

Proceedings of the 10th International Conference “Pattern Recognition and Image Analysis: New Informational Technologies” (PRIA-10-2010)

St. Petersburg, Russian Federation, December 5–12, 2010

DOI: 10.1134/S105466181102057X

This special issue of Pattern Recognition and Image Analysis is the first of two issues publishing the abstracts of the participants of the 10th International Conference “Pattern Recognition and Image Analysis: New Informational Technologies” (PRIA-10-2010) held at St. Petersburg Electrotechnical University (LETI) December 5–12, 2010, under the auspices of the RAS National Committee for Pattern Recognition and Image Analysis, the Russian Foundation for Basic Research, the Foundation for the Support of Small Business in Scientific and Technological Sphere, LLC “Information Research (Study. Analysis. Evaluation. Recognition)” (Moscow), and LLC “Biosignal” (St. Petersburg).

PRIA-10-2010 continues the cycle of international conferences in the field of pattern recognition and image analysis held in accordance with the list of international, national, and regional scientific and scientific technical meetings, conferences, symposia, congresses, seminars, and workshops of the Russian Academy of Sciences in the field of natural and social sciences. The working languages of the conference were English and Russian.

PRIA-10-2010 is the main international conference in the Russian Federation and Central and Eastern Europe in the field of pattern recognition and image analysis. The previous conferences were held in Minsk, Byelorussia (PRIA-1-1991, 1991), Ulyanovsk, Russian Federation (PRIA-2-1995), Nizhni Novgorod, Russian Federation (PRIA-3-1997), Novosibirsk, Russian Federation (PRIA-4-1998), Samara, Russian Federation (PRIA-5-2000), Velikii Novgorod, Russian Federation (PRIA-6-2002), St. Petersburg, Russian Federation (PRIA-7-2004), Yoshkar Ola, Russian Federation (PRIA-8-2007), and Nizhni Novgorod, Russian Federation (PRIA-9-2008).

PRIA-10-2010 included the following research, scientific, and organizational events: the 10th International conference “Pattern Recognition and Image Analysis: New Informational Technologies”; lectures and survey papers presented by leading researchers and specialists “Current status of pattern recognition and image analysis”; the exhibition “Software and

hardware for the implementation and support of promising information technologies of image analysis and pattern recognition”; meeting of the Technical Committee TC 16 International Association of Pattern Recognition (IAPR) “Algebraic methods and methods of discrete mathematics in pattern recognition and image analysis”; meeting of the RAS National Committee for pattern recognition and image analysis; meeting of the Contest Committee of the conference for the Program “Member of the Youth Competition of Scientific Innovations-2010” MYCSI.

The theme of PRIA-10-2010 is “Knowledge is Power in itself,” and the conference is a multitrack international forum for discussions on recent advances in the field. PRIA-10-2010 was mainly devoted to the problems, research, and developments connected with the creation, implementation, and application of information technologies of pattern recognition and image analysis:

- statement, study, and solution of mathematical problems arising in connection with the development, study, and implementation of the methods for information conversion, analysis, and evaluation in the problems of recognition, classification, and forecasting when the input data are represented as numeric and text arrays, expert data, implementation of signals, images, time series, random multidimensional fields or as a combination of the above-listed types;

- image processing, analysis, recognition, understanding, and synthesis (including computer graphics, visualization, and virtual reality);

- speech processing, analysis, recognition, understanding, and synthesis;

- development, investigation, modification, and systematization of mathematical and computational methods, which form the algorithmic basis of information technologies;

- development, investigation, modification, and systematization of methods for the automatization of synthesis and testing of information technologies;

- development of specialized information technologies (for classes of problems and object domains);

—development and implementation multipurpose tools, databases, knowledge bases and linguistic tools (including ontology and thesauruses) for the support of information technologies of pattern recognition, image analysis, speech analysis and synthesis and signal processing;

—development, investigation, adaptation and implementation of methods for the solution of non-standard and critically important, and mass problems of pattern recognition, analysis, and understanding of images, speech, and signals;

—analysis, synthesis, and processing of complex graphical information and spatially distributed data, development and implementation of mathematical models for the description of graphic documents, development of knowledge bases, information and terminological support and software for computerized systems for processing of complex graphical information;

—development of multimedia technologies.

The conference was mostly devoted to the following directions of research and development:

(1) Mathematical theory of pattern recognition and forecasting.

(2) Mathematical theory of image processing, analysis, recognition, and understanding.

(3) Mathematical theory of speech processing, analysis, recognition, and understanding.

(4) Models, methods, and means for representation of the input information in the problems of pattern recognition, image analysis, and signal processing.

(5) Computerization of processing, testing, and adaptation of information technologies of pattern recognition, processing, analysis and understanding of images, speech, and signals.

(6) Algorithmic and software systems, software tools, and information technologies for the solution of the problems of pattern recognition with standard information.

(7) Algorithmic and software systems, automatized systems, software tools, and information technologies for analysis and evaluation of information represented as images and signals.

(8) Knowledge and databases and linguistic tools for the support of information technologies of pattern recognition, processing, analysis, and understanding of images, speech, and signals.

(9) Specialized architectures, software and hardware tools for the support of information technologies of pattern recognition, processing, analysis, and understanding of images, speech, and signals.

(10) Neural networks and neural network methods for data processing, analysis, and interpretation.

(11) Algorithmic and software tools and information technologies for intelligent geographic and map-making information systems and environmental monitoring. GIS technology.

(12) Algorithms, software tools, and information technologies for intelligent biomedical and biotechnical systems.

(13) Algorithms, software tools, and information technologies in bioinformatics and medical informatics.

(14) Processing and analysis of video information.

(15) Computer graphics, visualization, and virtual reality.

(16) Optical and digital optical systems for processing and analysis of images and signals.

(17) Applied problems of pattern recognition and processing, analysis, and understanding of images, speech, and signals.

(18) Visual and aural perception in living organisms.

(19) Multimedia technologies.

The scientific program of PRIA-10-2010 included 209 reports. Out of those there were 16 invited plenary papers, 10 lectures, 78 section oral presentations, and 104 posters. All the reports were subdivided into four sections.

Section 1. Mathematical methods in pattern recognition (13 section papers and 10 posters).

Section 2. Processing, analysis, representation, and understanding of images (23 section papers and 34 posters).

Section 3. Software and hardware tools in pattern recognition and image analysis (16 section papers and 16 posters).

Section 4. Applied problems (26 section papers and 44 posters).

The conference was attended by 202 scientists, researchers, and postgraduate and graduate students from 11 countries (Germany, France, Italy, Spain, Brazil, Turkey, the Czech Republic, Finland, Taiwan, Byelorussia, and Russia). Among them, 177 participants were from 23 cities of the Russian Federation (Moscow, St. Petersburg, Tula, Novosibirsk, Samara, Yekaterinburg, Cherepovets, Rostov-on-Don, Sarov, Ulyanovsk, Vladimir, Nizhni Novgorod, Murmansk, Irkutsk, Yoshkar Ola, Velikii Novgorod, Kazan, Murom, Kirov, Vladivostok, Krasnoyarsk, Tomsk, and Dubna); 82 participants were under 33.

We hope that these special issues, following the tradition of all PRIA conferences, will not only impact the current research of the readers but will also represent important archival material, to which future generations of researchers in pattern recognition and image analysis will be returning for years to come.

Full texts of PRIA-10-2010 papers presented by the authors at the conference and recommended by the Program Committee will be published in 2012 as

special issues of the international journal *Pattern Recognition and Image Analysis: Advances in Mathematical Theory and Applications* (Pleiades Publishing Ltd. c/o INTERNATIONAL ACADEMIC PUBLISHING COMPANY Nauka/Interperiodica, Moscow, distributed worldwide by SPRINGER).

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