## K. I. DEAMANTARAS - S. Y. KUNG

# Principal Component Neural Networks Theory and Applications

### **Principal Component Neural Networks**

**Sun Yuan Kung** 

#### **Principal Component Neural Networks:**

**Principal Component Neural Networks** K. I. Diamantaras, S. Y. Kung, 1996-03-08 Systematically explores the relationship between principal component analysis PCA and neural networks Provides a synergistic examination of the mathematical algorithmic application and architectural aspects of principal component neural networks Using a unified formulation the authors present neural models performing PCA from the Hebbian learning rule and those which use least squares learning rules such as back propagation Examines the principles of biological perceptual systems to explain how the brain works Every chapter contains a selected list of applications examples from diverse areas Principal Component Analysis Networks and Algorithms Xiangyu Kong, Changhua Hu, Zhansheng Duan, 2017-01-09 This book not only provides a comprehensive introduction to neural based PCA methods in control science but also presents many novel PCA algorithms and their extensions and generalizations e g dual purpose coupled PCA GED neural based SVD algorithms etc It also discusses in detail various analysis methods for the convergence stabilizing self stabilizing property of algorithms and introduces the deterministic discrete time systems method to analyze the convergence of PCA MCA algorithms Readers should be familiar with numerical analysis and the fundamentals of statistics such as the basics of least squares and stochastic algorithms Although it focuses on neural networks the book only presents their learning law which is simply an iterative algorithm Therefore no a priori knowledge of neural networks is required This book will be of interest and serve as a reference source to researchers and students in applied mathematics statistics engineering and other related fields

Neural Networks - ICANN 2010 Konstantinos Diamantaras, Wlodek Duch, Lazaros S. Iliadis, 2010-09-13 th This volume is part of the three volume proceedings of the 20 International Conference on Arti cial Neural Networks ICANN 2010 that was held in Th saloniki Greece during September 15 18 2010 ICANN is an annual meeting sponsored by the European Neural Network Society ENNS in cooperation with the International Neural Network So ety INNS and the Japanese Neural Network Society JNNS This series of conferences has been held annually since 1991 in Europe covering the eld of neurocomputing learning systems and other related areas As in the past 19 events ICANN 2010 provided a distinguished lively and interdisciplinary discussion forum for researches and scientists from around the globe Ito eredagoodchanceto discussthe latestadvancesofresearchandalso all the developments and applications in the area of Arti cial Neural Networks ANNs ANNs provide an information processing structure inspired by biolo cal nervous systems and they consist of a large number of highly interconnected processing elements neurons Each neuron is a simple processor with a limited computing capacity typically restricted to a rule for combining input signals utilizing an activation function in order to calculate the output one Output signalsmaybesenttootherunitsalongconnectionsknownasweightsthatexcite or inhibit the signal being communicated ANNs have the ability to learn by example a large volume of cases through several iterations without requiring a priori xed

knowledge of the relationships between process parameters Artificial Neural Networks, 2 I. Aleksander, J. Taylor, 2014-06-28 This two volume proceedings compilation is a selection of research papers presented at the ICANN 92 The scope of the volumes is interdisciplinary ranging from the minutiae of VLSI hardware to new discoveries in neurobiology through to the workings of the human mind USA and European research is well represented including not only new thoughts from old masters but also a large number of first time authors who are ensuring the continued development of the field

Threshold Accepting Trained Hybrid Principal Component Neural Networks for Pattern Classification V. Ravi, 2018 This paper proposes a new architecture for neural networks where the hidden layer is completely replaced by what is referred to as a principal component layer This layer consists of only a few selected principal components that perform the function of hidden nodes Then an algorithm based on the threshold accepting TA meta heuristic is suggested to train the hybrid principal component neural network PC NN The new architecture reduces the number of weights by a great number as there are no formal connections between the input layer and the principal component layer Further one needs to pre specify only two parameters that control the optimizer and the percentage variance explained which determines the number of principal components to be selected The algorithm is tested on wine classification and Wisconsin breast cancer problems The results showed better generalization power for the new algorithm compared to the backpropagation Also its performance is comparable to that of a TA based algorithm for the multilayer neural networks proposed elsewhere

Applications and Science of Neural Networks, Fuzzy Systems, and Evolutionary Computation ,1998 **Identification of Nonlinear Principal Component Neural Networks** Brigitta Voss, 2003 Use of Principal Component Analysis for Data Reduction for Training Neural Networks Glen Gray Paschal, 1996 Self-Organising Neural Networks Mark Girolami, 2012-12-06 The conception of fresh ideas and the development of new techniques for Blind Source Separation and Independent Component Analysis have been rapid in recent years It is also encouraging from the perspective of the many scientists involved in this fascinating area of research to witness the growing list of successful applications of these methods to a diverse range of practical everyday problems This growth has been due in part to the number of promising young and enthusiastic researchers who have committed their efforts to expanding the current body of knowledge within this field of research The author of this book is among one of their number I trust that the present book by Dr Mark Girolami will provide a rapid and effective means of communicating some of these new ideas to a wide international audience and that in turn this will expand further the growth of knowledge In my opinion this book makes an important contribution to the theory of Independent Component Analysis and Blind Source Separation This opens a range of exciting methods techniques and algorithms for applied researchers and practitioner engineers especially from the perspective of artificial neural networks and information theory It has been interesting to see how rapidly the scientific literature in this area has Digital Neural Networks Sun Yuan Kung, 1993 Intended for engineers and researchers interested in the grown

applications of neural networks to signal and image processing this book is theoretically based with emphasis on application and implementation Coverage includes neural networks for representation unsupervised networks for association classification neural networks for generalization restoration neural net and conventional optimization techniques and special purpose supercomputers for neural nets The 1996 IEEE International Conference on Neural Networks, June 3-6, 1996, Sheraton Washington Hotel, Washington, DC, USA.: Proceedings ,1996 1995 IEEE International IEEE ... International Conference on Neural Networks Shun'ichi Conference on Neural Networks .1995 Amari.1997 The 1997 IEEE International Conference on Neural Networks, June 9-12, 1997, Westin Galleria 1991 IEEE International Joint Conference on Neural Networks ,1991 Hotel, Houston, Texas, USA, 1997 18th International Conference on VLSI Design International Conference on VLSI Design, 2005 Third International Symposium on Multispectral Image Processing Hanging Lu, Tianxu Zhang, 2003 **Artificial Neural Networks for** Nonlinear Extensions of Principal Component Analysis Agus Sudjianto, 1996 **Neural Networks and Learning** Machines Simon S. Haykin, 2009 For graduate level neural network courses offered in the departments of Computer Engineering Electrical Engineering and Computer Science Renowned for its thoroughness and readability this well organized and completely up to date text remains the most comprehensive treatment of neural networks from an engineering perspective Matlab codes used for the computer experiments in the text are available for download at http www pearsonhighered com haykin Refocused revised and renamed to reflect the duality of neural networks and learning machines this edition recognizes that the subject matter is richer when these topics are studied together Ideas drawn from neural networks and machine learning are hybridized to perform improved learning tasks beyond the capability of either independently

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