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Neural networks are being used to solve all kinds of problems from a wide range of disciplines. Some neural networks work better than others on specific problems and the models are run using continuous, discrete, and stochastic methods. For more information on stochastic methods , the reader is directed to the textbooks at the end of this chapter.

~~Neural Networks | Springerlink~~

A neural network is a statistical technique that calculates weights (score points) for predictor characteristics (such as age and income) by self-learning from data examples (such as good and bad loans). It can be trained to detect fraud by reviewing examples of good and fraudulent transactions on a bank's portfolio.

~~Neural Network - an overview | ScienceDirect Topics~~

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However, by using the deep neural network (DNN) approximation, the DNN is able to get a relatively stable solution without any regularization . Moreover, the structure preserving of the solutions can be easily satisfied, for instance, we can simply apply an exponential function to the output of the NN to ensure the positivity of the solutions. Another promising application using PINN is the hidden fluid mechanics (HFM), which takes advantage of the physics-informed deep learning framework to ...

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Artificial neural networks (ANNs) are a feasible way to deal with complex and ill-defined problems. ANNs are fault tolerant in the sense that they are able to handle noisy and incomplete data, are able to tackle non-linear problems, and once trained, based on examples and historical data, can perform very rapidly predictions and generalizations.

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Neural networks have been advocated as an alternative to traditional statistical forecasting methods. In the present experiment, time series forecasts produced by neural networks are compared with... Neural Network Models for Time Series Forecasts | Management Science

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An Introduction to Neural Network Methods for Differential Equations (SpringerBriefs in Applied Sciences and Technology) eBook: Neha Yadav, Anupam Yadav, Manoj Kumar: Amazon.co.uk: Kindle Store

In response to the exponentially increasing need to analyze vast amounts of data, Neural Networks for Applied Sciences and Engineering: From Fundamentals to Complex Pattern Recognition provides scientists with a simple but systematic introduction to neural networks. Beginning with an introductory discussion on the role of neural networks in

Beginning with an introductory discussion on the role of neural networks in scientific data analysis, this book provides a solid foundation of basic neural network concepts. It contains an overview of neural network architectures for practical data analysis followed by extensive step-by-step coverage on linear networks, as well as, multi-layer perceptron for nonlinear prediction and classification explaining all stages of processing and model development illustrated through practical examples and case studies. Later chapters present an extensive coverage on Self Organizing Maps for nonlinear data clustering, recurrent networks for linear nonlinear time series forecasting, and other network types suitable for scientific data analysis.

This book is a printed edition of the Special Issue "Applied Artificial Neural Network" that was published in Applied Sciences

The aim of this book is to handle different application problems of science and engineering using expert Artificial Neural Network (ANN). As such, the book starts with basics of ANN along with different mathematical preliminaries with respect to algebraic equations. Then it addresses ANN based methods for solving different algebraic equations viz. polynomial equations, diophantine equations, transcendental equations, system of linear and nonlinear equations, eigenvalue problems etc. which are the basic equations to handle the application problems mentioned in the content of the book. Although there exist various methods to handle these problems, but sometimes those may be problem dependent and may fail to give a converge solution with particular discretization. Accordingly, ANN based methods have been addressed here to solve these problems. Detail ANN architecture with step by step procedure and algorithm have been included. Different example problems are solved with respect to various application and mathematical problems. Convergence plots and/or convergence tables of the solutions are depicted to show the efficacy of these methods. It is worth mentioning that various application problems viz. Bakery problem, Power electronics applications, Pole placement, Electrical Network Analysis, Structural engineering problem etc. have been solved using the ANN based methods.

This book introduces a variety of neural network methods for solving differential equations arising in science and engineering. The emphasis is placed on a deep understanding of the neural network techniques, which has been presented in a mostly heuristic and intuitive manner. This approach will enable the reader to understand the working, efficiency and shortcomings of each neural network technique for solving differential equations. The objective of this book is to provide the reader with a sound understanding of the foundations of neural networks and a comprehensive introduction to neural network methods for solving differential equations together with recent developments in the techniques and their applications. The book comprises four major sections. Section I consists of a brief overview of differential equations and the relevant physical problems arising in science and engineering. Section II illustrates the history of neural networks starting from their beginnings in the 1940s through to the renewed interest of the 1980s. A general introduction to neural networks and learning technologies is presented in Section III. This section also includes the description of the multilayer perceptron and its learning methods. In Section IV, the different neural network methods for solving differential equations are introduced, including discussion of the most recent developments in the field. Advanced students and researchers in mathematics, computer science and various disciplines in science and engineering will find this book a valuable reference source.

Develop and optimize deep learning models with advanced architectures. This book teaches you the intricate details and subtleties of the algorithms that are at the core of convolutional neural networks. In Advanced Applied Deep Learning, you will study advanced topics on CNN and object detection using Keras and TensorFlow. Along the way, you will look at the fundamental operations in CNN, such as convolution and pooling, and then look at more advanced architectures such as inception networks, resnets, and many more. While the book discusses theoretical topics, you will discover how to work efficiently with Keras with many tricks and tips, including how to customize logging in Keras with custom callback classes, what is eager execution, and how to use it in your models. Finally, you will study how object detection works, and build a complete implementation of the YOLO (you only look once) algorithm in Keras and TensorFlow. By the end of the book you will have implemented various models in Keras and learned many advanced tricks that will bring your skills to the next level. What You Will Learn See how convolutional neural networks and object detection work Save weights and models on disk Pause training and restart it at a later stage Use hardware acceleration (GPUs) in your code Work with the Dataset TensorFlow abstraction and use pre-trained models and transfer learning Remove and add layers to pre-trained networks to adapt them to your specific project Apply pre-trained models such as Alexnet and VGG16 to new datasets Who This Book Is For Scientists and researchers with intermediate-to-advanced Python and machine learning know-how. Additionally, intermediate knowledge of Keras and TensorFlow is expected.

"This book introduces and explains Higher Order Neural Networks (HONNs) to people working in the fields of computer science and computer engineering, and how to use HONNS in these areas"--Provided by publisher.

This book is a printed edition of the Special Issue "Application of Artificial Neural Networks in Geoinformatics" that was published in Applied Sciences

A comprehensive introduction to the use of neural networks in signal processing.