Map of the Main Venues

24th International Conference on Artificial Neural Networks
ICANN 2014
15-19 September 2014
Hamburg, Germany
Organization

General Chair

Stefan Wermter Hamburg, Germany

Program Co-Chairs

Wlodzislaw Duch Torun, Poland, ENNS Past-President
Timo Honkela Helsinki, Finland
Petia Koprinkova-Hristova Sofia, Bulgaria
Günther Palm Ulm, Germany
Alessandro E.P. Villa Lausanne, Switzerland, ENNS President
Cornelius Weber Hamburg, Germany

Local Organising Committee Chairs (Hamburg, Germany)

Sven Magg Johannes Bauer
Jorge Dávila-Chacón Stefan Heinrich
Doreen Jirak Katja Kösters
Erik Strahl

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**Fri 19 Sept 2014 11:30-12:30**

**Hall 221**

Chair: Alessandro Villa

**Neuroscience - Spiking and Single Cell Models**

Factors Influencing Polychronous Group Sustainability as a Model of Working Memory
Panagiotis Ioannou, Matthew Casey, Andre Gruning

Pre- and Postsynaptic Properties Regulate Synaptic Competition through Spike-Timing-Dependent Plasticity
Hana Ito, Katsunori Kitano

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**Hall 121**

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 Heinermann, Oliver Kramer

Location-dependent Dendritic Computation in a Modeled Striatal Projection Neuron
Youwei Zheng, Lars Schwabe, Joshua Plotkin

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**Fri 19 Sept 2014 12:30-13:00**

**Hall 221**

Chair: Stefan Wermter

**Closing Session**
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. Verschure, 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
## Program

### Tue 16 Sept 2014

| 09:00  | Registration                  |
| 10:00  | Opening Session               |
| 11:00  | Coffee Break                  |
| 11:30  | Recurrent Networks - ESNs     |
| 12:30  | Lunch Break                   |
| 14:00  | Keynote Christopher Bishop    |
| 15:00  | Recurrent Networks - Theory   |
| 16:00  | Coffee Break                  |
| 16:20  | Poster Spotlights 1 and Demonstrations |
| 17:00  | Posters and Demonstrations   |
| 18:00  | Welcome Reception             |

### Wed 17 Sept 2014

| 09:00  | Keynote Paul Verschure        |
| 10:00  | Recurrent Networks - Sequence Learning |
| 11:00  | Competitive Learning and Self-Organisation |
| 11:30  | Human Machine Interaction I   |
| 12:30  | Theory - Optimisation         |
| 14:00  | Keynote Jun Tani              |
| 15:00  | Recurrent Networks - Theory   |
| 16:00  | Coffee Break                  |
| 16:20  | Poster Spotlights 2           |
| 17:00  | Posters                      |
| 18:00  | ENNS Board Meeting led by Alessandro Villa |

### 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

**Supervised Learning - Regression**
- Fast Sensitivity-Based Training of BP-Networks
  - Iveta Mrazova, Zuzana Petrickova
- Learning Anisotropic RBF Kernels
  - Fabio Aiolli, Michele Donini
- Shape from Shading by Model Inclusive Learning with Simultaneously Estimating Reflection Parameters
  - Yasuaki Kuroe, Hajimu Kawakami
- Empowering Imbalanced Data in Supervised Learning:
  - A Semi-Supervised Learning Approach
  - Bassam Almogahed, Ioannis Kakadiaris

#### 14:00-15:00

**Hall 221**

**Chair: Shigeo Abe**

**Keynote Barbara Hammer**
- Metric Learning and Model Interpretability

#### 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

**Dynamical Models and Time Series**
- Coupling Gaussian Process Dynamical Models with Product-of-Experts Kernels
  - Dmytro Velychko, Dominik Endres, Nick Taubert, Martin Giese
- How Visual Attention and Suppression Facilitate Object Recognition?
  - Frederik Beuth, Amirhossein Jamalain, Fred H. Hamker
- A Deep Dynamic Binary Neural Network and Its Application to Matrix Converters
  - Jungo Moriyasu, Toshimichi Saito
- Analysis of Neural Circuit for Visual Attention using Lognormally Distributed Input
  - Yoshihiro Nagano, Norifumi Watanabe, Atsushi Aoyama
- Improving Humanoid Robot Speech Recognition with Sound Source Localisation
  - Jorge Dávila Chacón, Johannes Twiefel, Jindong Liu, Stefan Wermter
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, Jorg 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 Struwe, Stephan Hasler, Ute Bauer-Worsing

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

Fri 19 Sept 2014

Keynote Kevin Gurney

Vision - Detection and Recognition
Supervised Learning - Ensembles
Neuroscience - Line Attractors and Neural Fields
Applications - Users and Social Technologies

Vision - Invariances and Shape Recovery
Supervised Learning - Regression
Neuroscience - Spiking and Single Cell Models
Applications - Technical Systems

Break

Vision - Attention and Pose Estimation
Dynamical Models and Time Series

Neuroscience - Cortical Models
Supervised Learning - Classification

Mon 15 Sep 2014
18:00-19:00
Registration

Events in Lecture Hall 221

Events in Lecture Hall 121

Special Session on Human-Machine Interaction chaired by Doreen Jirak

Conference Dinner

Lecture Halls are in Building ESA1-West, Edmund-Siemers-Allee 1, Hamburg
Detailed Program

Tue 16 Sept 2014 09:30-10:00
Hall 221

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

Tue 16 Sept 2014 10:00 - 11:00
Hall 221
Chair: Timo Honkela

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 Speckermann, Siegmund Düll, Steffen Udluft, Thomas Runkler

Chair: Marina Resta

Competitive Learning and Self-Organisation

Discriminative Fast Soft Competitive Learning
Frank-Michael Schlief

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
Nicolai Waniek, Simon Bremer, Jorg Conradt

Wed 17 Sept 2014 16:20-18:00
Hall 221 and Foyer
Chair: Cornelius Weber

Poster Session 2

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 Katahira

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

Sampling Hidden Parameters from Oracle Distribution
Sho Sonoda, Noboru Murata

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 Kneiessler, Martin Butz

Latency-based Probabilistic Information Processing in Recurrent Neural Hierarchies
Alexander Gepperth, Mathieu Lefort
**Human-Machine Interaction II**

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

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

**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 Wermer

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

**Deep Networks**

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

**Reinforcement Learning and Action**

Contingent Features for Reinforcement Learning
Nathan Sprague

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

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

**Recurrent Networks - Theory**

Interactive Evolving Recurrent Neural Networks are Super-Turing Universal
Jerémie 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
Hidetsu Hino, Atsushi Node, Masami Tatsuno, Shotaro Akaho, Noboru Murata

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

Factor Graph Inference Engine on the SpiNaker 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 Schultze, Joachim Funke

Financial Self-Organizing Maps
Marina Resta

Demonstrations

Entrepreneurship Support Based on Mixed Bio-Artificial Neural Network Simulator (ESBBANN)
Eugenio M. Fedriani, Manuel Chaves-Maza

Live Demonstration: Real-Time Motor Rotation Frequency Detection by Spike-based Visual and Auditory Sensory Fusion on AER and FPGA
Antonio Rios-Navarro, Angel Jimenez-Fernandez, Elena Cerezuela-Escudero, Manuel Rivas, Gabriel Jimenez-Moreno, Alejandro Linares-Barranco

Keynote Paul F.M.J. Verschure

A Biologically Grounded Architecture for a Social Robot: Distributed Adaptive Control and the iCub

Human-Machine Interaction I

Human Activity Recognition on Smartphones With Awareness of Basic Activities and Postural Transitions
Jorge Luis Reyes Ortiz, Luca Oneto, Alessandro Ghio, Albert Samà, Davide Anguita, Xavier Parra

sNN-LDS: Spatio-temporal Non-negative Sparse Coding for Human Action Recognition
Thomas Guthier, Adrian Sosic, Volker Willert, Julian Eggert

Interactive Language Understanding with Multiple Timescale Recurrent Neural Networks
Stefan Heinrich, Stefan Wermter

Theory - Optimisation

Row-action Projections for Nonnegative Matrix Factorization
Rafal Zdunek

Structure Perturbation Optimization for Hopfield-type Neural Networks
Gang Yang, Xirong Li, JePing XU, Qin Jin

Complex-valued Multilayer Perceptron Search Utilizing Singular Regions of Complex-valued Parameter Space
Seiya Satoh, Ryohel Nakano