_d(x_d)$ of univariate functions $u_j(x_j)$, $j = 1, \dots, d$. In the case $d = 2$ it is a classical problem of bilinear approximation. In the case of approximation in the L_2 space the bilinear approximation problem is closely related to the problem of singular value decomposition (also called Schmidt expansion) of the corresponding integral operator with the kernel $f(x_1, x_2)$. We will discuss some known results on the rate of decay of errors of best bilinear approximation in L_p under different smoothness assumptions on f . The problem of multilinear approximation in the case $d \geq 3$ is more difficult and much less studied than the bilinear approximation problem. We will present some known and recent results on best multilinear approximation in L_p under mixed smoothness assumption on f .

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