1.1 Das Logo


Das Logo steht in der Regel farbig auf weißem Hintergrund.

2. Sprechen besondere gestalterische oder technische Gründe für eine abweichende Anwendung, so kann das Logo in den rechts dargestellten Nichtfarben-Variationen eingesetzt werden.

2. Die Graustufendarstellung (60% Schwarz) wird verwendet, wenn nicht zweifarbig gedruckt werden kann.

3. Die Solid-Darstellung (100% Schwarz) wird verwendet, wenn nicht mit Graustufen (60% Schwarz) gedruckt werden kann.
The International Conference on Artificial Neural Networks (ICANN) is the annual flagship conference of the European Neural Network Society (ENNS). Its wide scope in neural networks ranges from machine learning algorithms to models of real nervous systems. ICANN aims at bringing together researchers from different research fields, such as computer science, neuroscience, cognitive science and engineering. Further aims are to address new challenges, share solutions and discuss future research directions toward developing more intelligent artificial systems and increasing our understanding of neural and cognitive processes in the brain.

The ICANN series of conferences was initiated in 1991 and soon became the major European conference in its field, with experts coming from several continents. The 24th ICANN is held on 15-19 September 2014 at the University of Hamburg. The hosts are the University of Hamburg and its Knowledge Technology Institute (http://www.informatik.uni-hamburg.de/WTM/).

The conference has attracted contributions from among the most internationally established researchers in the neural network community. The six keynote speakers in 2014 cover a wide spectrum: Christopher M. Bishop, expert in machine learning; Jun Tani, expert in recurrent neural networks; Paul F.M.J. Verchure, expert in autonomous systems; Yann LeCun, expert in neural vision; Barbara Hammer, expert in computational intelligence; Kevin N. Gurney, expert in computational neuroscience. We also acknowledge support from the Körber Foundation for a special session on “Human-Machine Interaction”.

A total of 173 papers was submitted to the ICANN 2014 conference. A large program committee, including accepted authors from recent ICANN conferences, performed altogether 744 reviews, delivering an average of 4.3 reviews per paper. This helped to obtain a reliable evaluation score for each paper, which was computed by the Springer Online Conference Service by averaging the reviewers’ ratings and taking into account the reviewers’ confidences. Papers were sorted with respect to their scores and the 108 papers with highest score were accepted. Furthermore, the multiple professional reviews delivered valuable feedback to all authors.

The conference program features 24 sessions, which contain 3 talks each, and which are arranged in 2 parallel tracks. There are 2 poster sessions with 33 posters and 2 live demonstrations of research results. Talks and posters are categorised into topical areas, providing the titles for the conference sessions and for the chapters in the Springer LNCS proceedings volume. Its chapters are ordered roughly in the chronological order of the conference sessions.

We would like to thank all the participants for their contribution to the conference program and to the proceedings. Many thanks go to the local organizers for their support and hospitality. We also express our sincere thanks to all active reviewers for their assistance in the review procedures and their valuable comments and recommendations.

July 2014

Stefan Wermter
Cornelius Weber
Wlodzislaw Duch
Timo Honkela
Petia Koprinkova-Hristova
Sven Magg
Günther Palm
Alessandro E.P. Villa
 Fight
Opening Session

Prof. Dr. Stefan Wermter
Full Professor in Computer Science
Head of Knowledge Technology
ICANN General Chair

Prof. Dr. Heinrich Graener
Dean of the Faculty of Mathematics
Informatics and Natural Sciences

Prof. Dr. Claudia S. Leopold
Vice President of Universität Hamburg

Recurrent Networks - Sequence Learning

Dynamic Cortex Memory: Enhancing Recurrent Neural Networks for Gradient-based Sequence Learning
Sebastian Otte, Marcus Liwicki, Andreas Zell

Learning and Recognition of Multiple Fluctuating Temporal Patterns Using S-CTRNN
Shingo Murata, Hiroaki Arie, Tetsuya Ogata, Jun Tani, Shigeki Sugano

Regularized Recurrent Neural Networks for Data Efficient Dual-Task Learning
Sigurd Spieckermann, Siegmund Düll, Steffen Udfft, Thomas Runkler

Recurrent Networks - ESNs

On-line Training of ESN and IP Tuning Effect
Petia Koprinkova-Hristova

An Incremental Approach to Language Acquisition: Thematic Role Assignment with Echo State Networks
Xavier Hinaut, Stefan Wermter

Memory Capacity of Input-driven Echo State Networks at the Edge of Chaos
Peter Barancok, Igor Farkas

Competitive Learning and Self-Organisation

Discriminative Fast Soft Competitive Learning
Frank-Michael Schleif

Human Action Recognition with Hierarchical Growing Neural Gas Learning
German Ignacio Parisi, Cornelius Weber, Stefan Wermter

Real-Time Anomaly Detection with a Growing Neural Gas
Nicola Waniek, Simon Bremer, Jorg Conradt

Clustering and Classification

A Non-Parametric Maximum Entropy Clustering
Hideitsu Hino, Noboru Murata

Instance Selection using Two Phase Collaborative Neighbor Representation
Fadi Dornaika

Global Metric Learning by Gradient Descent
Jens Hocke, Thomas Martinetz

Recurrent Networks - Theory

Interactive Evolving Recurrent Neural Networks are Super-Turing Universal
Jérémie Cabessa, Alessandro Villa

Attractor Metadynamics in Adapting Neural Networks
Claudius Gros, Mathias Linkerhand, Valentin Walther

Basic Feature Quantities of Digital Spike Maps
Hiroki Yamaoka, Narutoshi Horimoto, Toshimichi Saito

Trees and Graphs

An Algorithm for Directed Graph Estimation
Hideitsu Hino, Atsushi Noda, Masami Tatsuno, Shotaro Akaho, Noboru Murata

Merging Strategy for Local Model Networks based on the Lolimot Algorithm
Torsten Fischer, Oliver Nelles

Factor Graph Inference Engine on the SpiNNaker Neural Computing System
Indar Sugianto, Jorg Conradt
Poster Session 1

Adaptive Critical Reservoirs with Power Law Forgetting of Unexpected Input Sequences
Norbert Michael Mayer

Classification with Reject Option Using the Self-Organizing Map
Ricardo Sousa, Ajalmar Rocha Neto, Jaime Cardoso, Guilherme Barreto

Leaving Local Optima in Unsupervised Kernel Regression
Daniel Lückehe, Oliver Kramer

High-Dimensional Binary Pattern Classification by Scalar Neural Network Tree
Vladimir Kryzhanovskiy, Magomed Malsagov, Juan Antonio Clares Tomas, Irina Zhelavskaya

On Improving the Classification Capability of Reservoir Computing For Arabic Speech Recognition
Abdulrahman Alalshekmubarak, Leslie Smith

Neural Network Based Data Fusion for Hand Pose Recognition with Multiple ToF Sensors
Alexander Gepperth, Stefan Geisler, Uwe Handmann, Thomas Kopinski

Sparse Single-hidden Layer Feedforward Network for Mapping Natural Language Questions to SQL Queries
Issam Hadj Laradji, Lahouari Ghouti, Faisal Saleh, Musab AlTurki

Towards Context-Dependence Eye Movements Prediction in Smart Meeting Rooms
Redwan Mohammed, Lars Schwabe, Oliver Staadt

Minimizing Computation in Convolutional Neural Networks
Jingsheng Cong, Bingjun Xiao

One-shot Learning with Feedback for Multi-layered Convolutional Network
Kunihiko Fukushima

A Gaussian Process Reinforcement Learning Algorithm with Adaptability and Minimal Tuning Requirements
Jonathan Strahl, Timo Honkela, Paul Wagner

Sensorimotor Control Learning using a New Adaptive Spiking Neuro-Fuzzy Machine, Spike-IDS and STDP
Mohsen Firouzi, Saeed Bagheri Shouraki, Jorg Conradt

Model-based Identification of EEG Markers for Learning Opportunities in an Associative Learning Task with Delayed Feedback
Felix Putze, Daniel Holt, Tanja Schultz, Joachim Funke

Financial Self-Organizing Maps
Marina Resta
**Human-Machine Interaction II**

A neural Dynamic Architecture Resolves Phrases about Spatial Relations in Visual Scenes
Mathis Richter, Jonas Lins, Sebastian Schneegans, Gregor Schönér

Chinese Image Character Recognition Using DNN and Machine Simulated Training Samples
Jinfeng Bai, Zhineng Chen, Bailan Feng, Bo Xu

Polyphonic Music Generation by Modeling Temporal Dependencies Using a RNN-DBN
Kratarth Goel, Raunaq Vohra, J. K. Sahoo

**Theory - Layered Networks**

Mix-Matrix Transformation Method for Max-Cut Problem
Iakov Karandashev, Boris Kryzhanovsky

Complexity of Shallow Networks Representing Functions with Large Variations
Vera Kurkova, Marcello Sanguineti

Visualizing Hierarchical Representation in A Multilayered Restricted RBF Network
Pitoyo Hartono, Paul Hollensen, Thomas Trappenberg

**Keynote Jun Tani**

Self-Organization and Compositionality in Cognitive Brains: A Neuro-Robotics Study

**Deep Networks**

Variational EM Learning of DSBNs with conditional Deep Boltzmann Machines
Xing Zhang, Siwei Lyu

Improving Deep Neural Network Performance by Reusing Features Trained with Transductive Transference
Chetak Kandaswamy, Luis Silva, Luis Alexandre, Jorge Santos, Joaquim Marques de Sa

From Maxout to Channel-Out: Encoding Information on Sparse Pathways
Qi Wang, Joseph JaJa

Contingent Features for Reinforcement Learning
Nathan Sprague

A Non-Stationary Infinite Partially-Observable Markov Decision Process
Sotiris Chatzis, Dimitrios Kosmopoulos

Tool-body Assimilation Model based on Body Babbling and a Neuro-dynamical System for Motion Generation
Kunijuki Takahashi, Tetsuya Ogata, Hadi Tjandra, Shingo Murata, Hiroaki Arie, Shigeki Sugano

**Reinforcement Learning and Action**

Towards Sparsity and Selectivity: Bayesian Learning of Restricted Boltzmann Machine for Early Visual Features
Hanchen Xiong, Sandor Szedmak, Antonio Rodriguez-sanchez, Justus Piater

Improving the Convergence Property of Soft Committee Machines By Replacing Derivative with Truncated Gaussian Function
Kazuyuki Hara, Kentaro Katakura

A Geometrical Approach for Parameter Selection of Radial Basis Functions Networks
Luiz Torres, Andre Lemos, Cristiano Castro, Antônio Braga

Incremental Input Variable Selection by Block Addition and Block Deletion
Shigeo Abe

Improved Adaline Networks for Robust Pattern Classification
César Mattos, Jose Daniel Alencar Santos, Guilherme Barreto

Learning under Concept Drift with Support Vector Machines
Omar AYAD

Two subspace-based Kernel Local Discriminant Embedding
Fadi Domaika, Alireza Bosagzadeh

Control of UPOs of Unknown Chaotic Systems via ANN
Abdelkrim Boukabou

Event-based Visual Data Sets for Prediction Tasks in Spiking Neural Networks

Modeling of Chaotic Time Series by Interval Type-2 NEO-Fuzzy Neural Network
Yancho Todorov, Margarita Terziyska

Bio-mimetic Path Integration Using a Self Organizing Population of Grid Cells
Ankur Sinha, Jack Jianguo Wang

Learning Spatial Transformations using Structured Gain-Field Networks
Jan Kneissler, Martin Butz

Latency-based Probabilistic Information Processing in Recurrent Neural Hierarchies
Alexander Gepperth, Mathieu Lefort
Classifying Spike Patterns by Reward-Modulated STDP  
Brian Gardner, Ioana Sporea, Andre Gruning

Lateral Inhibition Pyramidal Neural Network for Detection of Optical defocus (Zernike Z5)  
Bruno Fernandes, Diego Rativa

Development of a Dynamically Extendable SpiNNaker Chip Computing Module  
Rui Araújo, Nicolai Waniek, Jörg Conradt

The Importance of Physiological Noise Regression in High Temporal Resolution fMRI  
Norman Scheel, Catie Chang, Amir Madany

Development of Automated Diagnostic System for skin Cancer: Performance Analysis of Neural Network Learning Algorithms for Classification  
Ammara Masood, Adel Ali Al-Jumaily, Tariq Adnan

Thu 18 Sept 2014 09:00-10:00  
Hall 221  
Chair: Jörg Conradt

Keynote Yann LeCun  
Title will follow soon

Thu 18 Sept 2014 10:00 - 11:00  
Hall 221  
Chair: Rolf Würtz

Vision - Detection and Recognition  
Structured Prediction for Object Detection in Deep Neural Networks  
Hannes Schulz, Sven Behnke

A Multichannel Convolutional Neural Network for Hand Posture Recognition  
Pablo Barros, Sven Magg, Cornelius Weber, Stefan Wermter

A Two-stage Classifier Architecture for Detecting Objects under Real-world Occlusion Patterns  
Marvin Sruwe, Stephan Hasler, Ute Bauer-Wersing

Supervised Learning - Ensembles  
Dynamic Ensemble Selection and Instantaneous Pruning for Regression used in Signal Calibration  
Kaushala Dias, Terry Windeatt

Global and Local Rejection Option in Multi-classification Task  
Marcin Luckner

Comparative Study of Accuracies on the Family of the Recursive-Rule Extraction Algorithm  
Yoichi Hayashi, Yuki Tanaka, Shota Fujisawa, Tomoki Izawa

Thu 18 Sept 2014 11:30-12:30  
Hall 221  
Chair: Ute Bauer-Wersing

Vision - Invariances and Shape Recovery  
Online Learning of Invariant Object Recognition in a Hierarchical Neural Network  
Markus Leßmann, Rolf P. Würtz

Incorporating Scale Invariance into the Cellular Associative Neural Network  
Nathan Burles, Simon O’Keefe, Jim Austin

Shape from Shading by Model Inclusive Learning with Simultaneously Estimating Reflection Parameters  
Yasuaki Kuroe, Hajimu Kawakami

Thu 18 Sept 2014 14:00-15:00  
Hall 221  
Chair: Shigeo Abe

Keynote Barbara Hammer  
Metric Learning and Model Interpretability

Thu 18 Sept 2014 15:00-16:00  
Hall 221  
Chair: Thomas Martinetz

Vision - Attention and Pose Estimation  
Instance-based Object Recognition with Simultaneous Pose Estimation Using Keypoint Maps and Neural Dynamics  
Oliver Lomp, Kasim Terzić, Christian Faubel, J. M. H. du Buf, Gregor Schöner

How Visual Attention and Suppression Facilitate Object Recognition?  
Frederik Beuth, Amirhossein Jamalian, Fred H. Hamker

Analysis of Neural Circuit for Visual Attention using Lognormally Distributed Input  
Yoshihiro Nagano, Norifumi Watanabe, Atsushi Aoyama

Supervised Learning - Regression  
Fast Sensitivity-Based Training of BP-Networks  
Iveta Mrazova, Zuzana Petrickova

Learning Anisotropic RBF Kernels  
Fabio Aiolli, Michele Donini

Empowering Imbalanced Data in Supervised Learning: A Semi-Supervised Learning Approach  
Bassam Almogahed, Ioannis Kakadiaris

Hall 121  
Chair: Ryohei Nakano

Supervised Learning - Regression  
Fast Sensitivity-Based Training of BP-Networks  
Iveta Mrazova, Zuzana Petrickova

Learning Anisotropic RBF Kernels  
Fabio Aiolli, Michele Donini

Empowering Imbalanced Data in Supervised Learning: A Semi-Supervised Learning Approach  
Bassam Almogahed, Ioannis Kakadiaris

Hall 121  
Chair: Norbert Michael Mayer

Dynamical Models and Time Series  
Coupling Gaussian Process Dynamical Models with Product-of-Experts Kernels  
Dmytro Velychko, Dominik Endres, Nick Taubert, Martin Giese

A Deep Dynamic Binary Neural Network and Its Application to Matrix Converters  
Jungo Moriyasu, Toshimichi Saito

Improving Humanoid Robot Speech Recognition with Sound Source Localisation  
Jorge Dávila Chacón, Johannes Twiefel, Jindong Liu, Stefan Wermter
Neuroscience - Cortical Models

Excitation/inhibition Patterns in a System of Coupled Cortical Columns
Daniel Malagarriga, Alessandro E.P. Villa, Jordi Garcia-Ojalvo, Antonio J. Pons
Self-generated Off-line Memory Reprocessing Strongly Improves Generalization in a Hierarchical Recurrent Neural Network Jenia Jitsev
Lateral Inhibition Pyramidal Neural Networks Designed by Particle Swarm Optimization Alessandra Soares, Bruno Fernandes, Carmelo Bastos-Filho

Supervised Learning - Classification

A CFS-based Feature Weighting Approach to Naïve Bayes Text Classifiers Shasha Wang, Liangxiao Jiang, Chaonan Li
Local Rejection Strategies for Learning Vector Quantization Lydia Fischer, Barbara Hammer, Heiko Wersing
Efficient Adaptation of Structure Metrics in Prototype-based Classification Bassam Mokbel, Benjamin Paassen, Barbara Hammer

Keynote Kevin N. Gurney

Deciding what to do next: Models of Action Selection in the Basal Ganglia at Multiple Levels of Description

Fri 19 Sept 2014 09:00-10:00
Hall 221
Chair: Yulia Sandamirskaya

Neuroscience - Line Attractors and Neural Fields

Flexible Cue Integration by Line Attraction Dynamics and Divisive Normalization Mohsen Firouzi, Stefan Gläsauer, Jorg Conradt
Learning to Look: a Dynamic Neural Fields Architecture for Gaze Shift Generation Christian Bell, Tobias Storck, Yulia Sandamirskaya
Skeleton Model for the Neurodynamics of Visual Action Representations Martin Giese

Applications - Users and Social Technologies

Quantifying the Effect of Meaning Variation in Survey Analysis Henri Sintonen, Juha Raitio, Timo Honkela
Discovery of Spatio-Temporal Patterns from Foursquare by Diffusion-type Estimation and ICA Yoshitatsu Matsuda, Kazunori Yamaguchi, Ken- ichiro Nishioka
Content-Boosted Restricted Boltzmann Machine for Recommendation Yongqi Liu, Qiuli Tong, Zhao Du, Lantao Hu

Fri 19 Sept 2014 11:30-12:30
Hall 221
Chair: Janet Wiles

Applications - Technical Systems

RatSLAM on Humanoids - A Bio-inspired SLAM Model Adapted to a Humanoid Robot Stefan Müller, Cornelius Weber, Stefan Wermter
Precise Wind Power Prediction with SVM Ensemble Regression Justin Heinemann, Oliver Kramer
Neural Network Approaches to Solution of the Inverse Problem of Identification and Determination of Partial Concentrations of Salts in Multi-component Water Solutions Sergey Dolenko, Sergey Burikov, Tatiana Dolenko, Alexander Efitorov, Kirill Gushchin, Igor Persiantsev

Fri 19 Sept 2014 12:30-13:00
Hall 221
Chair: Stefan Wermter

Closing Session