Veronika Cheplygina

v.cheplygina@erasmusmc.nl
http://www.veronikach.com

Education

2011–2015 **Ph.D. in Computer Science**, *Delft University of Technology*, Delft, The Netherlands.
Thesis: Dissimilarity-Based Multiple Instance Learning.
Advisor: Dr. Marco Loog

2004–2010 **M.Sc. in Media & Knowledge Engineering**, *Delft University of Technology*, Delft, The Netherlands.
Thesis: Random Subspace Method for One-Class Classifiers

2002–2004 **International Baccalaureate**, *International School of the Hague*, The Hague, The Netherlands.

Research experience

2015– **Postdoctoral researcher**, *Biomedical Imaging Group Rotterdam, Erasmus MC*, The Netherlands.

- Transfer learning and weakly supervised learning in medical image analysis
- Collaborating with The Image Section, University of Copenhagen on lung image analysis
- Collaborating with Heidelberg Image Collaboratory, University of Heidelberg on crowdsourcing

2011–2014 **Ph.D. researcher**, *Pattern Recognition Laboratory, Delft University of Technology*, The Netherlands.

- Data representation, weakly-supervised learning, dissimilarity-based learning, learning with structured data
- Machine learning summer schools in Santa Cruz, United States and Tuebingen, Germany
- Teaching and presentation courses, Delft University of Technology
- Research visit (3 months) to Machine Learning and Computational Biology group, MPI Intelligent Systems, Tuebingen, Germany

2010 **Intern**, *Prime Vision*, Delft, The Netherlands.
Outlier detection in images

Research

Summary

My background is in machine learning and medical image analysis. I focus on weakly-supervised algorithms, such as learning from similarities, or learning from data that is annotated in groups. Currently I am working on such algorithms for classification problems in chest CT and brain MR images, where annotations are scarce.

I recently started a project on crowdsourcing to address this annotation problem. The key idea is that even though crowd workers are not medical experts, they could still provide weak annotations. The current application is annotating airways in chest CT images, but the approach is more general, and my goal is to develop this into my own line of research.

Publications

I have published 5 journal papers and 12 peer-reviewed conference papers since 2011. My Google scholar page is `https://scholar.google.com/citations?user=4x1y2bwAAAAJ`. On 20/04/2016, I had 110 citations and an h-index of 7. Below I provide a sample of representative publications, a full list is attached to the end of this CV.

2015 Cheplygina, V., L. Sørensen, D. M. J. Tax, M. de Bruijne, and M. Loog. "Label stability in multiple instance learning". In: *Medical Image Computing and Computer Assisted Interventions (MICCAI)*. Springer, pp. 539–546.

2015 Cheplygina, V., D. M. J. Tax, and M. Loog. "On classification with bags, groups and sets". In: *Pattern Recognition Letters* 59, pp. 11–17.

2015 Cheplygina, V., David M. J. Tax, and M. Loog. "Multiple instance learning with bag dissimilarities". In: *Pattern Recognition* 48.1, pp. 264–275.

Invited presentations

2016 **Weakly labeled learning in medical image analysis**, *Medical and Biological Informatics, German Center for Cancer Research, Heidelberg, Germany*.

2015 **Dissimilarity-based multiple instance learning**, *HCI, University of Heidelberg, Germany*.

2015 **Non-metric dissimilarities in multiple instance learning**, *Colors of Dissimilarities workshop, Delft, The Netherlands*.

2015 **Weakly labeled learning in chest CT images**, *NFBIA symposium, Nijmegen, The Netherlands*.

2015 **Label stability in multiple instance learning**, *The Image Section, University of Copenhagen, Denmark*.

2014 **Network-guided group feature selection for classification of autism spectrum disorder**, *Biomediq, Copenhagen, Denmark*.

2014 **Classifying autism spectrum disorder using structural brain connectivity**, *d'Arc: Autism & ADHD research center, University of Amsterdam, The Netherlands*.

2013 **Dissimilarity-based multiple instance learning**, *Machine learning & computational biology group, Max Planck Institutes, Tuebingen, Germany*.

Grants and awards

2016 **Winner**, *Pallas Ludens Academic Challenge*.
PI of project "CRAVE: Crowdsourcing for Airway and Vessel Extraction", €5.000

2015 **Finalist**, *STW Open Mind Award*.
PI of project "Game for crowdsourcing medical image analysis", top 15 of 132 applicants

2013 **Travel scholarship**, *ERASMUS / Delft University of Technology*.
Visited Max Planck Institute for Intelligent Systems for 3 months

2013 **Travel scholarship**, *ACM-W/Microsoft*.
Visited Multiple Classifier Systems workshop in Nanjing, China

2009 **Member of merit**, *W.I.S.V. 'Christiaan Huygens'*.
Recognized for my contribution to the society for mathematics and computer science students

Under review

2016 **NWO Rubicon**, *Under review*.
PI of project "Crowd-algorithm collaboration for large-scale medical image annotation", €130.000.

2016 **COST.eu**, *Under review*.
"European network for interactive knowledge discovery", secondary proposer

Service

2014 **Board member (treasurer)**, *NVPHBV, Dutch society for Pattern Recognition and Image Processing*.

2014–2015 **Workshop organizer**.
- 2nd International Features and Structures (FEAST) workshop at the International Conference of Machine Learning in Lille, France (2015)
- 1st International Features and Structures (FEAST) workshop at the International Conference of Pattern Recognition in Stockholm, Sweden (2014)

Program committee.
- Statistical, Structural and Structural Pattern Recognition (S+SSPR 2016)
- International Joint Conference on Artificial Intelligence (IJCAI 2016)
- Similarity-based Pattern Recognition (SIMBAD 2015)
- Belgium Netherlands Machine Learning Conference (BENELEARN 2015)

Reviewer (journals).
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Medical Imaging
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Knowledge and Data Engineering
- International Journal on Pattern Recognition and Artificial Intelligence
- Neurocomputing
- Neural Computation

Reviewer (conferences).
- Medical Image Computing and Computer-Assisted Interventions (MICCAI) 2015-2016
- International Symposium on Biomedical Imaging (ISBI) 2016
- Neural Information Processing Systems (NIPS) 2016
- European Symposium on Artificial Neural Netorks (ESANN) 2014-2016

Teaching and supervision

Project supervision.

- Dylan Dophemont, BSc student from Hogeschool Rotterdam, The Netherlands. Supervising (2016) graduation project "Gamification of airway extraction".
- Isabel Pino Pena, visiting PhD student from University of Aalborg, Denmark. Co-supervised with Marleen de Bruijne (2015-2016). Project "Quantification of emphysema with multiple instance learning".
- Irene Cara, visiting MSc student from Università degli studi di Cagliari, Italy. Co-supervised with Marco Loog (2014). Project "Multi-class multiple instance learning for image categorization".
- Groups of 3-4 BSc students carrying out a literature survey on machine learning topics. Co-supervised with Jesse Krijthe (2014).

Thesis committee.

- Dimitrios Palachanis, "Using the multiple instance learning framework to address differential regulation", MSc thesis, Delft University of Technology
- Gijs van Tulder, "Sample reusability in importance-weighted active learning", MSc thesis, Delft University of Technology

2014 **Lecturer**, *Erasmus MC and Delft University of Technology*.

- Introduction to biomedical imaging for medical students (MSc level, Erasmus MC). Responsible for giving 5-6 lectures per year.
- Advanced pattern recognition (PhD level, Delft University of Technology). Responsible for lectures and exercises of 1 day in 5-day intensive course.
- Pattern recognition for biomedical engineering (BSc level, Delft University of Technology). Redesigned course together with Marco Loog and Jesse Krijthe. Responsible for lectures, exercises and exam questions of 1/3rd of the material.

2007–2013 **Teaching assistant**, *Delft University of Technology*.

- Pattern recognition for industry, PhD level
- Pattern recognition, MSc level
- Pattern recognition for biomedical engineering, BSc level
- Algorithms and data structures, BSc level

Open science and outreach

2011 **Open science**.

I am dedicated making my research accessible to others. I maintain a repository of multiple instance learning datasets (`http://www.miproblems.org`) and contribute to a multiple instance learning toolbox for MATLAB. I use my personal website (`http://www.veronikach.com`) to upload preprints and other resources.

2014 **Outreach**.

I am a guest lecturer at VHTO (Dutch national organization on girls/women and science and technology). I periodically lecture at schools about technical education and careers.

Publications

Journals

2015 Alpaydın, E., V. Cheplygina, M. Loog, and D. M. J. Tax. "Single- vs. multiple-instance classification". In: *Pattern Recognition* 48.9, pp. 2831–2838.

2015 Cheplygina, V., D. M. J. Tax, and M. Loog. "Dissimilarity-based ensembles for multiple instance learning". In: *IEEE Transactions on Neural Networks and Learning Systems (TNNLS), in press*.

2015 Cheplygina, V., D. M. J. Tax, and M. Loog. "On classification with bags, groups and sets". In: *Pattern Recognition Letters* 59, pp. 11–17.

2015 Cheplygina, V., David M. J. Tax, and M. Loog. "Multiple instance learning with bag dissimilarities". In: *Pattern Recognition* 48.1, pp. 264–275.

2012 Lee, W.-J., V. Cheplygina, D. M. J. Tax, M. Loog, and R. P. W. Duin. "Bridging structure and feature representations in graph matching". In: *International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI)* 26.05.

Conferences

2016 Cheplygina, V., A. van Opbroek, M. A. Ikram, M. W. Vernooij, and M. de Bruijne. "Asymmetric similarity-weighted ensembles for image segmentation". In: *International Symposium on Biomedical Imaging (ISBI)*. IEEE, In press.

2015 Cheplygina, V., L. Sørensen, D. M. J. Tax, M. de Bruijne, and M. Loog. "Label stability in multiple instance learning". In: *Medical Image Computing and Computer Assisted Interventions (MICCAI)*. Springer, pp. 539–546.

2015 Cheplygina, V. and D. M. J. Tax. "Characterizing multiple instance datasets". In: *Similarity-Based Pattern Recognition (SIMBAD)*. Springer, pp. 15–27.

2015 Hernández-Durán, M., V. Cheplygina, and Y. Plasencia-Calaña. "Dissimilarity representations for low-resolution face recognition". In: *Similarity-Based Pattern Recognition (SIMBAD)*. Springer, pp. 70–83.

2014 Cheplygina, V., L. Sørensen, D. M. J. Tax, J. H. Pedersen, M. Loog, and M. de Bruijne. "Classification of COPD with multiple instance learning". In: *International Conference on Pattern Recognition (ICPR)*, pp. 1508–1513.

2014 Cheplygina, V., D. M. J. Tax, M. Loog, and A. Feragen. "Network-guided group feature selection for classification of autism spectrum disorder". In: *Machine Learning in Medical Imaging (MICCAI MLMI)*. Springer, pp. 190–197.

2013 Cheplygina, V., D. M. J. Tax, and M. Loog. "Combining instance information to classify bags". In: *Multiple Classifier Systems (MCS)*. Springer, pp. 13–24.

2013 Plasencia Calaña, Y., V. Cheplygina, R. P. W. Duin, E. García-Reyes, M. Orozco-Alzate, D. M. J. Tax, and M. Loog. "On the informativeness of asymmetric dissimilarities". In: *Similarity-Based Pattern Recognition (SIMBAD)*. Springer, pp. 75–89.

2012 Cheplygina, V., D. M. J. Tax, and M. Loog. "Class-dependent dissimilarity measures for multiple instance learning". In: *Structural, Syntactic, and Statistical Pattern Recognition (S+SSPR)*. Springer, pp. 602–610.

2012 Cheplygina, V., D. M. J. Tax, and M. Loog. "Does one rotten apple spoil the whole barrel?" In: *International Conference on Pattern Recognition (ICPR)*, pp. 1156–1159.

2011 Cheplygina, V. and D. M. J. Tax. "Pruned random subspace method for one-class classifiers". In: *Multiple Classifier Systems (MCS)*. Springer, pp. 96–105.

2011 Tax, D. M. J., M. Loog, R. P. W. Duin, V. Cheplygina, and W.-J. Lee. "Bag dissimilarities for multiple instance learning". In: *Similarity-Based Pattern Recognition (SIMBAD)*. Springer, pp. 222–234.

Theses

2015 Cheplygina, V. "Dissimilarity-based multiple instance learning". PhD thesis. Delft University of Technology.

2010 Cheplygina, V. "Random subspace method for one-class classifiers". MSc thesis. Delft University of Technology.

Under review and in preparation

2016 Cheplygina, V., D. Kondermann, W. Kuo, A. Perez-Rovira, H. Tiddens, and M. de Bruijne. "Crowdsourcing for extraction of airways in chest CT". In: *Large-scale annotation of biomedical data (MICCAI LABELS), in preparation*.

2016 Cheplygina, V., A. van Opbroek, M. W. Vernooij, M. A. Ikram, and M. de Bruijne. "Ensemble classifiers for segmentation in brain MRI: a transfer learning approach". In: *Neuroimage, in preparation*.

2016 Cheplygina, V., I. Pino Pena, J. H. Pedersen, L. Sørensen, and M. de Bruijne. "Transfer learning for multi-center classification of COPD". In: *Medical Image Computing and Computer-Assisted Interventions (MICCAI), under review*.

2016 Pena, I. Pino, V. Cheplygina, and M. de Bruijne. "Quantification of emphysema with multiple instance learning". In: *IEEE Transactions on Medical Imaging (TMI), in preparation*.