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Piecewise Approximation and Neural Networks

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Abstract: The paper deals with the recently proposed autotracking piecewise cubic approximation (APCA) based on the discrete projective transformation, and neural networks (NN). The suggested new approach facilitates the analysis of data with complex dependence and relatively small errors. We introduce a new representation of polynomials that can provide different local approximation models. We demonstrate how APCA can be applied to especially noisy data thanks to NN and local estimations. On the other hand, the new approximation method also has its impact on neural networks. We show how APCA helps to decrease the computation time of feed forward NN.

Keywords: data smoothing; least squares and related methods; linear regression; approximation by polynomials; neural networks;

AMS Subject Classification: 93E14; 93E24; 62J05;

References

[1] N. D. Dikoussar: Function parametrization by using 4-point transforms. Comput. Phys. Comm. 99 (1997), 235–254.

[2] N. D. Dikoussar and Cs. Török: Automatic knot finding for piecewise-cubic approximation. Mat. Model. T–18 (2006), 3, 23–40.

[3] D. Kahaner, C. Moler, and S. Nash: Numerical Methods and Software. Practice–Hall, Englewood Cliffs, N.J. 1989.

[4] S. Mallat: A Wavelet Tour of Signal Processing. Academic Press, New York 1999.

[5] M. Révayová and Cs. Török: Analysis of prediction with neural networks. In: Prastan 2004, Bratislava, pp. 85–93.

[6] B. D. Riplay: Pattern Recognition and Neural Networks. Cambridge University Press, Cambridge 1996.

[7] G. A. F. Seber: Linear Regression Analysis. Wiley, New York 1977.

[8] Cs. Török: 4-Point transforms and approximation. Comput. Phys. Comm. 125 (2000), 154–166.

[9] Cs. Török and N. D. Dikoussar: Approximation with discrete projective transformation. Comput. Math. Appl. 38 (1999), 211–220.

[10] Cs. Török: Visualization and data analysis in the MS.NET framework. In: Comm. JINR 2004, E10-2004-136, pp. 1–22.