

8th Annual International Conference on Biologically Inspired Cognitive Architectures (BICA 2017)

Procedia Computer Science Volume 123

Moscow, Russia
1 – 6 August 2017

Editors:

**Alexei V. Samsonovich
Valentin V. Klimov**

ISBN: 978-1-5108-5744-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com



Table of Contents

Laboratory Approbation of a New Approach for Contrast Enhancement of Human Face Thermal Image Based on Selective Multifunction Pixel Brightness Conversion Function	1
<i>Mikhail Alyushin, Alexander Alyushin and Lyubov Kolobashkina</i>	
Development of a Metrological Database with Images of a Human Face in the Infrared Range to Evaluate the Effectiveness of Biometric Algorithms	7
<i>Mikhail Alyushin and Lyubov Kolobashkina</i>	
Laboratory Approbation of the Algorithm for Isolating People’s Faces on a Thermal Infrared Image in the Case of their Quasi-Stationary Arrangement in a Room	12
<i>Mikhail Alyushin, Lyubov Kolobashkina and Alexander Alyushin</i>	
Optimization of the Data Representation Integrated Form in the Viola-Jones Algorithm for a Person’s Face Search	18
<i>Mikhail Alyushin, Lyubov Kolobashkina and Victor Alyushin</i>	
Natural Language Oral Communication in Humans under Stress. Linguistic Cognitive Coping Strategies for Enrichment of Artificial Intelligence	24
<i>Valentina Anikushina, Victor Taratukhin and Christiane von Stutterheim</i>	
Discussion on the Rise of the Self in a Conscious System	29
<i>Kensuke Arai and Junichi Takeno</i>	
Discussion on explicit consciousness, sub-consciousness, and self-awareness in a conscious system	35
<i>Soichiro Arai and Junichi Takeno</i>	
Simulating the Usage Acquisition of Two-Word Sentences with a First- or Second-Person Subject and Verb	41
<i>Naoya Arakawa</i>	
Comparative study of semantic mapping of images	47
<i>Julia A. Arinchekhina, Vyacheslav Orlov, Alexei V. Samsonovich and Vadim L. Ushakov</i>	
Methodology for the Development of Dictionaries for Automated Classification System	57
<i>Alexey Artamonov, Dmitry Kshnyakov, Valeriya Danilova, Ilya Galin and Andrey Cherkasskiy</i>	

Social signs processing in a cognitive architecture for an humanoid robot. <i>Agnese Augello, Emanuele Cipolla, Ignazio Infantino, Adriano Manfredi, Giovanni Pilato and Filippo Vella</i>	63
A bioinspired model of early visual processing with hue-feature saliency for a cognitive architecture <i>Cynthia Avila-Contreras, Félix Ramos, Daniel Madrigal and Juan Luis Del Valle-Padilla</i>	69
A Virtual Actor with Social-Emotional Intelligence <i>Daniil A. Azarnov, Arthur A. Chubarov and Alexei V. Samsonovich</i>	76
Neural Network Prediction of Daily Relativistic Electrons Fluence in the Outer Radiation Belt of the Earth: Selection of Delay Embedding Method <i>Roman Batusov, Sergey Dolenko and Irina Myagkova</i>	86
The Correlation between EEG Signals as Measured in Different Positions on Scalp Varying with Distance <i>Ronakben Bhavsar, Yi Sun, Na Helian, Neil Davey, David Mayor and Tony Steffert</i>	92
Strong Semantic Computing – a BICA framework <i>Piotr Boltuc</i>	98
Looking at faces in the wild <i>Eugene Borovikov, Szilard Vajda, Michael Bonifant and Michael Gill</i>	104
Cryptographic Wireless Communication Device <i>Aleksander Boruchinkin, Anastasia Tolstaya and Arseniy Zhgilev</i>	110
The All-Pervasiveness of the Blockchain Technology <i>Dmitry Efanov and Pavel Roschin</i>	116
Study of Efficiency of Dividing the Problem Space as a Means to Improve Solution of Multi-parameter Inverse Problem by Adaptive Methods <i>Alexander Efitorov, Tatiana Dolenko, Sergey Burikov, Kirill Laptinskiy and Sergey Dolenko</i>	122
GPU-based high-performance computing of multichannel EEG phase wavelet synchronization <i>Alexander Efitorov, Irina Knyazeva, Yulia Boytsova and Sergey Danko</i>	128
Semi-empirical Neural Network Based Approach to Modelling and Simulation of Controlled Dynamical Systems <i>Mikhail Egorchev and Yury Tiumentsev</i>	134

Analyzing Weak Semantic Map of Word Senses	140
<i>Alexander A. Eidlin, Maria A. Eidlina and Alexei V. Samsonovich</i>	
The Decision-Making System for a Multi-Channel Robotic Device Control	149
<i>Alexander Gridnev, Timofei Voznenko and Eugene Chepin</i>	
An Overview of the Multipurpose Enhanced Cognitive Architecture (MECA)	155
<i>Ricardo Gudwin, André Luis Paraense, Suelen Mapa de Paula, Eduardo Fróes, Wandemberg Gibaut, Elisa Castro, Vera Figueiredo and Klaus Raizer</i>	
The analysis of modern methods for video authentication	161
<i>Pavel Gusev and Georgii Borzunov</i>	
A Cognitive Architecture Consisting of Human Intelligence Factors	165
<i>Ryutaro Ichise</i>	
Training with Noise Addition in Neural Network Solution of Inverse Problems: Procedures for Selection of the Optimal Network	171
<i>Igor Isaev and Sergey Dolenko</i>	
Neural Network Solution of an Inverse Problem in Raman Spectroscopy of Multi-Component Solutions of Inorganic Salts: Group Determination as a Method to Increase Noise Resilience of the Solution	177
<i>Igor Isaev, Ekaterina Vervalde, Olga Sarmanova and Sergey Dolenko</i>	
Basic constructions of the computational model of support for access operations to the semantic network	183
<i>Larisa Ismailova, Sergey Kosikov and Viacheslav Wolfengagen</i>	
Semantic Filtering of Exemplar Queries	189
<i>Larisa Ismailova, Sergey Kosikov, Viacheslav Wolfengagen, Anatolii Zaytsev and Irina Aleksandrova</i>	
Means for ensuring compatibility of heterogeneous data models in an interactive visualization environment	195
<i>Larisa Ismailova, Viacheslav Wolfengagen, Sergey Kosikov, Irina Parfenova and Iliya Nikulin</i>	
Non-Binary Pseudorandom Number Generators For Information Security Purposes	203
<i>M.A. Ivanov, E.B. Roslyj, A.V. Starikovskiy, S.A. Krasnikova, N.A. Shevchenko and L.I. Shustova</i>	
Designing a Creative Assistant of a Designer	212
<i>Elizaveta D. Karkh and Alexei V. Samsonovich</i>	

Human-like Emotional Responses in a Simplified Independent Core Observer Model System	221
<i>David Kelley and Mark Waser</i>	
Automatic Fuzzy Cognitive Map Building Online System	228
<i>Vasilii S. Kireev, Ivan S. Smirnov and Victor S. Tyunyakov</i>	
Overview of different approaches to solving problems of Data Mining	234
<i>Vadim Kochetov</i>	
Architecture of Internet Agent with Social Awareness	240
<i>Anton Kolonin</i>	
The Typing System to Provide Compositional Thinking About Data Flows	246
<i>Sergey Kosikov, Viacheslav Wolfengagen and Larisa Ismailova</i>	
Neural network based semi-empirical models for dynamical systems represented by differential-algebraic equations of index 2	252
<i>Dmitry Kozlov and Yury Tiumentsev</i>	
Semantic-Map-Based Approach to Designing an Insight Problem Solving Assistant	258
<i>Ksenia Kuznetsova and Alexei V. Samsonovich</i>	
Simulation of the Cognitive Process in Looking at Rubin's Vase	265
<i>Daiki Matsumoto, Hanwen Xu and Junichi Takeno</i>	
Text clustering as graph community detection	271
<i>Elizaveta Mikhina and Vsevolod Trifalencov</i>	
Remote Attacks Taxonomy and their Verbal Indicators	278
<i>Natalia Miloslavskaya</i>	
A DIKW Architecture for Cognitive Engineering	285
<i>Amit Kumar Mishra</i>	
ICABiDAS: Intuition Centred Architecture for Big Data Analysis and Synthesis	290
<i>Amit Kumar Mishra</i>	
Modeling emotion and inference as a value calculation system	295
<i>Masahiro Miyata and Takashi Omori</i>	
Proposal of a Deep Q-network with Profit Sharing	302
<i>Kazuteru Miyazaki</i>	
Whole brain connectomic architecture to develop general artificial intelligence	308
<i>Haruo Mizutani, Michihiko Ueno, Naoya Arakawa and Hiroshi Yamakawa</i>	

Context-Dependent Robust Text Recognition using Large-scale Restricted Bayesian Network	314
<i>Hidemoto Nakada and Yuuji Ichisugi Ichisugi</i>	
Control of an agent in the multi-goal environment with homeostasis-based neural network	321
<i>Oleg Nikitin and Olga Lukyanova</i>	
Some features of eye movements during reading and retelling the text by people with stuttering	328
<i>Olga Mishulina, Olga Skripko and Anastasia Korosteleva</i>	
Physiological noise reduction algorithms for fMRI data	334
<i>Vyacheslav Orlov, Victoria Zinchenko, Vadim Ushakov and Boris Velichkovsky</i>	
The Functional Plausibility of Topologically Extended Models of RBMs as Hippocampal Models	341
<i>Masahiko Osawa and Michita Imai</i>	
Grid Path Planning with Deep Reinforcement Learning: Preliminary Results	347
<i>Aleksandr I. Panov, Konstantin S. Yakovlev and Roman Suvorov</i>	
Dynamics of Information Images in the Mind of an Individual during Simultaneous Interpretation	354
<i>Alexandr Petukhov and Sophia Polevaya</i>	
Data-driven Social Mood Analysis through the Conceptualization of Emotional Fingerprints	360
<i>Giovanni Pilato and Ernesto D'Avanzo</i>	
Functional Plasticity in a Recurrent Neurodynamic Model: from Gradual to Trigger Behavior	366
<i>Yury Prostov and Yury Tiumentsev</i>	
Molecular Associative Memory with Spatial Auto-logistic Model for Pattern Recall	373
<i>Dharani Punithan and Byoung-Tak Zhang</i>	
Model of Collective Behavior of Investors and Producers in Decentralized Economic System	380
<i>Vladimir Redko and Zarema Sokhova</i>	
Architecture for Modular Type System for Information Systems Based on Relational-Applicative Technologies	386
<i>Vladimir Rosloutsev</i>	

Building Semantic Technologies Based on Relational-Applicative Foundations	393
<i>Vladimir Roslovtssev</i>	
Building Sense Tagged Corpus Using Wikipedia for Supervised Word Sense Disambiguation	403
<i>Abdulgabbbar Saif, Nazli Omar and Mohd Juziaddin Ab Aziz</i>	
Impulse X-ray spectrometer based on the thermoluminescent detectors . . .	413
<i>Gayar Salakhutdinov and Irina Grigoryeva</i>	
Automatic gender identification of author of Russian text by machine learning and neural net algorithms in case of gender deception	417
<i>Alexandr Sboev, Ivan Moloshnikov, Dmitry Gudovskikh, Anton Selivanov, Roman Rybka and Tatiana Litvinova</i>	
Deep Learning neural nets versus traditional machine learning in gender identification of authors of RusProfiling texts	424
<i>Alexandr Sboev, Ivan Moloshnikov, Dmitry Gudovskikh, Anton Selivanov, Roman Rybka and Tatiana Litvinova</i>	
To the role of the choice of the neuron model in spiking network learning on base of Spike-Timing-Dependent Plasticity	432
<i>Alexandr Sboev, Roman Rybka, Alexey Serenko, Danila Vlasov, Nikolay Kudryashov and Vyacheslav Demin</i>	
Information transfer between rich-club structures in the human brain . . .	440
<i>Maksim Sharaev, Vyacheslav Orlov, Vadim Ushakov and Boris Velichkovsky</i>	
Semantic-Map-Based Assistant for Creative Text Generation	446
<i>Andrei Shedko</i>	
Testing the capsular endoscopic complex "Landish"	451
<i>Aleksander Smirnov</i>	
Text Messages Protection System	457
<i>Andrey Starikovskiy, Arseniy Zhgilev and Nadezhda Shevchenko</i>	
Discussion of Stalking Behavior Using a Conscious System	467
<i>Tomoya Sumioka and Junichi Takeno</i>	
Simulation of serotonin mechanisms in NEUCOGAR cognitive architecture	473
<i>Max Talanov, Fail Gafarov, Jordi Vallverdú, Sergey Ostapenko, Marat Gazizov, Alexander Toshev, Alexey Leukhin and Salvatore Distefano</i>	
Towards a socio-inspired multiagent approach for new generation of product life cycle management	479
<i>Victor Taratukhin and Yulia Yadgarova</i>	

A Greedy Feature Selection Algorithm for Brain-Computer Interface Classification Committees	488
<i>Alexander G. Trofimov, Sergei L. Shishkin, Bogdan L. Kozyrskiy and Boris M. Velichkovsky</i>	
Solving a classification task by spiking neurons with STDP and temporal coding	494
<i>Danila Vlasov, Alexandr Sboev, Alexey Serenko and Roman Rybka</i>	
Human-like Prototypes for Psychologically Inspired Knowledge Representation	501
<i>Alisa Volkert, Stefanie Mueller and Alexandra Kirsch</i>	
Inference algorithm for teams of robots using local interaction	507
<i>Vitaly Vorobiev</i>	
A conceptually different approach to the empirical test of Alan Turing ...	512
<i>Ilya S. Vorobyev and Alexei V. Samsonovich</i>	
The Control System Based on Extended BCI for a Robotic Wheelchair ..	522
<i>Timofei Voznenko, Eugene Chepin and Gleb Urvanov</i>	
The Experimental Study of 'Unwanted Music' Noise Pollution Influence on Command Recognition by Brain-Computer Interface	528
<i>Timofei Voznenko, Alexander Dyumin, Evgeniya Aksenova, Alexander Gridnev and Vladislav Delov</i>	
Sensory Integration Model of Pedestrian by Vection and Somatosensory Stimulation	534
<i>Norifumi Watanabe and Fumihiko Mori</i>	
Model of conversion of data objects for defining the object-relation mapping	541
<i>Viacheslav E. Wolfengagen, Larisa Yu. Ismailova and Sergey V. Kosikov</i>	
Bio-inspired Approach for Automatic Speaker Clustering Using Auditory Modeling and Self-Organizing Maps	547
<i>Anton Yakovenko and Galina Malykhina</i>	
Toward a Virtual Composer Assistant	553
<i>Roman Yakupov, Yana Buravenkova, Alexei V. Samsonovich and Evgeniya Stepanskaya</i>	
Time Series Analysis Based on Modular Architectures of Neural Networks	562
<i>Sergey Yarushev and Alexey Averkin</i>	

About using of AI to choosing a refueling channel and manipulating control rods in RBMK-type reactor	568
<i>Andrey M. Zagrebaev, Rustem N. Ramazanov and Andrey V. Trifonenkov</i>	
Self-modeling in Hopfield Neural Networks with Continuous Activation Function	573
<i>Mario A. Zarco-López and Tom Froese</i>	
Joint Goal Human Robot collaboration-From Remembering to Inferring	579
<i>Vishwanathan Mohan and Ajaz Ahmad Bhat</i>	