

Preface

This monograph is the continuation and completion of the author's earlier 2011 monograph, "Intelligent Systems: Approximation by Artificial Neural Networks", Springer, Intelligent Systems Reference Library, Volume 19.

In this monograph we present the complete recent work of the last four years of the author in approximation by neural networks. It is the natural outgrowth of his related publications. Chapters are self-contained and can be read independently and several advanced courses can be taught out of this book. An extensive list of references is given per chapter.

The topics covered are from A to Z of this research area, all studied for the first time by the author. We list these topics:

- Rate of convergence of basic neural network operators to the unit-univariate case.

- Rate of convergence of basic multivariate neural network operators to the unit.

- Fractional neural network approximation.

- Fractional approximation by Cardaliaguet-Euvrard and squashing neural network operators.

- Fractional Voronovskaya type asymptotic expansions for quasi-interpolation neural network operators.

- Voronovskaya type asymptotic expansions for multivariate quasi-interpolation neural network operators.

- Fractional approximation by normalized bell and squashing type neural network operators.

- Fractional Voronovskaya type asymptotic expansions for bell and squashing type neural network operators.

- Multivariate Voronovskaya type asymptotic expansions for normalized bell and squashing type neural network operators.

- Multivariate fuzzy-random normalized neural network approximation operators.

- Fuzzy fractional approximations by fuzzy normalized bell and squashing type neural network operators.

- Fuzzy fractional neural network approximation by fuzzy quasi-interpolation operators.

Higher order multivariate fuzzy approximation by basic neural network operators.

High degree multivariate fuzzy approximation by quasi-interpolation neural network operators.

Multivariate fuzzy-random quasi-interpolation neural network approximation operators.

Approximation by Kantorovich and quadrature type quasi-interpolation neural network operators.

Univariate error function-based neural network approximation.

Multivariate error function-based neural network approximations.

Voronovskaya type asymptotic expansions for error function-based quasi-interpolation neural network operators.

Fuzzy fractional error function-based neural network approximation.

High order multivariate fuzzy approximation by neural network operators based on the error function.

Multivariate fuzzy-random error function-based neural network approximation.

Approximation by perturbed neural network operators.

Approximation by multivariate perturbed neural network operators.

Voronovskaya type asymptotic expansions for perturbed neural network operators.

Approximation by fuzzy perturbed neural network operators.

Multivariate fuzzy perturbed neural network operators approximation.

Multivariate fuzzy-random perturbed neural network approximation.

The book's results are expected to find applications in many areas of applied mathematics, computer science and engineering. As such this monograph is suitable for researchers, graduate students, and seminars of the above subjects, also to be in all science and engineering libraries.

The preparation of book took place during 2014–2015 in Memphis, Tennessee, USA.

I would like to thank Prof. Alina Alb Lupas of University of Oradea, Romania, for checking and reading the manuscript.

Memphis, USA
March 2015

George A. Anastassiou

Intelligent Systems II: Complete Approximation by
Neural Network Operators

Anastassiou, G.A.

2016, XV, 712 p. 1 illus., Hardcover

ISBN: 978-3-319-20504-5