

Commercial Applications of Artificial Neural Networks



This help provides information about specific applications of Neural Networks in commercial products. Artificial neural networks have become an accepted information analysis technology in a variety of disciplines. This has resulted in a variety of commercial applications (in both products and services) of neural network technology. It is estimated that worldwide sales of neural technology will reach \$1 billion in 1997 [The Economist, 15 April 1995, pp. 75-77]. The following links provide some examples of commercial applications of neural network technology.



Business



Marketing



Real Estate



Document and Form Processing



Machine Printed Character Recognition



Graphics Recognition



Hand Printed Character Recognition



Cursive Handwriting Character Recognition



Food Industry



Odor/Aroma Analysis



Product Development



Quality Assurance



Financial Industry



Market Trading



Fraud Detection



Credit Rating



Energy Industry



Electrical Load Forecasting



Hydroelectric Dam Operation



Natural Gas



Manufacturing



Process Control



Quality Control



Medical and Health Care Industry



Image Analysis



Drug Development



Resource Allocation



Science and Engineering



Chemical Engineering



Electrical Engineering



Weather



Transportation and Communication

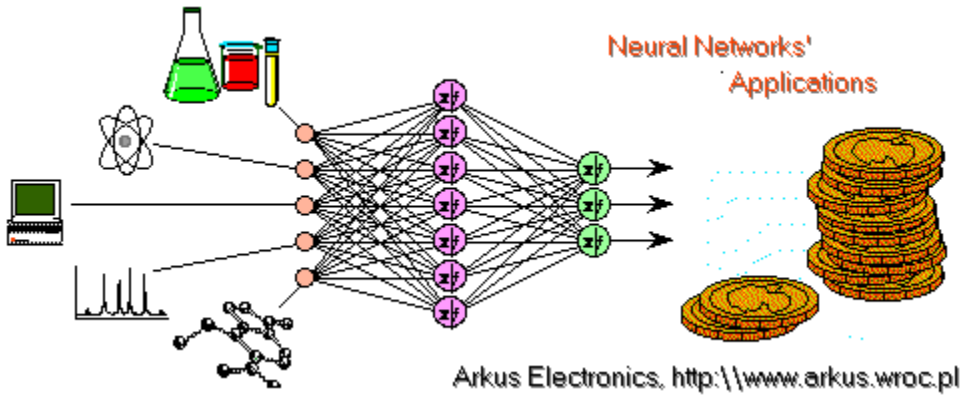


Transportation



Communication

Follow this link to see collection of WWW addresses, where you can find more information about artificial neural networks and their applications.



Neural network bibliography

- Bibliography servers, Publishers & Journals :
<http://class1.phys.uni.torun.pl/neural/node4.html#SECTION00040000000000000000>
- EEG Data file of Lester Ingber's Code and Reprint Archive
http://www.ingber.com/smni_eeg_data.html
- Neural Networks and Machine Learning
<http://www.newton.cam.ac.uk/programs/nnm.html>
- NEURAL COMPUTING SURVEYS
<http://www.icsi.berkeley.edu/~jagota/NCS/>
- Directory of /pub/Time-Series/MyPapers
<ftp://ftp.cs.colorado.edu/pub/Time-Series/MyPapers/>
- IDIAP Neural Network Home Page
<http://www.idiap.ch/nn.html>
- Complexity
<http://www.ruca.ua.ac.be/~VisionLab/complexity.html>
- Neuroscience Web Search
<http://www.acsiom.org/nsr/neuro.html>
- Inferential Sciences / Geometric Algebra Group WWW Server
<http://wol.ra.phy.cam.ac.uk>
- Machine Learning Project
<http://lucy.cs.waikato.ac.nz/~ml/>
- The Informant
<http://informant.dartmouth.edu>
- Fritzke --- Bochum, Systems Biophysics
<http://www.neuroinformatik.ruhr-uni-bochum.de/ini/VDM/research.html>
- ACSE - Department of Automatic Control and Systems Engineering
<http://www2.shef.ac.uk/uni/academic/A-C/acse/>
- Sheffield - Computer Science Departmental Seminars
<http://www.dcs.shef.ac.uk/dept/events/seminars/>
- Cambridge University Engineering Department SVR Group
<http://svr-www.eng.cam.ac.uk>
- WEBSOM - A novel SOM-based approach to free-text mining
<http://websom.hut.fi>
- Lateral Interactions in the Cortex: Structure and Function
<http://eris.wisdom.weizmann.ac.il/~edelman/htmlbook96/>
- NEURAL COMPUTING SURVEYS
<http://www.icsi.berkeley.edu/~jagota/NCS/>
- Aston University: Neural Computing Research Group
<http://www.ncrg.aston.ac.uk>
- Workshop on Soft Computing
<http://www.bioele.nuce.nagoya-u.ac.jp/wsc1/>
- UCI Machine Learning Group
<http://www.ics.uci.edu/AI/ML/Machine-Learning.html>
- Vapnik-Chervonenkis Dimension - ICMS Workshop on the VC Dimension
<http://www.dcs.ed.ac.uk/~mrj/VCWorkshop/>
- ART WWW SITE
<http://www.wi.leidenuniv.nl/art/>
- HMMER - hidden Markov models of DNA and protein consensus
<http://genome.wustl.edu/eddy/hmm.html>
- Human Brain, Aging
<http://exhibition.amnh.org/hhbe/feature/feature.html>
- London & South East High Performance Computing Centre
<http://www.lpac.ac.uk/SEL-HPC/>
- KD Mine: Data Mining and Knowledge Discovery Resources Index
<http://info.gte.com/~kdd/index.html>



Business Applications

Marketing



Adaptive Decision Systems

Application: evaluates direct marketing decisions



BehavHeuristics Inc.

Application: forecasts demand of airline flights

Product: Airline Marketing Assistant



Britvic

Application: predicting sales of soft drinks (e.g., Tango Orange Man)



Churchill Systems

Application: optimize marketing Strategy

Product: The Target Market System

Customers: Veratex Corp.



Microsoft

Application: direct mail marketing



NeuralWare

Application: determine which customers should receive catalogs

Customer: Spiegel Inc.



HNC Software Inc.

Application: predictive modeling system for direct marketers

Product: DataBase Mining® Marksman



HNC Software Inc.

Application: Web advertising placement server

Product: SelectCast



major US supermarket chain

Application: finding the connection between the sales of diapers and beer

Real Estate



Day & Zimmerman, Inc.

Application: real estate appraisal



HNC Software

Application: property valuation system

Product: Automated Real Estate Appraisal System (AREAS)



Document and Form Processing

Machine Printed Character Recognition

- Audre Recognition Systems
Application: optical character recognition
Product: Audre Neural Network
- Caere Corporation
Application: optical character recognition
Product: OmniPage 6.0 and 7.0 Pro for Windows
Product: OmniPage 6.0 Pro for MacOS
Product: AnyFax OCR engine
Product: FaxMaster
Product: WinFax Pro 3.0 (from Delrina Technology Inc.)
- Electronic Data Publishing, Inc
Application: optical character recognition
- Synaptics
Application: check reader
Product: VeriFone Oynx

Hand Printed Character Recognition

- Cardiff Software
Application: handwritten character recognition for faxes
Product: Teleform
- Eastman Kodak
Application: forms processor
Customers: UK motor vehicles bureau
- HNC Software
Application: handwritten character recognizer
Product: Quickstroke Automated Data Entry System
Customers: Avon, state of Wyoming
- Poqet Computer/Fujitsu
Application: input to pen-based computers
- Synaptics
Application: input to Windows based computers
Product: HR1200

Cursive Handwriting Character Recognition

- Apple Computer

Application: input for personal data assistant
Product: Apple Newton 120 (not earlier versions)



Lexus

Application: cursive handwriting system for PCs

Graphic Recognition



Fein-Marquart Associates, Inc.

Application: translation of chemistry drawings into connection tables



Food Industry

Odor/Aroma Analysis



AlphaMOS

Application: odor analysis via electronic nose



AromaScan Inc.

Application: odor analysis via electronic nose

Product: AromaScan electronic nose

Customers: Coca Cola, Food and Drug Administration, several others



Bloodhound Sensors Ltd.

Application: odor analysis via electronic nose

Product: Bloodhound Electronic Nose



Neotronics Scientific

Application: aroma/odor detection and recognition

Product: e-NOSE 4000 electronic nose



Sharp Corporation

Application: cooking control via electronic nose in microwave oven

Product Development



M&M/Mars

Application: search for improved chemical formulations

Quality Assurance



Anheuser-Busch

Application: beer testing



Florida Department of Citrus

Application: purity testing, pulp wash detection



Frito-Lay

Application: quality control of potato chips



Financial Applications

Market Trading

- Carl & Associates
Application: stock forecasting
- Citibank
Application: trends analysis in international markets
- Daiwa Securities Co., Ltd. and NEC Corporation
Application: stock price forecasting
- Econostat Ltd.
Application: bond portfolio management
Product: Global Bond
- Gerber Baby Foods
Application: manage cattle futures trading
- G.R. Pugh & Company
Application: corporate bond rating
- John Deere & Company
Application: pension fund management
- LBS Capital Management Inc.
Application: mutual fund management
- Mellon Equity Associates
Application: portfolio management
- Neural Applications Corporation
Applications: stock forecasting
Product: NetProfit
- O'Sullivan Brothers Investments, Ltd.
Application: monetary market trading
- Walkrich Investment Advisors
Application: stock forecasting

Fraud Detection

- Dunn and Bradstreet
Application: check approval

HNC Software

Application: credit card fraud detection

Product: Falcon

Customers: First Bank USA, Household Credit Services, and National Colonial Bank USA



MasterCard

Application: identify deviations in spending habits



Nestor Inc. and Fraud Detection Systems

Application: credit card fraud detection

Customers: Bank of America, Canadian Imperial Bank of Commerce, and Europay International S.A. Belgium



NeuroMetric Vision System Inc.

Application: signature verification from checks

Product: Check Signature Verification System

Customers: US banking industry and Federal Reserve System



Visa

Application: identify deviations in spending habits

Credit Rating



Adaptive Decision Systems

Application: credit scoring



Chase Financial Technologies

Application: forecasting credit worthiness

Product: Creditview



HNC Software

Application: mortgage underwriting and risk-management

Product: Colleague, Aquarius



Energy

Electrical Load Forecasting



Bayernwerk AG

Application: electrical load forecasting



Britvic

Application: energy demand forecasting



Electric Power Research Institute

Application: load forecasting



Energie Versorgung Schwaben

Application: load forecasting



Pacific Gas & Electric

Application: short- and long-term load forecasting



PUB Singapore

Application: load forecasting



Vattenfall

Application: load estimation

Hydroelectric Dam Operation



Tauernkraftwerke

Application: dam-displacement prediction

Natural Gas



Northern Natural Gas

Application: predicting gas index prices



Manufacturing

Process Controllers

- Fujitsu
Application: controller for continuous casting
- Honeywell
Application: process control systems
- Neural Applications Corporation
Application: controller for steel making
Product: Intelligent Arc Furnace
- Nippon Steel
Application: controller for continuous casting
- Pavilion Technologies
Application: process control, waste reduction
Product: Process Insights®
Customers: Eastman Kodak
- Siemens
Application: process control of rolling mills
Customers: Krupp Hoesch Stahl, HYLISA, Thyssen, Voest Alpine, Hanbo, Gallatin Steel,
- Texaco's Puget Sound Refinery
Application: refinery process control system

Quality Control Systems

- Anheuser-Busch
Application: beer testing
- Applied Intelligent Systems
Application: vision recognition systems
- CTS Electronics
Application: loudspeaker defect classifications
- Dunlop
Application: tire testing
- Intel
Application: computer chip manufacturing quality control
- Monsanto

- **Application:** predicting quality of plastics
- Netrologic, Inc.
Application: welding quality control
- NLK - Celpap
Application: predicting quality of paper
- Volvo
Application: diesel knock testing, paint inspection



Medicine and Health Care

Image Analysis



NeuroMedical Systems Inc.

Application: pap smear diagnostic aid

Product: PapNet [received FDA approval Dec. 95]

Drug Development



Vysis Inc.

Application: protein analysis for drug development

Resource Allocation



Anderson Memorial Hospital

Application: predict the severity of illness and use of hospital resources

There are many ANN applications in medicine that are currently in development, clinical trials, or waiting for FDA approval



Science and Engineering

Chemical Engineering



AI Ware Inc.

Application: optimize set of ingredients and processing attributes

Product: CAD/Chem Custom Formulation System



Chemometric Solutions

Application: analysis of chemical data



StellarNet Inc.

Application: spectroscopy

Electrical Engineering



NeuroCad Inc.

Application: optimized circuit routing

Product: NeuroRoute



Prosoniq

Application: timbre evaluation, model estimation and audio processing

Product: sonicWORX Artist & Studio

Application: noise removal system

Product: deNOISE Neural Noise Removal System

Weather



National Weather Service

Application: quantitative weather forecasting



Transportation and Communication

Transportation



London Underground

Application: fault detection



Rolls Royce

Application: fault detection

Communications



AT&T/Lucent Technologies

Application: echo cancellation system -- in use for > 20 years

