# CURRICULUM VITAE

## Personal Information

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| Name: | Yury Tsoy |
| Sex: | male |
| Date of birth: | May 02, 1981 |
| Ethnicity: | Korean |
| Citizenship: | Russian |

## Contacts

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| Telephone | +82-010-9234-8276 |
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**Scientific Interests**: Evolutionary Computation, Neuroevolutionary Algorithms, Machine Learning, Self-Organization and Complexity, Image Processing.

## Education

- *September, 2004 – August, 2007*: **PhD in Computer Science**, thesis "Neuroevolutionary Algorithm and Software for Image Processing"[1]. Defence: May 16, 2007. Supervisor: Prof. Vladimir Spitsyn.

- *September, 2002 – July, 2004*: **Master of Technique and Technologies** with honours, thesis "The Development of Genetic Algorithm for Neural Networks Design and Tuning"[2]. Defence: June 2004. Supervisor: Prof. Dr. Sci. Vladimir Spitsyn.

- *September, 1998 – July, 2002*: **Bachelor of Technique and Technologies** with honours. Supervisor: Dr. Julius Katsman.

## Work Experience

- *October, 2014 – till now*: **Scientist**, **Head of the Computational Biology Group**, Institut Pasteur Korea, Seongnam, South Korea
  *Duties*: Leading a group of computer scientists, software engineers and cheminformatics specialists. Research planning and reporting. Algorithms and software development for processing of biological images and data. Research in image processing and data analysis.

- *October, 2013 – October, 2013*: **Scientist**, **acting head of the Image Mining Group**, Image Mining Group, Institut Pasteur Korea, Seongnam, South Korea
  *Duties*: Leading a group of computer scientists and software engineers. Research planning and reporting. Algorithms and software development for processing of biological images and data. Research in image processing and data analysis.

- *October, 2012 – till now*: **Scientist**, Image Mining Group, Institut Pasteur Korea, Seongnam, South Korea
  *Duties*: Algorithms and software development for processing of biological images and data. Research in image processing and data analysis.

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[1] http://qai.narod.ru/Dissertation/tsoy_phd.thesis.zip
[2] http://qai.narod.ru/Publications/tsoy_mthesis.pdf

- *September, 2009 – September, 2012*: **Assistant Professor**, Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia.
  *Duties*: Teaching machine learning, intelligent systems, C/C++ programming. Research in computational intelligence.

- *March, 2008 – September, 2012*: **Assistant Professor**, Tomsk Polytechnic University, Tomsk, Russia
  *Duties*: Teaching decision making and system analysis.

- *June, 2007 – March, 2008*: **Senior Lecturer**, Tomsk Polytechnic University, Tomsk, Russia
  *Duties*: Teaching intelligent systems, C/C++ programming. Research in computational intelligence.

- *September, 2006 – June, 2007*: **Assistant**, Tomsk Polytechnic University, Tomsk, Russia
  *Duties*: Teaching intelligent systems. Research in computational intelligence.

## Technical skills

- **Image processing**: filtering (Gaussian, median, anisotropic diffusion, edge detection), morphology (erosion, dilation, opening, closing, reconstruction, tophat), segmentation (K-Means, EM, watersheds, gradient vector flow, level set segmentation, superpixels), salient points detection (Harris detector), image registration (scale, rotation & translation invariant with sub-pixel accuracy), processing of cell biology images (nuclei, cell and aggregates detection and quantification, analysis of timelapse images, splitting clustered cells, handling of biased illumination).
- **Machine learning**: classification (k-NN, neural networks, evolving neural networks, naïve Bayesian classifier, linear discriminant analysis, PLS, kernel-PLS), clustering (K-Means, EM, hierarchical clustering, self-organizing maps, growing neural gas), dimensionality reduction (PCA, dynamical PCA with neural networks, restricted Boltzmann machines), committee methods (bagging, boosting), evolutionary computations (binary and real-coded genetic algorithm, evolution strategies, CMA-ES, AMaLGaM IDEA), rule-based inference.
- **Numerical methods**: matrix algebra, optimization, integration, differentiation, polynomial roots, curve & surface fitting, graph algorithms, single and multivariate distributions.
- **Programming**: C/C++ (>10 years), C#: (>10 years), Matlab, Assembler (x86, x96, x196), Python, Java, Julia, R.
- **Databases**: SQL, MS SQL Server, ADO.NET, NoSQL.
- **Parallel programming**: OpenMP, Windows threads.
- **Other:** DICOM file format; MIDI format; SCRUM; test-driven development; SVN, Git, TFS.

## Languages

- Russian (mother language)
- English (fluent)
- Korean (lower intermediate)

## Selected Academic Awards

1. Laureate of the National competition "Best Engineer - 2010", 2011.
2. Letter of gratitude from the Tomsk Polytechnic University, 2010.
3. Laureate of the Award of the State Duma of Tomsk Region, 2009.
4. Award by the Kapitsa Foundation for the best work in the "Mathematics and Informatics", 2006.

5. Bronze medal by the Tomsk Polytechnic University for excellence in study, 2004.
6. Best student research by the Russian association for artificial intelligence, 2004.

## References

- **Prof. Dr. Matthias Dehmer**
  Institute for Bioinformatics and Translational Research, UMIT
  Eduard Wallnoefer Zentrum 1, 6060
  A-Hall in Tyrol, Austria
  E-mail: Matthias.Dehmer@umit.at
- **Prof. Dr. Vladimir Red'ko**
  Center of Optical Neural Technologies of Scientific Research Institute for System Analysis
  Russian Academy of Sciences
  44/2, Vavilova St.
  Moscow, Russia
  119333
  E-mail: vgredko@gmail.com
- **Prof. Dr. Lyudmila Zinchenko**
  Bauman Moscow State Technical University
  2-nd Baumanskaya st, 5
  Moscow, Russia
  105005
  E-mail: lzinchenko@bmstu.ru

## Selected Publications

*Tutorials & Lectures:*

1. Tsoy Y.R. *Heuristics for Neuroevolution* // Tomsk Lecture Series on Computational Intelligence. Tomsk, April, 2012. In Russian.

   http://qai.narod.ru/TomskWorkshop/lecture_05_2012.pdf

2. Tsoy Y.R. *Estimation of Distribution Algorithms and Bayesian Optimization* // Tomsk Lecture Series on Computational Intelligence. Tomsk, October, 2011. In Russian.

   http://qai.narod.ru/TomskWorkshop/lecture_10_2011.pdf

3. Tsoy Y.R. *Neuroevolutionary Algorithms.* // Tomsk Lecture Series on Computational Intelligence. Tomsk, June, 2011. In Russian.

   http://qai.narod.ru/TomskWorkshop/lecture_06_2011.pdf

4. Tsoy Y.R. *Algorithms NEAT and Hyper-NEAT.* // Tomsk Lecture Series on Computational Intelligence. Tomsk, June, 2011. In Russian.

   http://qai.narod.ru/TomskWorkshop/neat_hneat_06_2011.pdf

5. Tsoy Y.R. *Neuroevolutionary Algorithms and Complex Adaptive Systems.* // Scientific Session of MEPHI - 2011. National scientific-technical conference "Neuroinformatics-2011": Lectures on Neuroinformatics. – Moscow, MEPHI, 2011. – P. 14-43. In Russian.

6. Tsoy Y.R. *Black Box Optimization Benchmarking - 2009 competition results.* // Tomsk Lecture Series on Computational Intelligence. Tomsk, April, 2010. In Russian.
   http://qai.narod.ru/TomskWorkshop/bbob2009_04_2010.pdf

7. Tsoy Y.R. *Artificial Neural Networks* // Tomsk Lecture Series on Computational Intelligence. Tomsk, March, 2010. In Russian. http://qai.narod.ru/TomskWorkshop/lecture_02_2010.pdf

8. Tsoy Y.R. *Modern Open-Source Libraries for Evolutionary Computation* // Tomsk Lecture Series on Computational Intelligence. Tomsk, December, 2009. In Russian. http://qai.narod.ru/TomskWorkshop/osea_12_2009.pdf

9. Tsoy Y.R. *Evolutionary Computation: History, State-of-the-art, and the Future* // Tomsk Lecture Series on Computational Intelligence. Tomsk, October, 2009. In Russian. http://qai.narod.ru/TomskWorkshop/lecture_10_2009.pdf

10. Tsoy Y.R. *An Introduction to Neuro-Evolutionary Approach: Main Concepts and Applications* // Scientific Session Of Mephi - 2007. Pan-Russian Scientific-Technical Conference "Neuroinformatics-2007": Lectures on Neuroinformatics, Vol. 2. – Moscow, Mephi, 2007. – P. 43-76. In Russian.

11. Spitsyn V.G., Tsoy Y.R. *Evolving Artificial Neural Networks* // IV Conf. For Students and Young Scientists "Youth And Modern Inf. Tech.". Tomsk, 2006. Pp. 411-413. In Russian.

*Book chapters:*

1. Tsoy Y. *Neuroevolutionary algorithms and complex adaptive systems* / In Kureichik V., Red'ko V., Zinchenko L. (Eds): Bionic Information Systems and their Applications. – Moscow: Physmatlit, 2011. – P. 128-156. In Russian.

2. Tsoy Y., Red'ko V.G. *Estimating Speed and Efficiency of Evolutionary Algorithms* / In Kureichik V., Red'ko V., Zinchenko L. (Eds): Bionic Information Systems and their Applications. – Moscow: Physmatlit, 2011. – P. 110-127. In Russian.

3. Dehmer M., Emmert-Streib F., Tsoy Y., Varmuza K. *Quantifying Structural Complexity of Graphs: Information Measures in Mathematical Chemistry* / In Putz M. (Editor): Quantum Frontiers of Atoms and Molecules in Physics, Chemistry, and Biology. – Nova Science Publishers, 2010. – P. 467-485.

*Journal Papers:*

1. Song M., Jeonga E., Lee T.K., Tsoy Y., Kwon Y.J., Yoon S. Analysis of image-based phenotypic parameters for high throughput gene perturbation assays // Computational Biology and Chemistry, 2015, doi:10.1016/j.compbiolchem.2015.07.005.

2. Nguyen T.T., Tsoy Y. A kernel PLS based classification method with missing data handling // Statistical Papers, 2015, doi: 10.1007/s00362-015-0694-y.

3. Nguyen T.T.*, Song K.*, Tsoy Y., Kim J.Y., Kwon Y.J., Kang M.J., Hansen M.A.E. Robust dose-response curve estimation applied to high content screening data analysis // Source Code for Biology and Medicine, 2014, vol. 9, p. 27.

4. Dehmer M., Tsoy Y. R. Numerical Evaluation and Comparison of Kalantari's Zero Bounds for Complex Polynomials // PLoS ONE, 2014, vol. 9, no. 10, e110540.

5. Dehmer M., Tsoy Y. R. *The Quality of Zero Bounds for Complex Polynomials* // PLoS ONE, 2012, vol. 7, no. 7, e39537.

6. Kolesnikova S.I., Lakhodynov V.S., Tsoy Y. *Study of the stochastic system states recognition quality* // Information Systems, 2010, no. 6, pp. 56-62. In Russian.

7. Dehmer M., Emmert-Streib F., Tsoy Y., Varmuza K. *Novel Information Measure for the Analysis of Structure of Chemical Graphs* // Bulletin of the Tomsk Polytechnic University, 2010, vol. 316, no. 5, pp. 5-11. In Russian.

8. Tsoy Y.R., Spitsyn V.G. *Neuroevolutionary image quality enhancement* // Proceedings of TPU, 2009, no. 5, pp. 131-137.

9. Yankovskaya A.E., Tsoy Y.R. *Using Genetic Algorithms in Intelligent Recognizing Systems* // Vestnik TSU. Control, computers and informatics. 2009. Vol. 7, no. 2, pp. 76-84.

10. Red'ko V.G., Tsoy Y.R. *Efficiency Of Evolutionary Search In Quasispecies Model* // Fuzzy Systems And Soft Computing, 2007, no. 1.

11. Tsoy Y.R. *Approximate Calculation Of Local Mean And Deviation For Digital Images Processing* // Information Technologies, 2007, no. 4, pp. 28-32. In Russian.

12. Tsoy Y.R., Spitsyn V.G. *An Approach To Enhancement Of The Visual Quality Of Monochrome And Color Images Based On Application Of The Evolving Neural Network* // Information Technologies, 2006, no. 7, pp. 27-33. In Russian.

13. Tsoy Y.R., Spitsyn V.G. *Evolutionary Approach To Design And Training Of Neural Networks* // Neuroinformatics, 2006, vol. 1, no. 1, pp. 31-58. (On-Line Peer-Reviewed Journal[3]). In Russian.

14. Tsoy Y.R. *On Mathematical Models of the Evolutionary Algorithms* // Promising Information Technologies And Systems, 2006, no. 2, pp. 42-47. (On-Line Journal) In Russian. Journal Site

15. Red'ko V.G., Tsoy Y.R. *Estimation of Efficiency of Evolutionary Algorithms* // Proceedings Of The Russian Academy Of Sciences, 2005, vol. 404, no. 3, pp. 312-315. In Russian.

16. Tsoy Y.R., Spitsyn V.G. *Using Genetic Algorithm With Adaptive Mutation Mechanism For Neural Networks Design And Training* // Optical Memory And Neural Networks, 2004, vol. 13, no. 4, pp. 225-232.

*Conference Papers:*

1. Tsoy Y.R. Towards assessment of the image quality in the high-content screening // IS&T/SPIE Electronic Imaging, 2015. 939603-939603-9

2. Tsoy Y.R. *What Neuroevolutionary Algorithm Without Heuristics Is Capable For?* // Proceedings of the The 13th Russian Conference on Artificial Intelligence. - Belgorod, Russia, October 16-20, 2012. In Russian. In Press.

3. Tsoy Y.R. *Using Neural Networks for Dynamic Reduction of the Features Space Dimensionality* // Proceedings of The 7th International Forum on Strategic Technology (IFOST2012). - Tomsk, Russia, September 18-21, 2012. In Press.

4. Tsoy Y.R. *Using Bayesian optimization algorithm for neural network training* // Proceedings of the V National conference "Optimization Problems and their Economical Applications". - Omsk, Russia, July 2-5, 2012. In Russian.

5. Tsoy Y.R. *Evolving Linear Neural Networks for Features Space Dimensionality Reduction* // Proceedings of the 2012 IEEE International Joint Conference on Neural Networks (IJCNN 2012). - Brisbane, Australia, June, 10-15, 2012. P. 2227-2232

6. Tsoy Y.R. *Neuroevolutionary Method for Computing Pseudo-Principal Components* // National Sci.-Tech. Conf. "Neuroinformatics-2012": Proc., Vol. 1. Moscow, Mephi, 2012. P. 21-30. In Russian.

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[3] http://www.niisi.ru/iont/ni/Journal/ (in Russian)

7. Tsoy Y.R. *Neuroevolutionary Pseudo-Principal Components Analysis* // Proceedings of the 8-th Open German-Russian workshop on pattern recognition and image understanding (21-26 Nov, 2011). Nizhniy Novgorod, Russia. P. 295-298.

8. Tsoy Y.R. *Improving quality of the combined training of neural networks* // Proceedings of 15-th Pan-Russian Conference Mathematical Methods for Pattern Recognition (Petrozavodsk, September 11-17, 2011). Moscow: MAX Press, 2011. P. 120-123. In Russian.

9. Tsoy Y.R. *Neuroevolutionary transform of a features space for neural classification problems* // Proceedings of VI Conference on Integrated models and soft computing in artificial intelligence. (16-19 May 2011, Kolomna, Russia). Vol. 2. – Moscow: Physmatlit, 2011. – P. 669–676. In Russian.

10. Tsoy Y.R. *Combining neuroevolutionary and gradient learning for solving classification problems* // Computational Intelligence (Results, Problems and Perspectives): Proceedings of the First International Conference (10-13 May 2011, Cherkasy, Ukraine). – Cherkasy: McLaut, 2011. – P. 75-76.

11. Tsoy Y.R. *Do Corner Pixels Contain Enough Information for Image Categorization?*// Proceedings of the 10th International Conference "Pattern Recognition and Image Analysis: New Information Technologies" PRIA-10-2010 (December 5-12, 2010. St. Petersburg, The Russian Federation) Vol. 1. - St. Petersburg: POLITECHNIKA, 2010. - P. 363-366.

12. Tsoy Y.R. *On Adaptive Increase of the Features Space Dimensionality*// 12th Int. Conf. with Int. Participation on Artificial Intelligence (CAI-2010), Vol. 4. – Moscow: Physmathlit, 2010. – P. 134-140. In Russian.

13. Spitsyn V.G., Tsoy Y.R., Bolotova Y.A. *Neuroevolutionary Enhancement and Segmentation of Aerial Images* // Proceedings of the 12-th International Conference "Digital Signals Processing and its Applications". - Moscow, 2010. - P. 342-345. In Russian.

14. Tsoy Y.R. *Neuroevolutionary Approach to Image Quality Assessment* // Pan-Russian Sci.-Tech. Conf. "Neuroinformatics-2010": Proc., Vol. 2. – Moscow, Mephi, 2010. – P. 467-485. In Russian.

15. Tsoy Y.R., Spitsyn V.G. *Fast Neuroevolutionary Digital Image Enhancement* // 2009 USNC/URSI National Radio Science Meeting: Abstracts - Charleston, USA. - June 1-5, 2009. - Charleston: URSI. - 2009. - c. 345

16. Tsoy Y.R. *On Evolving Neural Networks and Modelling of Open-Ended Evolution* // Scientific Session of MEPHI - 2009. Pan-Russian scientific-technical conference "Neuroinformatics-2009": Proceedings, vol. 1. – Moscow, MEPHI, 2009. – P. 201. In Russian.

17. Tsoy Y.R. *Computational Regulatory Networks and Self-Adaptive Neuroevolutionary Algorithm* // 11th Int. Conf. with Int. Participation on Artificial Intelligence (CAI-2008), Vol. 3. – Moscow: LENAND, 2008. – P. 50-57.

18. Tsoy Y.R. *Computational Regulatory Networks* // Scientific Session of MEPHI - 2008. Pan-Russian scientific-technical conference "Neuroinformatics-2008": Proceedings, vol. 1. – Moscow, MEPHI, 2008. – P. 148. In Russian.

19. Tsoy Y.R., Spitsyn V.G., Chernyavsky A.V. *No-Reference Image Quality Assessment Through Interactive Neuroevolution* // Proc. of Int. Conf. on Comp. Graphics (Graphicon-2007), June 23-27, 2007, Moscow State University, Moscow, Russia, P. 156-159.

20. Tsoy Y.R. *ECWorkshop – An Instrumental Classes Library for Evolutionary Computation* // Proc. of the Joint Int. Sci.-Tech. Conf. "IEEE Artificial Intelligent Systems" and "Intelligent Computer Aided Design". – Moscow: Phizmatlit, 2007. – P. 94-101. In Russian.

21. Tsoy Y. R., Spitsyn V.G. *Digital Images Enhancement With Use of Evolving Neural Networks* // Proc. of the IX Int. Conf. Parallel Problems Solving From Nature (PPSN-IX), Reykjavik, Iceland, September 9-13, 2006. LNCS, Vol. 4193. – Berlin: Springer-Verlag, 2006. – P. 593-602.

22. Tsoy Y.R. On *Application of Neural Networks to Approximation of the Rules Table of Cellular Automata* // A.N. Gorban, E.M. Mirkes (Eds): Neuroinformatics and its Applications: Proc. of the XIV Pan-Russian Workshop, Oct., 6-8, 2006. – ICM SB RAS, Krasnoyarsk, 2006. – P. 129-130.

23. Tsoy Y.R. *One Method for Computing of Mixing Time of Genetic Crossing Operators* // Proc. of 10th National Conf. with Int. Participation on Artificial Intelligence (CAI-2006), Vol. 3. – Moscow: Phizmatlit, 2006. – P. 1047-1054.


*Translations into Russian (author's permission granted):*

1. Mitchell M. *Exact Mathematical Models of Simple Genetic Algorithms* / Chapter 4.3 from Mitchell M. An Introduction to Genetic Algorithms. Cambridge, MA: The MIT Press, 1996

2. Mitchell M. *Statistical Mechanics Approaches* / Chapter 4.4 from Mitchell M. An Introduction to Genetic Algorithms. Cambridge, MA: The MIT Press, 1996.

3. Luke S. *Essentials of Metaheuristics. A Set of Undergraduate Lecture Notes*. 2009 (http://cs.gmu.edu/~sean/book/metaheuristics/)


## Grants

- Grant by the Russian Foundation for Basic Research, project no. 12-08-00296-a "Creation of complex technologies of object recognition on images on the basis applying of models of visual perception and methods of computational intelligence", 2012-2014. *Implementer*.

- Grant by the Russian Foundation for Basic Research, project no. 11-07-00027-a, " Basic Theory of Development and Software of High Performance Artificial Information System for Aerospace Monitoring", 2011-2013. *Implementer*.

- Grant by the Human Capital Foundation "Automated adaptive image categorization method", Russia, 2010. *Head*.

- Grant by the Russian Foundation for Basic Research, project no. 09-08-00309-a, "Development of software complex for the automated image processing and pattern recognition on the base of artificial neural networks, regulatory networks and evolutionary algorithms", 2009-2011. *Implementer*.

- Grant by the Russian Foundation for Basic Research, project no. 09-01-99014-r_ofi, "Development of approaches to increase efficiency of pattern recognition methods and algorithms and their quality estimation", 2009-2010. *Implementer*.

- Grant by the Russian Foundation for Basic Research, project no. 06-08-00840, "Development of automation technologies of digital images enhancement on the base of evolving artificial neural network application", 2006-2008. *Implementer*.

- Individual grant for young scientists by the Tomsk Polytechnic University, "Development of the neural networks based method for enhancement of digital images", 2007. *Head*.


## Scientific societies membership

- Member of the Russian Neural Networks Society.
- Member of the Russian Association for Fuzzy Systems and Soft Computing, Vice-president for Neural Computation (2011).
- Member of the Russian Association for Pattern Recognition and Image Analysis.

**Scientific service**

1. **Conference reviewer**: International Joint Conference On Neural Networks (2005-2007, 2011-2014), Neuroinformatics (Russia, 2006-2012).
2. **Journal reviewer**: Neural Computations (MIT Press), Pattern Recognition (Elsevier), Engineering Applications of Artificial Intelligence (Elsevier). Central European Journal of Computer Science (Springer)
3. **Member of organizing committee**: Workshop on Bionic Information Systems and their Applications (Dubna, Russia, 2008), Workshop on Computational Intelligence and Metaheuristics (Tver', Russia, 2010), Prospects of Development of Fundamental Sciences (Tomsk, Russia, 2009-2013).
4. **Member of program committee**: Hybrid and Synergetic Intelligent Systems (Kaliningrad, Russia, 2012).
5. **Co-founder**: Tomsk Lecture Series on Computational Intelligence[4] (held once in 2 months since October, 2009).
6. **Founder and owner** of one of the oldest and most informative Russian web-sites about genetic algorithms and evolutionary computation[5] (since February 2003).
7. **Founder** of the discussion group ECEtc[6] on Google Groups, dedicated to evolutionary computation, neuroevolutionary algorithms and metaheuristics (launched at Dec, 2006, 71 members as for April 03, 2012).

**Family**

- **Married** (since December 2, 2006)
- Wife: **Olga Tyan** (born May 24, 1985)
- Children: son **Andrei** (born April 23, 2008)
  son **Artyom** (born February 15, 2011)

**Other**

- **Driving licence**.
- **Interests**: Guitar playing, Reading, Sport version of "What? Where? When?", Project Euler tasks solving.

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[4] http://qai.narod.ru/TomskWorkshop/index.html (in Russian)

[5] http://qai.narod.ru (most contents is in Russian)

[6] http://groups.google.com/group/ecetc?hl=ru (in Russian)