SAMPLING KANTOROVICH OPERATORS FOR THE SOLUTION OF CONCRETE REAL WORLD PROBLEMS

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Sampling Kantorovich operators (SKO) have been introduced in the mathematical literature to extend the results of the classic and generalized sampling theorems to class of not necessarily continuous functions ([3, 2]). Starting from the one dimensional case, their expression has been consequently reformulated in multidimensional setting. Effective application models can be deduced from the mathematical formulation of the operators, particularly suitable to describe the practical sampling procedure. Thanks to this, the SKO have been successfully applied to images and to other bidimensional data elaborations for the solution of both medical as engineering specific problems. In particular, the open problem of the extraction of the pervious lumen boundaries in the aortic vessels, in presence of atheroma, has been made possible even without the introduction of contrast medium, nowdays representing the gold standard clinical procedure. Moreover, the characterization of the macular fundus for the prevention and the early diagnosis of the retinopathy, has been approached.
Furthermore, in the engineering contest, the quantification of the thermal and the acoustic bridges have been reformulated: in the first case, a more precise esteem of the energy losses of the buildings have been achieved ([1]); in the second case, the noise sources in complex environment has been localized in 3D. The application of such methods in reliable times has been made possible thanks to a numerical optimization of the reconstruction algorithm ([4]). A review of the results, achieved using the SKO procedure, is presented particularly focusing on the applications and on the connected concrete real world problems.
This is a joint work with prof. G. Vinti and the research group of the Department of Mathematics and Informatics of the University of Perugia.

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