SENSOR NETWORKS AND DATA COMMUNICATIONS

Open Access

Patrick Siarry, Ph.D.,

Editor-in-chief

BIOGRAPHY

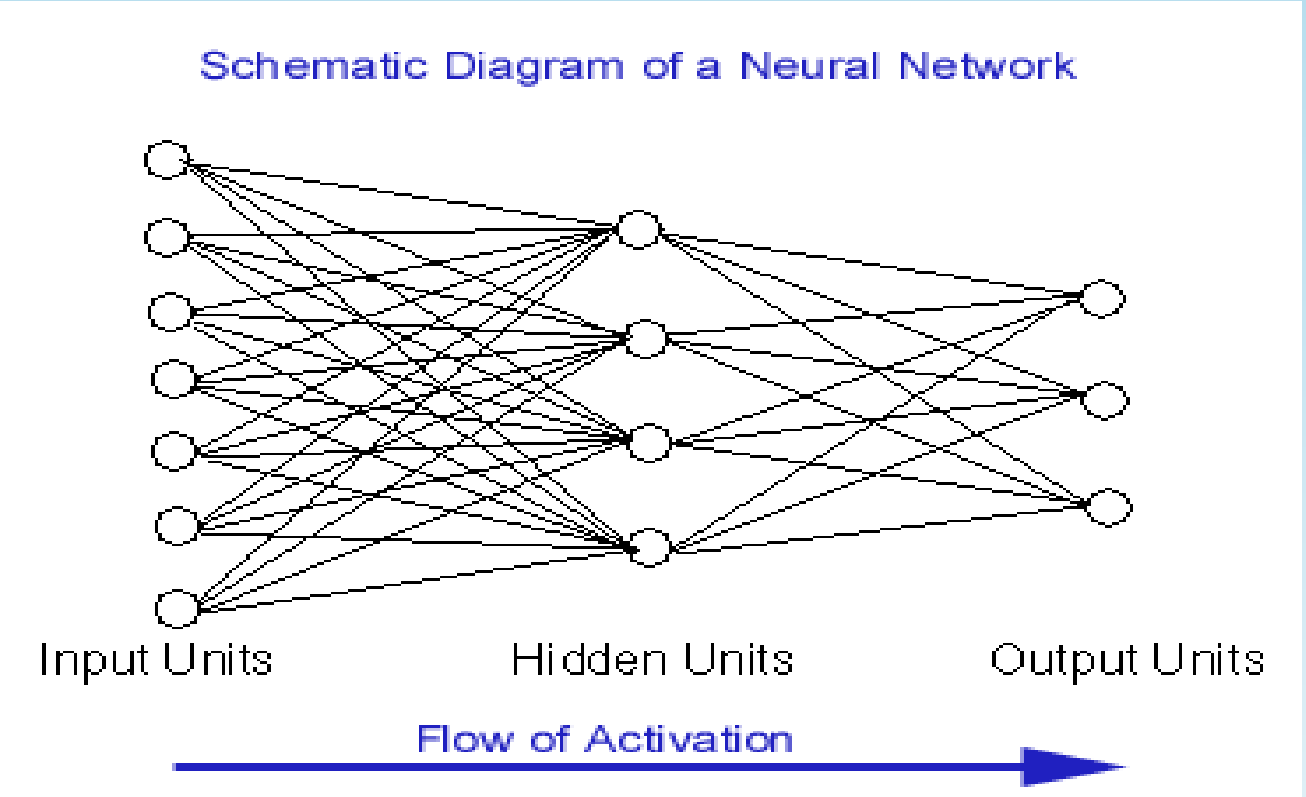
- **Patrick Siarry was born in France in 1952. He received the PhD degree from the University Paris 6, in 1986 and the Doctorate of Sciences (Habilitation) from the University Paris 11, in 1994. He was first involved in the development of analog and digital models of nuclear power plants at Electricité de France (E.D.F.). Since 1995 he is a professor in automatics and informatics.**

RESEARCH INTERESTS

- **His main research interests are computer-aided design of electronic circuits, and the applications of new stochastic global optimization heuristics to various engineering fields. He is also interested in the fitting of process models to experimental data, the learning of fuzzy rule bases, and of neural networks.**

NEURAL NETWORKS

- **An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system.**




Go back to the past to
Go ON to the future

HISTORY

- late-1800's - Neural Networks appear as an analogy to biological systems
- 1960's and 70's – Simple neural networks appear
  - Fall out of favor because the perceptron is not effective by itself, and there were no good algorithms for multilayer nets
- 1986 – Backpropagation algorithm appears
  - Neural Networks have a resurgence in popularity

USES

- **Neural networks, with their remarkable ability to derive meaning from complicated or imprecise data, can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. A trained neural network can be thought of as an "expert" in the category of information it has been given to analyse. This expert can then be used to provide projections given new situations of interest and answer "what if" questions.**

- **Other advantages include:**
- **Adaptive learning: An ability to learn how to do tasks based on the data given for training or initial experience.**
- **Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time.**
- **Real Time Operation: ANN computations may be carried out in parallel, and special hardware devices are being designed and manufactured which take advantage of this capability.**
- **Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage.**

APPLICATIONS

- Handwriting recognition
- Recognizing spoken words
- Face recognition
  - You will get a chance to play with this later!
- ALVINN
- TD-BACKGAMMON

ALVINN

- Autonomous Land Vehicle in a Neural Network
- Robotic car
- Created in 1980s by David Pomerleau
- 1995
  - Drove 1000 miles in traffic at speed of up to 120 MPH
  - Steered the car coast to coast (throttle and brakes controlled by human)
- 30 x 32 image as input, 4 hidden units, and 30 outputs

TD-GAMMON

- Plays backgammon
- Created by Gerry Tesauro in the early 90s
- Uses variation of Q-learning (similar to what we might use)
  - Neural network was used to learn the evaluation function
- Trained on over 1 million games played against itself
- Plays competitively at world class level

BASIC IDEA

- Modeled on biological systems
  - This association has become much looser
- Learn to classify objects
  - Can do more than this
- Learn from given training data of the form (x1...xn, output)

PROPERTIES

- Inputs are flexible
  - any real values
  - Highly correlated or independent
- Target function may be discrete-valued, real-valued, or vectors of discrete or real values
  - Outputs are real numbers between 0 and 1
- Resistant to errors in the training data
- Long training time
- Fast evaluation
- The function produced can be difficult for humans to interpret

RECENT PUBLICATIONS

- A framework for analysis of brain cine MR sequences. Nakib A, Siarry P, Decq P. Comput Med Imaging Graph. 2012 Mar;36(2):152-68.
- Fast brain MRI segmentation based on two-dimensional survival exponential entropy and particle swarm optimization. Nakib A, Roman S, Oulhadj H, Siarry P. Conf Proc IEEE Eng Med Biol Soc. 2007;2007:5563-6.
- Robust rigid registration of retinal angiograms through optimization. Dréo J, Nunes JC, Siarry P. Comput Med Imaging Graph. 2006 Dec;30(8):453-63. Epub 2006 Oct 10.
- Optimized brainstem auditory evoked potentials estimation using simulated annealing. Cherrid N, Naït-Ali A, Siarry P. J Clin Monit Comput. 2005 Jun;19(3):231-8.
- Fast simulated annealing algorithm for BAEP time delay estimation using a reduced order dynamic model. Cherrid N, Naït-Ali A, Siarry P. Med Eng Phys. 2005 Oct;27(8):705-11.

SENSOR NETWORKS AND DATA COMMUNICATIONS RELATED JOURNALS

- **Biosensors & Bioelectronics**
- **Biosensors Journal**

SENSOR NETWORKS AND DATA COMMUNICATIONS RELATED CONFERENCES

- Global Summit on Electronics and Electrical Engineering, November 03-05, 2015 Valencia, Spain
- 4th International Conference and Exhibition on Biometrics & Biostatistics, November 16-18, 2015 San Antonio, USA
- 2ndInternational Conference on Big Data Analysis and Data Mining, November 30-December 02, 2015 San Antonio, USA
- 2nd International Conference and Business Expo on Wireless & Telecommunication April 21-22, 2016 Dubai, UAE

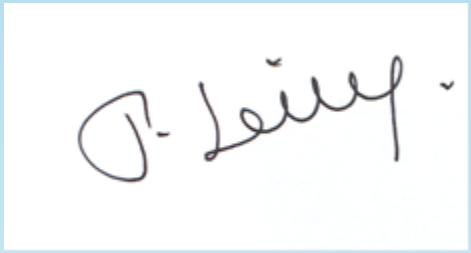
OMICS International **Open Access Membership**

OMICS International Group Open Access Membership enables academic and research institutions, funders and corporations to actively encourage open access in scholarly communication and the dissemination of research published by their authors.

For more details and benefits, click on the link below:

http://omicsonline.org/membership.php

E- Signature




Thank You!