

2019 IEEE International Conference on Advanced Trends in Information Theory (ATIT 2019)

**Kyiv, Ukraine
18 – 20 December 2019**



**IEEE Catalog Number: CFP19ATI-POD
ISBN: 978-1-7281-6145-7**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP19ATI-POD
ISBN (Print-On-Demand):	978-1-7281-6145-7
ISBN (Online):	978-1-7281-6144-0

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
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

CONTENS

Source Coding and Data Compression

- Olena Kapustian, Oleksandr Nakonechnyi*
1. Approximate Estimation of Functionals of the Solutions of Parabolic Equation under Nonlinearity in Output **16**
- Oleksandr Yudin, Yuliia Boiko, Ruslana Ziubina, Serhii Buchyk, Vitaly Tverdokhle, Svitlana Beresina*
2. Data Compression Based on Coding Methods With a Controlled Level of Quality Loss **22**
- Victoriya Himenko, Albert Lekakh, Victoria Dymchuk, Natalia Korolyova, Dmytro Zhuikov, Roman Puhachov*
3. Decoding technology for compressed videodata in infocommunication systems **27**
- Vladimir Barannik, Yuriy Ryabukha, Anton Sorokun, Anna Hahanova, Maksym Parkhomenko, Oleksandr Dodukh*
4. Developing A Method Of Composing Key Components Of A Video Image Based On The Integration Of Their Code Structures **31**
- Oleksandr Yudin, Ruslana Ziubina, Serhii Buchyk, Oleg Frolov, Olha Suprun, Natalia Barannik*
5. Efficiency Assessment of the Steganographic Coding Method with Indirect Integration of Critical Information **36**
- Dmitry Barannik, Fustii Vadym, Vitaliy Tverdokhle, Oleksandr Slobodyanyuk, Dmytro Havrylov, Igor Shevchenko*
6. Evaluation the Potential Performance of the DCT- Transformants Non-Equilibrium Positional Encoding Method **41**
- Victor Krasnobaev, Victoria Popenko, Tetiana Kuznetsova, Kateryna Kuznetsova*
7. Examples of Usage of Method of Data Errors Correction which are Presented by the Residual Classes **45**
- Oleksandr Lefterov, Oleg Naguliak, Iryna Natreba, Serhii Radchenko, Oleksandr Sudakov, Yuri Suleimanov*
8. Processing Technique of Weighted Data to Improve Assessment of Latent Information **51**
- Dmitriy Klyushin*
9. Randomness of Quantum Random Bit Generators **56**
- Veda Kasianiuk, Petro Kuliabko, Vasyl Tereshchenko, Yaroslav Tereshchenko*
10. Refactoring as a Technique for Transformation IMS-Queries into SQL-Queries **62**

- Hanna Ukhina, Valerii Sytnikov, Pavel Stupen, Oleh Strelcov, Iryna Yakovleva*
11. Signal Processing in the Restructuring of a Computer System Bandpass Frequency-Dependent Component to Eliminate the Internal Combustion Engine Detonation **66**
- Anatoly V. Anisimov, Igor O. Zavadskyi*
12. Splittable Data Compression Codes **71**
- Oleksandr Nakonechnyi, Anatoliy Pashko, Olena Kapustian, Taras Zinko, Iuliia Shevchuk*
13. Statistical Simulation of the Information Warfare **75**
- Victor Krasnobaev, Sergey Koshman, Anna Kononchenko, Kateryna Kuznetsova, Tetiana Kuznetsova*
14. The Formulation and Solution of the Task of the Optimum Reservation in the System of Residual Classes **81**
- Volodymyr Osadchyy, Yevgen Osadchyy, Vasyl Tereshchenko, Oleksandr Derevianchenko, Oleh Horbunov*
15. Transformer timer coding technology **85**
- Vladimir Barannik, Ivan Tupitsya, Iryna Gurzhii, Valeriy Barannik, Sergy Sidchenko, Oleg Kulitsa*
16. Two-Hierarchical Scheme of Statistical Coding of Information Resource Data with Quantitative Clustering **89**
- Anatoly V. Anisimov, Andrey Novokshonov*
17. Verifiable Arithmetic Computations Using Additively Homomorphic Tags **93**

Network Information Theory

- Oleksandra Aleksandrova, Yevgen Bashkov*
1. 3D face model reconstructing from its 2D images using neural networks **98**
- Andrii Sobchuk, Yurii Kravchenko, Maksym Tyshchenko, Piotr Gawliczek, Olesia Afanasyeva*
2. Analytical aspects of providing a feature of the functional stability according to the choice of technology for construction of wireless sensor networks **102**
- R. Tovkach, Yu. Kharkevych, I. Kal'chuk*
3. Application of a Fourier series for an analysis of a network signals **107**
- Olena Starkova, Kostiantyn Herasymenko, Sergii M. Korotin, Volodymyr Afanasiev, Anastasiia Lisnyk*
4. Development of recommendations for ensuring security in a corporate network **111**
- Olexandr Laptiev, German Shuklin, Spartak Hohonians, Amina Zidan, Ivanna Salanda*
5. Dynamic model of cyber defense diagnostics of information systems with the use of fuzzy technologies **116**

	<i>Yuri Kravchenko, Olga Leshchenko, Nataliia Dakhno, Oleksandr Trush, Oleksandr Makhovych</i>	
6.	Evaluating the effectiveness of cloud services	120
	<i>Olena Verenysh, Sergiy Bezshapkin, Ihor Vasyliev, Danylo Verenysh</i>	
7.	GIS-technologies using for spatial data analyse of the road traffic accidents on the example of Kyiv	125
	<i>Galina Kirichek, Dmytro Kyrychek, Svitlana Hrushko, Artur Timenko</i>	
8.	Implementation the protection method of data transmission in network	129
	<i>Volodymyr Saiko, Volodymyr Domrachev, Dmitry Gololobov</i>	
9.	Improving the noise immunity of the inter-satellite communication line of the leo-system with the architecture of the "distributed satellite"	133
	<i>Heorhii Loutskii, Artem Volokyta, Pavlo Rehida, Oleksandr Honcharenko, Bohdan Ivanishchev, Artem Kaplunov</i>	
10.	Increasing the fault tolerance of distributed systems for the Hyper de Bruijn topology with excess code	137
	<i>Anatoliy Rokochinskiy, Pavlo Volk, Lyudmyla Kuzmych, Vasyl Turcheniuk, Liubov Volk, Andriy Dudnik</i>	
11.	Mathematical Model Of Meteorological Software For Systematic Flood Control In The Carpathian Region	143
	<i>Kryvyi S. L., Pogorilyy S. D., Boyko Y.V.</i>	
12.	Network Model Of IT-Infrastructure Resource Management	149
	<i>Serhii Kovbasiuk, Mykhailo Rakushev, Oleksandr Permiakov, Oleksandr Lavrinchuk</i>	
13.	Outer Space Monitoring System: Purpose, Tasks, Structure and approaches to trajectory processing	154
	<i>Vitalii Tkachov, Maksym Bondarenko, Oleg Ulyanov, Oleksandr Reznichenko</i>	
14.	Overlay Network Infrastructure for Remote Control of Radio Astronomy Observatory	161
	<i>Alexandr Kuznetsov, Kyryl Shekhanin, Andrii Kolhatin, Diana Kovalchuk, Vitalina Babenko, Iryna Perevozova</i>	
15.	Performance of Hash Algorithms on GPUs for Use in Blockchain	166
	<i>Pavel V. Openko, Spartak Yu. Hohoniants, Olena V. Starkova, Kostiantyn V. Herasymenko, Mykola I. Yastrebov, Andrii O. Prudchenko</i>	
16.	Problem of choosing a DBMS in modern information systems	171

- Volodymyr Andrushchak, Mykola Kaidan, Taras Maksymyuk, Mykhailo Klymash*
17. Smart Payload Management in Edge Nodes of Optical Label Switching Networks **175**
- Vadym Mukhin, Yaroslav Kornaga, Valerii Zavgorodnii, Anna Zavgorodnya, Oksana Herasymenko, Oleg Mukhin*
18. Social Risk Assessment Mechanism Based on the Neural Networks **179**
- Viktor Bondarenko*
19. Subjective-probability approach to design an expert system for assessment of states of complex systems in conditions of non-regular destructive influences **183**
- Oleksandr Kurbatov, Pavel Kravchenko, Nikolay Poluyanenko, Oleksiy Shapoval, Tetiana Kuznetsova*
20. Using Ring Signatures For An Anonymous E-Voting System **187**
- Oleksandr Pliushch, Viktor Vyshnivskiy, Serhii Toliupa, Anatolii Rybydajlo*
21. Utilization of Clipper Circuits to Improve Efficiency of the Gradient Signal Processing Algorithm for Adaptive Antenna Arrays **191**

Information Theory and Technologies security

- Ievgeniia Kuzminykh, Maryna Yevdokymenko*
1. Analyses of Security of Rootkit Detection Methods **196**
- Serhey Lienkov, Genadiy Zhyrov, Ihor Pampukha, Ivan Chetverikov*
2. Block Encryption Algorithm for Digital Information Using Open Keys for Selfgeneration of Closed Random Private Keys **200**
- Alexandr Kuznetsov, Anastasiia Kiian, Yurii Gorbenko, Oleksii Smirnov, Oleksandr Cherep, Liliia Bexhter*
3. Code-based Pseudorandom Generator for the Post-Quantum Period **204**
- Oleksandr Lemeshko, Oleksandra Yeremenko, Maryna Yevdokymenko, Batoul Sleiman*
4. Enhanced Solution of the Disjoint Paths Set Calculation for Secure QoS Routing **210**
- Yurii Sarychev*
5. Information support is an integral part public administration systems: essence and meaning **214**
- Tamara Radivilova, Lyudmyla Kirichenko, Dmytro Ageyev, Maksym Tawalbeh, Vitalii Bulakh, Petro Zinchenko*
6. Intrusion Detection Based on Machine Learning Using Fractal Properties of Traffic Realizations **218**
- Serhii Toliupa, Liudmyla Tereikovska, Oleksandr Korystin, Denys Chernyshev, Ihor Tereikovskiy*
7. Low-Resource Convolution Neural Network For Keyboard Recognition Of The User **222**

<i>Ihor Tereikovskiy, Ihor Subach, Oleh Tereikovskiy, Liudmyla Tereikovska, Serhii Toliupa, Volodymyr Nakonechnyi</i>	
8.	Parameter Definition for Multilayer Perceptron Intended for Speaker Identification 227
<i>Alexandr Kuznetsov, Anastasiia Kiian, Kateryna Kuznetsova, Mihael Zub, Yevhena Zaburmekha, Elena Lyshchenko</i>	
9.	Pseudorandom Sequences with Multi-Level Correlation Function for Direct Spectrum Spreading 232
<i>D. Mogylevych, I. Kononova, B. Kredentser, O. Oksiuk</i>	
10.	Reliability of Redundant Telecommunications Equipment Advanced Model Considering Failures and Refusals of Structure Elements 238
<i>Bogdan Korniyenko, Liliya Galata, Lesya Ladieva</i>	
11.	Research of Information Protection System of Corporate Network Based on GNS3 244
<i>Valeriy Lakhno, Yurii Matus, Volodymyr Malyukov, Alyona Desyatko, Tetyana Hnatchenko</i>	
12.	Smart City Cybersecurity Projects Financing Model In Case Of Description Of Investors' Resources With Fuzzy Sets 249
<i>Oleksii Bychkov, Kateryna Merkulova, Yelyzaveta Zhabska</i>	
13.	Software Application for Biometrical Person's Identification by Portrait Photograph Based on Wavelet Transform 253
<i>Petro Snitsarenko, Volodymyr Nakonechnyi, Yurii Mikhieiev, Vitalii Hrytsiuk</i>	
14.	The approach to automated internet monitoring system creation 257
<i>Oleksandr Yudin, Yaroslav Symonychenko, Anna Symonychenko</i>	
15.	The method of detection of hidden information in a digital image using steganographic methods of analysis 262
<i>Vladimir Barannik, Tatyana Belikova, Pavlo Gurzhii</i>	
16.	The Model of Threats to Information and Psychological Security, Taking into Account the Hidden Information Destructive Impact on the Subconscious of Adolescents 267
<i>Lada Slipachuk, Volodymyr Nakonechnyi</i>	
17.	Typology of the Model of Integrated Sectoral Information System of the National Cyber Security Management 271
<i>Svitlana Popereshniak</i>	
18.	The Testing of Pseudorandom Sequence of Small Length as a Component of the Internet of Things Security 277

Information Theory in Computer Science

- Pursky Oleg, Selivanova Anna, Kharchenko Oleksandr, Demidov Pavlo, Kulazhenko Volodymyr*
1. Architecture Development for Web-based E-trade Management System **283**
- Eduard Zharikov, Sergii Telenyk, Oleksandr Rolik, Yevhenii Serdiuk*
2. Cloud resource management with a hybrid virtual machine consolidation approach **289**
- Svitlana Popereshnyak, Anastasiya Vecherkovskaya*
3. Information Model Development by the Polypropylene Filtering Elements Forming Technological Process Description **295**
- Valentyna Pleskach, Maria Pleskach, Olena Zelikovska*
4. Information security management system in distributed information systems **300**
- Tetiana Zatonatska, Olha Fedirko*
5. Modeling of the e-commerce impact on the employment in EU **304**
- Igor Panasiuk, Liudmyla Akimova, Olena Kuznietsova*
6. Modelling and Simulation Of The Thermal Performance Of Metal Framed Walls **309**
- Dmytro Zatonatskiy, Tetiana Dluhopolska, Oleksandr Rozhko, Nataliia Tkachenko, Tetiana Stechyshyn, Olga Metlushko*
7. Modern information technologies in HRM: concept of personnel security **313**
- Oleksandr Rolik, Valerii Kolesnik, Volodymyr Samotyy*
8. Neural network approach to forecasting of IT service quality **317**
- Mykhailo Strelbitskyi, Valentyn Mazur, Andrii Karpushyn*
9. Vessel Route Clustering in the Information and Telecommunication System of the Maritime Border Guard **321**
- Anatoliy Melnyk, Viktor Melnyk*
10. Specialized Processors Automatic Design Tools – the Basis of Self-Configurable Computer and Cyber-Physical Systems **326**
- Anastasiia Ivanytska, Liudmyla Zubyk, Dmitry Ivanov, Kateryna Domracheva*
11. Study of methods of complex data analysis that based on machine learning technologies **332**
- Maksym Osiponok, Vasyl Tereshchenko*
12. The "Divide and Conquer" technique to solve the Minimum Area Polygonalization problem **336**

- Oleh A. Zaiarnyi, Inna S. Zaiarna*
13. The application of distributed information systems based on blockchain technologies in higher education: benefits and challenges for Ukraine **340**

Iryna Vergunova

14. The System Dynamic Control Of The Water Erosion In a Hydrotechnical Rampart-Terrace **344**

Polianovskiy Hlib, Tetiana Zatonatska, Ihor Liutyi

15. Utilization of Information Technologies in Higher Education **349**

Stig Ottosson, Vladimir Zaslavskiy

16. Visualize what to be coded before programming **355**

Special. Artificial Intelligence and Information Theory

Oleksandr I. Provotar

1. About the calculation of fuzzy events probabilities by means of interval arithmetics **360**

Dmytro I. Cherniy, Yaroslav M. Linder, Volodymyr T. Matvienko, Volodymyr V. Pichkur

2. An algorithm for finding similar objects in an image **365**

Taras Lehinevych, Hlybovets Andii

3. Analysis of Deep Metric Learning Approaches **369**

Anatolii O. Pashko, Olga V. Lukovych, Iryna V. Rozora, Olga I. Vasylyk

4. Analysis of simulation methods for fractional Brownian motion in the problems of intelligent systems design **373**

Liliia Martynova, Galyna Kondratenko, Ievgen Sidenko, Yuriy Kondratenko

5. Application of Fuzzy TOPSIS Method in Group Decision-Making for Ranking Political Parties **384**

Emil Nasirov

6. Block-diagonal approach for Non-Negative Linguistic Matrix and Tensor Factorization **389**

Sergey Bushuyev, Igbal Babayev, Jahid Babayev, Boris Kozyr

7. Complementary Neural Networks for Managing Innovation Projects **393**

Sergiy Pogorilyy, Artem Kramov

8. Coreference Resolution Method Using a Convolutional Neural Network **397**

Victor Kulian, Olena Yunkova, Marina Korobova

9. Digital optimization of portfolio with market restrictions **402**

<i>Alexander Timinsky, Borys Lysytsin, Lyudmila Chernova, Liubava Chernova</i>	
10. Digitalisation HR-management Used Bi-adaptive and Foresight Models	406
<i>Denys Khusainov, Josef Diblik, Andriy Shatyрко, Jaromir Bastinec</i>	
11. Estimates of solution convergence dynamical processes in neuronet with time delay	411
<i>Mykola Svirnevskiy, Sergiy Ivaschenko, Olexander Barmak, Iurii Krak</i>	
12. Face image transformations for correct recognition problems solving	415
<i>Anatoliy Tryhuba, Inna Tryhuba, Vitalij Boyarchuk, Oksana Ftoma</i>	
13. Forecasting of a Lifecycle of the Projects of Production of Biofuel Raw Materials With Consideration of Risks	420
<i>Yuri Samokhvalov</i>	
14. Forecasting time and cost of the jobs in network models based on fuzzy linguistic estimates	426
<i>Vitalii Vrublevskiy, Oleksandr Marchenko</i>	
15. Grammar Error Correcting by the Means of CFG Parser	430
<i>Ruslan Bahrii, Iurii Krak, Olexander Barmak, Veda Kasianiuk</i>	
16. Implementing alternative communication using a limited number of simple sign language gestures	435
<i>Anatoliy O. Pashko, Iryna O. Pinchuk</i>	
17. Intellectual Methods of Estimation of Intending Primary School Teachers' Foreign Language Communicative Competence	439
<i>Alexander Khimich, Volodymyr Sydoruk, Pavlo Yershov</i>	
18. Intellectualization Of Computation Based On Neural Networks For Mathematical Modeling	445
<i>Vasyl Gorbachuk, Maxym Dunaievskiy, Seit-Bekir Suleimanov</i>	
19. Modeling of agency problems in complex decentralized systems under information asymmetry	449
<i>Kateryna Kolesnikova, Olga Mezentseva, Olena Savielieva</i>	
20. Modeling of Decision Making Strategies In Management of Steelmaking Processes	455
<i>Vladyslav Hryhorenko, Dmitriy Klyushin, Sergey Lyashko</i>	
21. Multiblock ADMM in machine learning	461
<i>Andriy Yaroshevskiy, Dmitriy Klyushin</i>	
22. Nonparametric Methods of Authorship Attribution in Classic and Modern Literature	465
<i>Hanna Livinska, Eugene Lebedev</i>	
23. On Asymptotic Merging of Nodes Set for Stochastic Networks with General Service	470

<i>Maryna Antonevych, Anna Didyk, Vitaliy Snytyuk</i>	
24. Optimization of functions of two variables by deformed stars method	475
<i>Viktor Morozov, Olena Kalnichenko, Anna Kolomiets</i>	
25. Research of the Impact of Changes Based on External Influences in Complex IT Projects	481
<i>Yana Bondarenko</i>	
26. Sequential A/B testing	488
<i>Olexander Barmak, Oleg Kalyta, Eduard Manziuk, Iurii Krak</i>	
27. Simplified model for recognition facial emotions	492
<i>Olha Sherstiuk, Oleksii Kolesnikov, Dmytro Lukianov</i>	
28. Team Behaviour Model as a Tool for Determining the Project Development Trajectory	496
<i>Olga Romanko, Mariia Voronenko, Nataliia Savina, Iryna Zhorova, Waldemar Wójcik, Volodymyr Lytvynenko</i>	
29. The use of static Bayesian networks for situational modeling of national economy competitiveness	501
<i>Dmytro Lukianov, Krystsina Mazhei, Viktor Gogunskii</i>	
30. Transformation of the International Project Management Association Project Managers Individual Competencies Model	506
<i>Oleksandr I. Provotar, Yaroslav M. Linder, Maksym M. Veres</i>	
31. Unsupervised anomaly detection in time series using LSTM-based autoencoders	513
<i>Tetiana Olekh, Viktor Gogunskii</i>	
32. Use of Discrete and Continuous Markov Chains for System Absorbing States	518
<i>Miedvediev Vladimir, Tsololo Serhii, Dikova Yuliia</i>	
33. Using a Neural Network Method to Solve the Problem of Automatic Generation of Vacations	522
<i>Mariia Voronenko, Iryna Lurie, Oleg Boskin, Ulzhalgas Zhunissova, Roman Baranenko, Volodymyr Lytvynenko</i>	
34. Using Bayesian methods for predicting the development of children autism	525