Research in AI
by A.V. Savchenko

- **Dr. of Sci.**, **Prof.**
- Head of research group in analysis of multimedia data in HSE
- Chair of “Analysis of images and video” track in Int. Conf. on Analysis of Images, Social Networks and Texts (AIST), Springer LNCS
- Research interests: computer vision, voice analysis, statistical pattern recognition
- Research topics:
  - Efficient facial photo/video analysis **(**unconstrained face identification, emotion recognition, video surveillance systems…**)**
  - Approximate nearest neighbor search for image recognition in low-resource settings
  - Fast classification of high-dimensional data for small-sample-size problem
  - Optimization/compression of deep neural networks in pattern recognition

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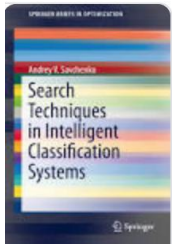
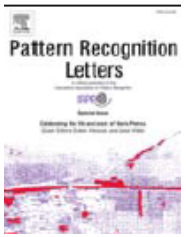
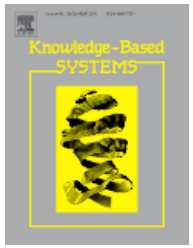
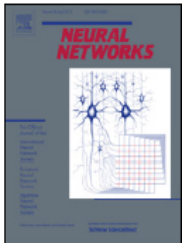
Research Summary

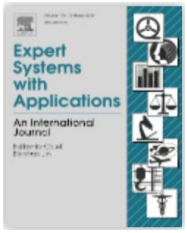
- More than 70 **publications** about **optimization of recognition algorithms in low-resource settings:**
  - approximate nearest neighbor search
  - highly-optimized deep CNNs
  - sequential analysis of deep features
  - emotion recognition
- More than 20 international conferences including ICPR, ICMI, ICVS, IJCRS,












РОССИЙСКАЯ ФЕДЕРАЦИЯ

ПАТЕНТ

№ 111944

УСТРОЙСТВО ДЛЯ ФОНЕТИЧЕСКОГО АНАЛИЗА И РАСПОЗНАВАНИЯ РЕЧИ


РОССИЙСКАЯ ФЕДЕРАЦИЯ

ПАТЕНТ

№ 88171

УСТРОЙСТВО ДЛЯ РАСПОЗНАВАНИЯ ИЗОБРАЖЕНИЙ

- Owner of 2 Russian **patents**
- Owner of 7 certificates of software registration
- Author of 3 patent applications from Samsung R&D: 2 Russian and 1 international (joint Russian, US, Korea)

Grants: RSF 14-01-00039, RF President МД-306.2017, RF Ministery of Science 11.G34.31.0057, 07.514.11.4137, FASIE 9771p/16570, 20 958, 10287, HSE 17-05-0007, 15-01-0019, 12-01-0003

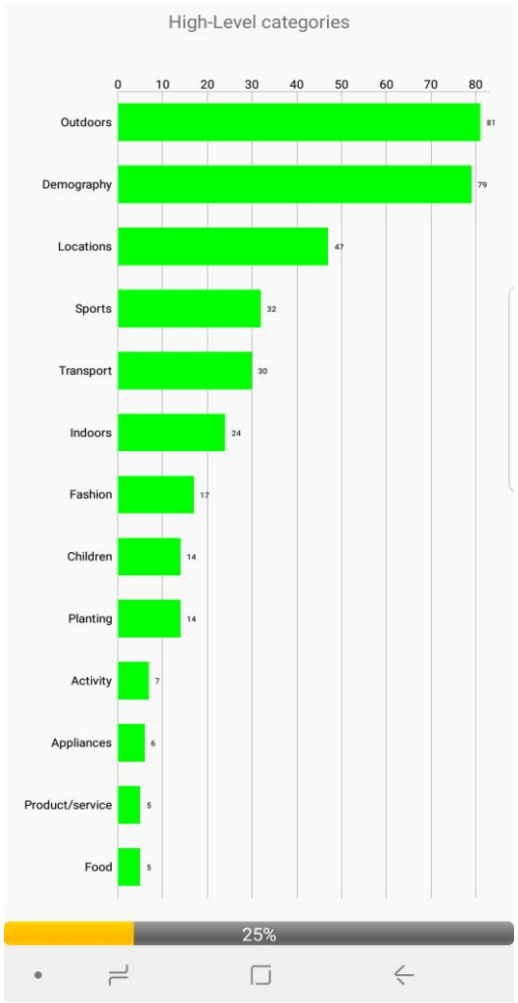
Core competency in AI. Research papers

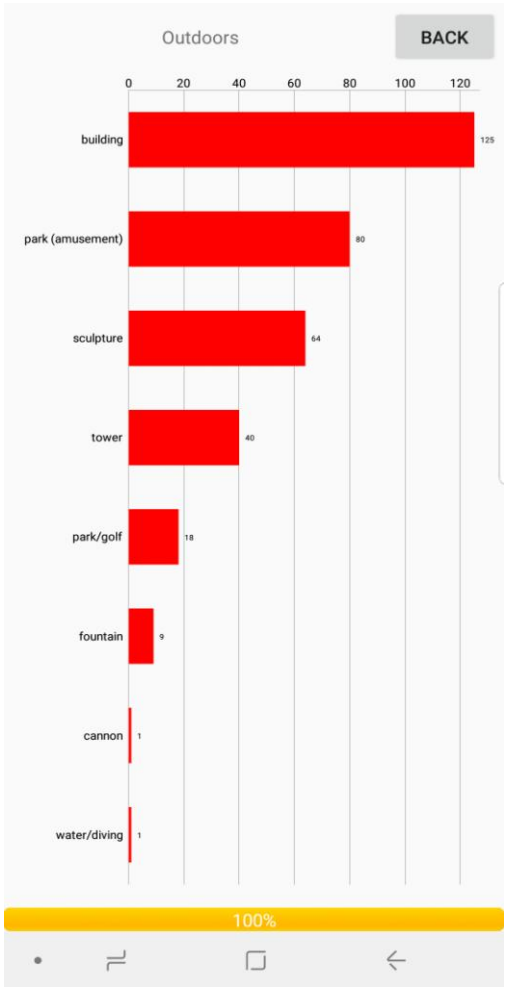
- Savchenko A.V., Belova N.S. Unconstrained Face Identification Using Maximum Likelihood of Distances Between Deep Off-the-shelf Features, **Expert Systems With Applications**, 2018
- Savchenko A.V. Maximum-Likelihood Approximate Nearest Neighbor Method in Real-time Image Recognition, **Pattern Recognition**, 2017
- Savchenko A.V. Search Techniques in Intelligent Classification Systems. Switzerland : **Springer International Publishing**, 2016
- Savchenko, A.V. Fast multi-class recognition of piecewise regular objects based on sequential three-way decisions and granular computing, **Knowledge-Based Systems**, 2016
- Savchenko A.V., Savchenko L.V. Towards the creation of reliable voice control system based on a fuzzy approach, **Pattern Recognition Letters**, 2015
- Savchenko A.V., Belova N.S. Statistical testing of segment homogeneity in classification of piecewise-regular objects. **International Journal of Applied Mathematics and Computer Science**, 2015
- Savchenko A.V., Probabilistic neural network with homogeneity testing in recognition of discrete patterns set, **Neural Networks**, 2013
- Savchenko A.V. Directed enumeration method in image recognition, **Pattern Recognition**, 2012
- Kharchevnikova A.S., Savchenko A.V. Neural Networks in Video-Based Age and Gender Recognition on Mobile Platforms, **Optical Memory and Neural Networks (Information Optics**), 2018
- Savchenko A.V., Belova N.S., Savchenko L.V. Fuzzy Analysis and Deep Convolution Neural Networks in Still-to-video Recognition, **Optical Memory and Neural Networks (Information Optics)**, 2018
- Sokolova A. D., Kharchevnikova A. S., Savchenko A. V. Organizing Multimedia Data in Video Surveillance Systems Based on Face Verification with Convolutional Neural Networks, AIST 2017, **Springer LNCS**
- Shipova K.G., Savchenko A.V. Video-based pedestrian detection on mobile phones with the cascade classifiers, NET, 2016, **Springer Proceedings in Mathematics & Statistics**
- Grachev A. M., Ignatov D. I., Savchenko A. V. Neural Networks Compression for Language Modeling, **PReMI 2017**, **Springer LNCS**
- Rassadin A., Gruzdev A., Savchenko A. Group-Level Emotion Recognition using Transfer Learning from Face Identification. In Proceedings of 19th **ACM ICMI 2017**
- Savchenko A.V. Granular Computing and Sequential Analysis of Deep Embeddings in Fast Still-to-Video Face Recognition, Proceedings of **IEEE SACI 2018**
- Savchenko A.V. Efficient Statistical Face Recognition Using Trigonometric Series and CNN Features, Proceedings of **IEEE ICPR 2018**

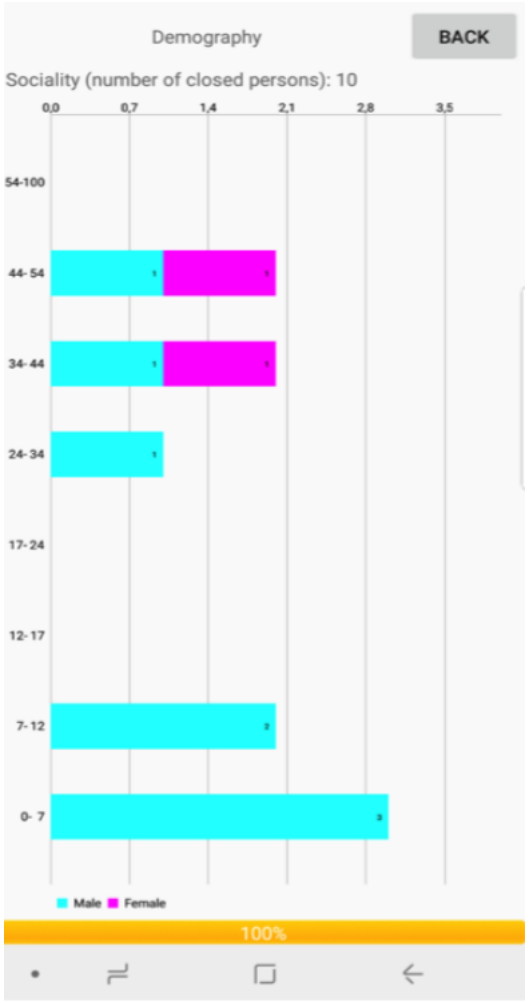
List of AI research projects

- **Visual Preferences Prediction in Visual Data on Mobile Devices** (1 year, $220K per year). Project of Samsung-PDMI Joint AI Center. Leader – A. Savchenko
- **Efficient image recognition medium-sized databases** (2 years, $20K per year). Russian Federation President grant for teams lead by young doctor of science. Joint project with department of computer science, HSE, Moscow. Leader – A. Savchenko
- **Clustering and Search Techniques in Large Scale Networks** (4 years, $110K per year), Russian Science Foundation project (https://nnov.hse.ru/en/latna/rsf_project). Joint project with researchers from USA, Italy and France. Leader – P. Pardalos
- **Computer-aided language learning systems** (2 years, $200K per year). Grant of Foundation For Assistance To Small Innovative Enterprises. Joint project with IstraSoft company (Moscow). Leaders – I. Kneller & A. Savchenko
- **Efficient speech recognition for voice control systems** (1.5 years, $260K per year). Grant of Russian Government. Joint project with IstraSoft company (Moscow). Leader – A. Savchenko

Visual Preferences Prediction in Visual Data on Mobile Devices







- Object detection
- Scene recognition
- Sport logo recognition
- Demography analytics (facial clustering, age/gender recognition)

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