

# Roman V. Shapovalov

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CONTACTS                      *Email:* romashapovalov@gmail.com                      *Web:* shapovalov.ro

LATEST CHANGES    August 5, 2016

RESEARCH INTERESTS                      Machine learning, computer vision, probabilistic graphical models, semantic segmentation of 2D and 3D data, structural prediction and learning, learning with latent variables, Bayesian methods, face recognition.

EDUCATION                      **Lomonosov Moscow State University**, Moscow, Russia

PhD in physics and mathematics                      **October 2010 to March 2015**

- Thesis topic: *Structural learning methods for collective labelling problems* (advisor: Dr. Dmitry Vetrov, Bayesian Learning Group)  
Developed algorithms for structured prediction based on Structural SVMs and sequential classification. Considered weakly supervised case where annotation for training data is scarce. The primary application is computer vision, where such models allow leveraging spatial context in 2D or 3D images.

specialist<sup>1</sup> in applied math and computer science                      **September 2005 to June 2010**

- GPA: 5.0 out of 5.0 (**with highest honors**)
- Thesis topic: *Automated object detection in laser-scanning data* (advisor: Dr. Anton Konushin), **3rd prize** on the faculty-wide 2010 best thesis contest

INDUSTRIAL EXPERIENCE                      **BlippAR**, London, UK

Computer vision research engineer                      **March 2016 to present**

- Developing, tuning, and evaluating deep learning models (torch7).
- Improving speed and accuracy of tracking for on-device augmented reality (C++11).

**Artec Group**, Moscow, Russia

Research and development engineer                      **September 2014 to March 2016**

Worked on face recognition from depth maps.

- Maintained C++ face recognition SDK.
- Improved face verification accuracy by tweaking image preprocessing algorithm.
- Developed a simple library of linear representation learning methods based on matrix factorizations, such as Fisher LDA (Python/numpy).
- Developed a framework for deep metric learning with problem-specific loss functions for Siamese architecture (torch7).

**MSU Graphics & Media Laboratory**, Moscow, Russia

Researcher / C++ developer                      **August 2008 to June 2011**

Developed algorithms and software for analysis of 2D and 3D geospatial imagery.

- Built a system for object detection (cars, poles, etc.) in LIDAR point clouds.
- Developed a semantic segmentation algorithm for aerial 3D scans.
- Developed an effective on-line learning algorithm for road surface analysis system.

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<sup>1</sup>*Specialist* is 5 year undergraduate programme in Russia. The degree is loosely equivalent to M.S.

## NetCracker, Moscow, Russia

Java developer at GUI System department **July 2007 to August 2008**  
Took part in development of the Java applet visualizing infrastructure of telecom operators, integrating with the NetCracker Operations Support System back-end.

## INTERNSHIPS

### Google Summer of Code

developer of Point Cloud Library (PCL) **May to August 2011**

- Topic: *Implementation of the Implicit Shape Models (ISM) framework and local descriptors for detection in 3D point clouds* (mentor: Dr. Radu B. Rusu)

### Czech Technical University in Prague, Czech Republic

research intern at Centre for Machine Perception **July to October 2009**

- Topic: *Efficient approximate nearest neighbour search by exploiting data statistics* (advisor: Dr. Jiří Matas)

## ACADEMIC EXPERIENCE

### Lomonosov Moscow State University, Moscow, Russia

Teaching Assistance and Grading:

- *Practice in Computing* mandatory course for students of Mathematical Prediction Dept., Spring 2013, Spring 2014: **authored and graded** an assignment on implementation of deep autoencoder; Fall 2013: **authored and graded** an assignment on background subtraction and gaussian mixture models;
- *Bayesian Methods in Machine Learning* elective course, Fall 2011: **graded** an assignment on Gibbs sampling and variational inference in Ising model, Fall 2013: **graded** an assignment on inference in Bayesian networks.
- *Algorithms and Languages* mandatory freshmen course, Fall 2010: **instructed** students during seminars and labs.
- *Introduction to Computer Graphics and Vision* mandatory course for 3rd year students, Fall 2008, Fall 2009: **graded** computer vision assignments; Fall 2010, Fall 2011: **authored and graded** computer vision assignments (course is taken by  $\approx 250$  students each year).
- *Introduction to Computer Vision* elective course, Spring 2009: **authored and graded** an object detection assignment.

Community service:

- Reviewer, CVPR 2015, ICCV 2015, CVPR 2016, ECCV 2016, ACCV 2016.
- Secretary for international participants, GraphiCon 2011 conference.
- Volunteer, GraphiCon 2007/2008/2009 conference.
- Volunteer, Microsoft Computer Vision School 2011.

SELECTED  
PUBLICATIONS

- R. Shapovalov**, D. Vetrov, A. Osokin, P. Kohli. Multi-utility Learning: Structured-output Learning with Multiple Annotation-specific Loss Functions. *EMMCVPR*. Hong Kong. January 2015.
- R. Shapovalov**, D. Vetrov, P. Kohli. Spatial Inference Machines. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. Portland, OR, USA. June 2013. **Oral presentation.**
- A. Velizhev, **R. Shapovalov**, K. Schindler. Implicit shape models for object detection in 3D point clouds. *ISPRS Congress*. Melbourne, Australia. August 2012.
- R. Shapovalov**, A. Velizhev. Cutting-Plane Training of Non-associative Markov Network for 3D Point Cloud Segmentation. *IEEE International Conference on 3D Digital Imaging, Modeling, Processing, Visualisation and Transmission (3DIMPVT)*. Hangzhou, China. May 2011.
- R. Shapovalov**, A. Velizhev, O. Barinova. Non-associative Markov networks for 3D point cloud classification. *Photogrammetric Computer Vision and Image Analysis (PCV)*. Paris, France. September 2010.

ADDITIONAL  
EDUCATION

Summer schools:

**Microsoft Learning and Intelligence School**, St. Petersburg **August 2015**  
**Microsoft Computer Vision School**, Moscow, Russia **August 2011**  
**Microsoft Research PhD Summer School**, Cambridge, UK **July 2011**  
**International Computer Vision Summer School**, Sicily, Italy **July 2010**

Relevant online courses completed:

- Probabilistic Graphical Models (Prof. Daphne Koller)
- Cryptography I (Prof. Dan Boneh)
- Functional Programming in Scala (Prof. Martin Odersky)
- Writing in Sciences (Prof. Kristin Sainani)
- Neural Networks for Machine Learning (Prof. Geoffrey E. Hinton)
- Game Theory (Prof. Kevin Leyton-Brown and others)
- Linear and Discrete Optimization (Prof. Friedrich Eisenbrand)
- Introduction to Recommender Systems (Prof. Joseph A. Konstan)
- Convex Optimization (Prof. Stephen P. Boyd)
- Mining Massive Datasets (Prof. Jeff Ullman and others)
- Autonomous Navigation for Flying Robots (Prof. Daniel Cremers and others)
- Scalable Machine Learning (with Apache Spark) (Prof. Ameet Talwalkar)

PROFESSIONAL  
SKILLS

*Software engineering*: C++ (STL, boost), Python (NumPy, PyData stack), Matlab, Lua, Java, Scala, SQL, MapReduce (Hadoop, Scrunch), Spark; software development process organization, version control systems, unit testing.

*Machine learning*: classification and clustering techniques, structural learning and inference, learning with latent variables, graphical models, Bayesian methods, deep learning, optimization methods, scikit-learn library, deep learning frameworks (torch, Theano).

*Computer vision*: image and 3D point cloud processing, object detection and recognition, categorization, segmentation, OpenCV library, Point Cloud Library (PCL).

COMPETITIVE  
PROGRAMMING

TopCoder maximum Algorithms track rating: 1,367  
HackerRank maximum Algorithms track rating: 2,876