Curriculum Vitae
Alexander Gammerman

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Research Areas

Pattern recognition; machine learning; Kolmogorov randomness; applications of machine learning in medical diagnostics, forensic science, homeland security, bioinformatics and other fields.

Education

MSc in Physics; PhD (candidate of physics and mathematics sciences)(1974), St.Peterburg; PhD thesis: "Mathematical Modelling of Phytochrome."Scientific supervisors: Prof.Leonid Y. Fukshansky and Academician Boris N. Moshkov.

Employment

1974–1976 AgroPhysical Research Institute, St.Peterburg

- Senior Engineer

1976–1980 Regional Research Computer Centre, St.Petersburg

- Senior Research Fellow

1980–1983 Computer Centre, St.Petersburg Health Service Bureau, St.Petersburg

- Research Fellow

1983–1993 Department of Computer Science, Heriot-Watt University, Edinburgh, UK

- Lecturer in Computer Science 1983–1987
- Senior Lecturer in Computer Science 1987–1990
- Reader 1990–1993

1993-present Department of Computer Science Royal Holloway, University of London

- Professor of Computer Science 1993–present
- Head of Computer Science Department 1995–2005
- Founding Director of Computer Learning Research Centre 1998–present

Research and Expertise

- *Publications*: 8 books authored and edited; over 150 refereed publications, including books, journal papers, conference proceedings, reports.
- *Research Grants*: 15 major grants over the last 10 years from EU Framework 6,7; EPSRC, BBSRC, MRC, UK government, China, Cyprus government, industry, etc. The most recent grants are: EU Horizon 2020 grant (2015 – 2018); EPSRC grant (2013-2016) and EPSRC iCASE award (2015 – 2018).
- *PhD students*: supervised and co-supervised 22 research postgraduate students; 18 awarded PhD and 4 in progress.

For detailed research programme, grants, publications, and teaching - see http://www.clrc.rhul.ac.uk/people/alex/index.html

Awards and Prizes

- P.W. Allen Prize of Forensic Science Society, 1996.
- Transductive Learning. Best paper prizes at SCIS and ISIS *Joint 3rd International Conference on Soft Computing* and Intelligent Systems and 7th International Symposium on Advanced Intelligent Systems, Tokyo, Japan, 2006.

- Reliable classification of childhood acute leukaemia
  from gene expression data using Confidence Machines.
  Best paper award at *IEEE International Conference on Granular Computing* Atlanta, USA, 2006 (joint work with Z.Luo and A.Bellotti).
- AIA-08 Prize: Modern algorithms in Machine Learning. Artificial Intelligence and Applications Conference-08, Innsbruck, Austria, 2008.

Honorary, Distinguished and Visiting Professorships

- Visiting Professor at School of Telecommunications
  University Polytechnic de Madrid, Madrid, Spain, 2003.
- Senior Research Scientist/Visiting Professor, Department of Computer Science and Center Computer Learning Systems, Columbia University New York, USA, 2004.
- Honorary Professor, University College London, from 2006 – 2010.
- Visiting Professor, University of Paris 9 (Dauphine), 2008 – 2009.
- Distinguished Professor (Profesor visitante distinguido Santander-UCM) of Complutense University de Madrid, Spain, 2010.

Learned Societies

- Fellow of the Royal Statistical Society; 1985 – present.
- Chartered Fellow of the British Computer Society: 1990 – 2011.
- EPSRC College 2004-2006.
- British Classification Society, 2011 – present.

Editorial Boards

- Editorial Board: The Law, Probability and Risk journal: 2002 – 2009.
- Editorial Board: The Computer Journal: 2005 – 2008.

Journals Reviewing

- Reviews for numerous journals and conferences in computer science, pattern recognition and artificial intelligence:
  - *IEEE Transactions on Information Theory*,
  - *IEEE Transactions on Pattern Recognition and Machine Intelligence*
  - *IEEE Transactions on Signal Processing*,
  - *Journal of Computer and System Sciences*,

– *Annals of Mathematics and Artificial Intelligence*
– *Pattern Recognition Letters*
– *Computational Statistics and Data Analysis*

Chair and Member of Conference Programmes and Organising Committees

- Organiser and co-Chair of *Kolmogorov Lecture and Medal* Committee at University of London ; 2003 – present
- Chair *Artificial Intelligence and Applications AIA 2008 Conference*, Innsbruck, Austria, February 2008.
- co-Chair *1st Conformal Prediction and its Applications Workshop*, COPA, AIAI2012, Halkidiki, Greece, Sept. 2012.
- co-Chair *2nd Conformal Prediction and its Applications Workshop*, COPA, AIAI2013, Cyprus, Sept.-Oct. 2013.
- co-Chair *2nd Conformal Prediction and its Applications Workshop*, COPA, AIAI2013, Rhodes, Greece, Sept. 2014.
- co-Chair *Symposium on Statistical Learning and Data Sciences (SLDS)*, SLDS2015, London, April 2015.
- Member of Programme Committee (PC) *International Conference on Data Mining (ICDM13)*, Dallas, Texas, USA, 2013. *Symposium on Statistical Learning and Data Sciences (SLDS), Paris, April 2009; Florence, 2012.*
- PC member *Conference on Intelligent Data Analysis (IDA), London, 1995; Amsterdam, 1997; Paris,1999,*
  2001, Lisbon; 2003, Berlin; 2005, Madrid, 2007; Barcelona, 2009; Helsinki, 2012.
- PC member *Knowledge and Data Discovery - 02 Conference, USA, 2002.*
- PC member *International Conference on Artificial Intelligence Applications* (AIAB 2011) and the *12th EANN & 7th AIAI Joint Conference 2011*, 15-18 September 2011, Corfu, Greece.
- PC member *Multidisciplinary MEMORIAL CONFERENCE*: in the memory of RAY SOLOMONOFF (1926-2009), Nov 29, 2011 - Dec 2, 2011, Melbourne, Australia
- *International Classification Conference ICC-2011*, 11-15 July, 2011, St Andrews, Scotland,
- PC member *IEEE International Conference on Data Mining series (ICDM)*, December 2011, Vancouver, Canada.

Invited Conference Talks

- International School for Synthesis of Expert Knowledge (ISSEK-2000), Udine, Italy, 2000.
- Office for National Statistics, London, 2000.
- A MathFIT Workshop: Application of Multiple-Valued Logic to Artificial Intelligence and to Data Mining, Belfast, April, 2001.
- Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Universidad Politecnica de Madrid,July, 2001.
- DTI/EPSRC workshop Risk Assessment Techniques for Design and Safety Management, London, April, 2001.
- Imputation with Support Vector Machine, EU Conference on Imputation and Editing, Jyvaskyla, Finland, 2002.
- National Statistical Office, Neuchatel, Switzerland, 2003
- Heriot-Watt, School of Mathematical Sciences, 2004.
- Bioinformatics workshop, St.Georges Medical School, 2005.
- Czech Technical University, Prague, 2006.
- 2nd Computer Journal Lecture, British Computer Society, London, 2006.
- German Statistical Society and Free University of Berlin, 2007.
- LEARNING 2007, San Juan, Puerto Rico, March 19-22, 2007
- AIA 2008 conference, Innsbruck, Austria, February, 2008.
- Computer Science at Frederick University, Cyprus, June, 2008.
- Dauphine University, Paris, 2008.
- Multivariate Analysis and Econometrics, invited talk, Tsahkadzor, Armenia, September, 2008.
- Statistical Learning and Data Sciences (SLDS), invited talk, Paris, April 2009.
- Multivariate Statistical Analysis, invited talk, Moscow, June 2009.
- Confidence Machine for Proteomic Pattern Diagnostics. The 57th Session of the International Statistical Institute. Durbin, South Africa, August 2009.
- Online Machine Learning in Data Analysis, EURATOM-CIEMAT, Madrid, January 2010.

- Modern Machine Learning Techiques, 7th International Conference on Artificial Intelligence AIAI, Cyprus, October 2010.
- Laboratori Nazionali di Frascati, Italy, November 2011.
- Statistical Learning and Data Sciences (SLDS), Florence, May 2012.
- Medical Image Analysis Lab, St.Georges, University of London, February, 2013.
- Mendel Conference, Brno, Czech Republic, invited talk, June, 2013.
- The Yandex School of Data AnalysisвЃ Єs conference on *Machine Learning and Big Data*, Moscow, invited talk, Sept-Oct., 2013.

PhD examiner

- University of Edinburgh, Department of Artificial Intelligence, 1996;
- University of Helsinki, Department of Computer Science, 1997.
- University College, London, 1998.
- Birbeck College, London, 1999.
- Imperial College, London, 2002.
- University Polytechnic de Madrid, Madrid, 2004.
- University College, London, 2005.
- Imperial College, London, 2006.
- Brunel University, London, 2007.
- Brunel University, 2008.
- Birbeck College, London, 2008.
- Brunel University, London, Feb 2009.
- Cardiff University, Cardiff, April 2011.
- Queen Mary, London, August 2013

Member of Selection Panels and Appointments

External member of panel in the selection and appointment of Professors and Readers:

- University of Belfast, 1996.
- Chair in Computer Science, University of Belfast, 1996.
- Goldsmith College, University of London, 1998.
- Chair in Computer Science in Goldsmith College, London, 1998.
- Heriot-Watt University, Edinburgh, 2000.
- Chair in Computer Science at Heriot-Watt, 2000.
- Birbeck College, University of London, 2002.
- Reader/Chair in Computer Science, Birbeck College, London, 2002.
- Member of the Panel for Fellowship selection for Finnish Academy of Science - 2005.
- Reader/Chair in various departments, Royal Holloway, London, 1995–2007.

Royal Society programmes/Visits

- RS visit to China, 1995: lectures and seminars in Beijing Tsinghua University, Beijing Xi'an Jiao Tong University, Xian; Jilin University, Changchun; and the Academy of Science of China, Beijing.
- "Random number generator"; Royal Society programme with the Russian Academy of Sciences, 2003–2005 (Professor B.Ryabko).
- Visit to China, 2010: lectures and seminars at Zhejiang University, Hangzhou.
- "Machine learning algorithms a Royal Society programme with China Zhejiang University, Hangzhou, 2009 -2 010 (with Dr.Z.Luo and Professor Guang Li).

International Visitors

- Professor Nobuo Suematsu - Computer Science, Hiroshima University, 2003-2004;
- Professor Hong Zhao - Computer Science from Beijing (China) visited in 2006-07.

- Professor Matilde Santos - Physics Department, University de Madrid, 2007-08.
- Prof. Z.Ivin, Moscow State University, 2012.

PhD students:

Supervised and co-supervised 22 postgraduate research students; 18 were awarded PhD degrees and 4 are in progress. The former PhD students work now in industry, financial sector and universities, including Facebook, Microsoft, Xerox, Amazon, Credit Suisse, Pricewaterhouse, Yandex and others.

Selected Publications

Books

1. A. Gammerman, (ed.) Probabilistic Reasoning and Bayesian Belief Networks. Alfred Waller, Henley-on-Thames, 1995.

2. A. Gammerman, (ed.) Computational Learning and Probabilistic Reasoning. John Wiley & Sons, Chichester, 1996.

3. A. Gammerman. Machine Learning: Progress and Prospects. ISBN 0 900145 93 5, 1997.

4. A. Gammerman, (ed.) Causal Models and Intelligent Data Management. Springer-Verlag, 1999.

5. V.Vovk, A.Gammerman and G.Shafer. Algorithmic learning in a random world. New York: Springer, 2005.

6. A.Gammerman, (ed.) Artificial Intelligence and Applications, Proceedings of the Conference, ACTA Press, ISBN: 978-0-88986-709-3, 2008.

7. Gammerman, A., Vovk, V. & Papadopoulos, H. (eds.). Statistical Learning and Data Sciences: Third International Symposium, SLDS 2015, UK, April 20-23, 2015, Springer LNAI, Proceedings, Vol. 9047.

8. V.Vovk, A.Gammerman and H.Papadoupolus (eds). Measures of Complexity. Festchrift in honor of Alexey Chervonenkis. Springer, 2015.

Special Issues of Journals

9. A.Gammerman and V.Vovk (editors). Special Issue on Kolmogorov Complexity. *The Computer Journal*, vol. 42, no. 4, pp.254-347, (1999).

10. C. Aitken, T. Connolly, A. Gammerman, G. Zhang, D. Oldfield. Predicting an Offender's Characteristics: an evaluation of statistical modelling. *Special Interest Series - Paper 4*, Home Office, London, 1995.

11. Alexander Gammerman and Vladimir Vovk. The 2nd British Computer Society Lecture. Hedging Predictions in Machine Learning. Published with discussion in *The Computer Journal*, v.50, No.2, 151-163, March 2007. The same journal also published: i) Discussion on Hedging Predictions in Machine Learning. *T*he Computer Journal, 2007, 50: 164-172; ii) Rejoinder Hedging Predictions in Machine Learning. *T*he Computer Journal, 2007, 50: 173-177.

12. Alex Gammerman, Ilia Nouretdinov, Brian Burford Alexey Chervonenkis, Vladimir Vovk and Zhiyuan Luo. Clinical Mass Spectrometry Proteomic Diagnosis by Conformal Predictors. *Statistical Applications in Genetics and Molecular Biology Journal*, Volume 7, Issue 2 2008 Article 13, 2008.

13. Alexander Gammerman. Conformal Predictors. *Progress in Artificial Intelligence, v.1, No.3, 2012*

14. Harris Papadopoulos, Volodya Vovk, Alex Gammerman. *Annals of Mathematics and Artificial Intelligence*, vol.74 (1-2), May-June 2015. Guest editors of the Special issue on **Conformal Prediction and its Applications**. DOI 10.1007/s10472-014-9429-3, 2015.

Refereed Book Chapters, Journal Papers, Conference Proceedings

15. Smith, J., Nouretdinov, I., Craddock, R., Offer, C. & Gammerman, A. Conformal Anomaly Detection of Trajectories with a Multi-class Hierarchy Statistical Learning and Data Sciences: Third International Symposium, SLDS 2015, Egham, UK, April 20-23, 2015, Springer LNAI Proceedings. Gammerman, A., Vovk, V. & Papadopoulos, H. (eds.). Vol. 9047, p. 281-290 10 p.

16. Cherubin, G., Nouretdinov, I., Gammerman, A., Jordaney, R., Wang, Z., Papini, D. & Cavallaro, L. Conformal Clustering and Its Application to Botnet Traffic.
Statistical Learning and Data Sciences: Third International Symposium, SLDS 2015, Egham, UK, 2015.
Gammerman, A., Vovk, V. & Papadopoulos, H. (eds.). Springer LNAI Proceedings 2015, Vol. 9047, p. 313-322 10 p.

17. Alexander Gammerman. Forward to the book emph Conformal Predictions for Reliable Machine Learning: Theory, Adaptations and Applications; editors: Vineeth Balasubramanian, Shen-Shyang Ho, Vladimir Vovk. Springer, 2014.

18. Ilia Nouretdinov, Tony Bellotti and Alexander Gammerman. Diagnostic and Prognostic by Conformal Predictors. Published in: *Conformal Predictions for Reliable Machine Learning: Theory, Adaptations and Applications*, pp.217–230; editors: Vineeth Balasubramanian, Shen-Shyang Ho, Vladimir Vovk. Springer, 2014.

19. Tony Bellotti, Ilia Nouretdinov, Meng Yang, Alex Gammerman. Feature Selection by Conformal Predictors. Published in: *Conformal Predictions for Reliable Machine Learning: Theory, Adaptations and Applications*, pp.115–130; editors: Vineeth Balasubramanian, Shen-Shyang Ho, Vladimir Vovk. Springer, 2014.

20. Antonis Lambrou, Harris Papadopoulos, Ilia Nouretdinov, and Alexander Gammerman. Reliable probabilistic outputs for large datasets. *Annals of Mathematics and Artificial Intelligence*, Sept.2014.

21. Ilia Nouretdinov, Dmitry Devetyarov, Brian Burford, Volodya Vovk, Stephane Camuzeaux, Aleksandra Gentry-Maharaj, Ali Tiss, Celia Smith, Zhiyuan Luo, Alexey Chervonenkis, Rachel Hallett, Mike Waterfield, Rainer Cramer, John F. Timms, Ian Jacobs, Usha Menon, **Alex Gammerman**. Multiprobabilistic Prediction in Early Medical Diagnoses. *Annals of Mathematics and Artificial Intelligence*, Sept.2014.

22. Brian Burford, Aleksandra Gentry-Maharaj, Rosalind Graham, Diane Allen, Johannes Pedersen, Aaron Nudelman, Ola Blixt, Evangelia-Ourania Fourkala, Deanna Bueti, Anne Dawnay, Jeremy Ford, Rakshit Desai, Leonor David, Peter Trinder, Bruce Acres, Tilo Schwientek, **Alex Gammerman**, Celso Reis, Luisa Silva, Hugo Osorio, Rachel Hallett, Hans Wandall, Ulla Mandel, Michael A Hollingsworth, Ian Jacobs, Ian Fentiman, Henrik Clausen, Joyce Taylor-Papadimitriou, Usha Menon, and Joy Burchell.

    Autoantibodies to MUC1 glycopeptides cannot be used as a screening assay for early detection of breast, ovarian, lung or pancreatic cancer. *British Journal of Cancer* (2013) 108, 2045вГУ2055. doi:10.1038/bjc.2013.214

    Antonis Lambrou, Harris Papadopoulos, and Alexander Gammerman. Osteoporosis Risk Assessment with Well-Calibrated Probabilistic Outputs. In *Proceedings of the 9th Artificial Intelligence Applications and Innovations Conference (AIAI)*, pp.432-441, eds. by H.Papadopoulos, A.Andreou, L. Iliiadis, I.Magologiannis, Springer, 2013.

23. Valentina Fedorova, Alex Gammerman, Ilia Nouretdinov and Vladimir Vovk. Conformal prediction under hypergraphical models. In Proceedings of the *9th Artificial Intelligence Applications and Innovations Conference (AIAI)*, pp.371–383, Springer, 2013.

24. Valentina Fedorova, Alex Gammerman, Ilia Nouretdinov, Volodya Vovk. Plug-in martingales for testing exchangeability on-line. *International Conference on Machine Learning*, 2012. Full text available at: arXiv:1204.3251v1.

25. Ilia Nouretdinov, Alex Gammerman, Yanjun Qi, Judith Klein-Seetharaman. Determining Confidence of Predicted Interactions Between HIV-1 and Human Proteins Using Conformal Method *Pacific Symposium on Biocomputing*, 17. p. 311–322; 2012

26. Devetyarov, D., Nouretdinov, I., Burford, B., Camuzeaux, S., Gentry-Maharaj, A., Tiss, A., Smith, C., Luo, Z., Chervonenkis, A., Hallett, R., Vovk, V., Waterfield, M., Cramer, R., Timms, J.F., Sinclair, J., Jacobs, I., Menon, U., Gammerman, A. Conformal Predictors in Early Diagnostics of Ovarian and Breast Cancers. In: *Progress in Artificial Intelligence*, v.1, No.3, pp.245-357, 2012).

27. Valentina Fedorova, Ilia Nouretdinov, Alex Gammerman. Testing exchangeability assumption. *Progress in Artificial Intellegence*, v.1, No.3, pp.205–213, 2012)

28. Olga Ivina, Ilia Nouretdinov, Alex Gammerman. Valid predictions with confidence estimation in air pollution problem. *Progress in Artificial Intellegence*, v.1, No.3, pp.235-243, 2012)

29. Nouretdinov, I., Devetyarov, D., Burford, B., Camuzeaux, S., Gentry-Maharaj, A., Tiss, A., Smith, C., Luo, Z., Chervonenkis, A., Hallett, R., Vovk, V., Waterfield, M., Cramer, R., Timms, J.F., Jacobs, I., Menon, U., Gammerman, A. Multiprobabilistic Venn Predictors with Logistic Regression. In: 8th AIAI *Artificial Intelligence Applications and Innovations* Conference, 1st Conformal Prediction and its Applications Workshop (COPA 2012).

30. Antonis Lambrou, Harris Papadopoulos, Ilia Nouretdinov, Alexander Gammerman Reliable probability estimates based on Support Vector Machines for large multiclass datasets.
In: 8th AIAI *Artificial Intelligence Applications and Innovations* Conference, 1st Conformal Prediction and its Applications Workshop (COPA 2012).

31. Harris Papadopoulos, Alexander Gammerman, Volodya Vovk Confidence Predictions for the Diagnosis of Acute Abdominal Pain. *Artificial Intelligence Applications and Innovations III*, Proceedings of the 5TH IFIP Conference on Artificial Intelligence Applications and Innovations (AIAI'2009), April 23-25, 2009, Thessaloniki, Greece; 01/2009

32. Timms JF, Menon U, Devetyarov D, Tiss A, Camuzeaux S, McCurrie K, Nouretdinov I, Burford B, Smith C, Gentry-Maharaj A, Hallett R, Ford J, Luo Z, Vovk V, Gammerman A, Cramer R, Jacobs I. "Early detection of ovarian cancer in samples pre-diagnosis using CA125 and MALDI-MS peaks". *Cancer Genomics Proteomics*. 2011 Nov;8(6):289-305.

33. H. Papadopoulos, V. Vovk and A.Gammerman. "Regression Conformal Prediction with Nearest Neighbours *Journal of Artificial Intelligence Research*, Volume 40, pages 815-840, 2011.

34. Dmitry Adamskiy, Ilia Nouretdinov and Alex Gammerman. "Conformal prediction in semi-supervised case". Chapter 4 in *"Learning and Data Science"*, edited by L.Bottou, F.Murtagh, M.Gettler-Summa, B.Goldfarb, C.Pardoux, M.Touati; Chapman&Hall, Paris, 2011.

35. I.Nouretdinov, S.Costafreda, A.Gammerman, A.Chervonenkis, V.Vovk, V.Vapnik and C.Fu. "Machine learning classification with confidence: Application of transductive conformal predictors to MRI-based diagnostic and prognostic markers in depression". *NEUROIMAGE*, volume 56, issue 2, year 2011, pp. 809 - 813.

36. A.Lambrou, H.Papadopoulos, E.Kyriacou, C.Pattichis, A.Nicolaides and A.Gammerman. "Assessment of stroke risk based on morphological ultrasound image analysis with conformal prediction". Submitted for

publication in the *International Journal on Artificial Intelligence Tools* (IJAIT), 2011. Also appeared in the 6th IFIP International Conference on Artificial Intelligence Applications & Innovations, AIAI 2010.

37. M.Yang, I.Nouretdinov, Z.Luo and A.Gammerman. "Feature selection by Conformal Prediction". Accepted for publication in Proceedings of the *Workshop on Artificial Intelligence Applications in Biomedicine* (AIAB 2011).

38. C.Zhou, I.Nouretdinov, Z.Luo and A.Gammerman. "Development of the Venn Machine". Accepted for publication in Proceedings of the *Workshop on Artificial Intelligence Applications in Biomedicine* (AIAB 2011).

39. D.Adamsky, I.Nouretdinov and A.Gammerman. "Applying Conformal Prediction to the Bovine TB Diagnosing". Accepted for publication in Proceedings of the *Workshop on Artificial Intelligence Applications in Biomedicine* (AIAB 2011).

40. A.Gammerman and V.Vovk. "Predictions contolees en apprentissage automatique". *MODULAD* Journal, v.42pp.16-33, 2010. In French.

41. Dmitry Devetyarov, Martin J. Woodward, Nicholas G. Coldham, Muna F. Anjum, Alex Gammerman. "A New Bioinformatics Tool for Prediction with Confidence". 2010 International Conference on Bioinformatics and Computational Biology (*BIOCOMP'10*) Proceedings, p. 24-26, 2010.

42. Ola Blixt, Deanna Bueti, Brian Burford, Diane Allen, Sylvain Julien, Michael Hollingsworth, Alex Gammerman, Ian Fentiman, Joyce Taylor-Papadimitriou and Joy M. Burchell. "Autoantibodies to aberrantly glycosylated MUC1 in early stage breast cancer are associated with a better prognosis". Accepted for publication in *Breast Cancer Research Journal* (MS : 1027144559463124).

43. John Francis Timms, Usha Menon, Dmitry Devetyarov, Ali Tiss, Stephane Camuzeaux, Aleksandra Gentry-Maharaj, Zhiyuan Luo, Alex Gammerman, Rainer Cramer, Ian Jacobs. "Early detection of ovarian cancer in pre-diagnosis samples using CA125 and MALDI MS peaks". Submitted to the *Journal of Gynecologic Oncology.*

44. V.Vovk, I.Nouretdinov and A.Gammerman. "On-line predictive linear regression". *Annals of Statistics*, Volume 37, Number 3 (2009), 1566-1590. Permanent link to this document: http://projecteuclid.org/euclid.aos/1239369032 Digital Object Identifier: doi:10.1214/08-AOS622

45. A. Lambrou, H. Papadopoulos and A. Gammerman. "Evolutionary Conformal Prediction for Breast Cancer Diagnosis". *9th International Conference on Information Technology and Applications in Biomedicine* (ITAB'09).

46. Harris Papadopoulos, Volodya Vovk and Alex Gammerman. Reliable diagnosis of acute abdominal pain with conformal prediction.
Journal of Engineering Intelligent Systems, Vol 17 Nos 2/3 June/September 2009, pp.127-137.

47. I.Nouretdinov, D.Devetyarov and A.Gammerman. Application of Inductive Confidence Machine to ICMLA-competition data. *8th International Conference on Machine Learning and Applications* - ICMLA 2009, Miami, Florida, 2009.

48. A.Gammerman, R.J.Richards, I.Nouretdinov. Detection and Abundance Estimation of Material Classes from Airborne from LWIR Hyperspectral Data. EMRS DTC 6th Conference, Edinburgh, 2009.

49. D.Devetyarov, I. Nouretdinov and A.Gammerman. Confidence Machine and its application to Medical Diagnosis; *Int.Conf.on Biological Computing* (BioComp09), July 2009, USA.

50. A. Lambrou, H. Papadopoulos, A. Gammerman Reliable Confidence Measures for Medical Diagnosis With Evolutionary Algorithms IEEE Transactions on Information Technology in Biomedicine (impact factor: 1.68). 02/2011; DOI:10.1109/TITB.2010.2091144

51. Antonis Lambrou, Harris Papadopoulos, Alexander Gammerman Reliable Confidence Measures for Medical Diagnosis With Evolutionary Algorithms. IEEE Transactions on Information Technology in Biomedicine 01/2011; 15:93-99.

52. Ali Tiss, Celia Smith, Dmitry Devetyarov, Aleksandra Gentry-Maharaj, Stephane Camuzeaux, Brian Burford, Ilia Nouretdinov, Jeremy Ford, Zhiyuan Luo, Alex Gammerman, John F. Timms, Ian Jacobs, Usha Menon and Rainer Cramer. Proteomics analysis of ovarian cancer serum samples (Part 1): Peptides generated ex vivo from abundant serum proteins by tumour-specific exopeptidases are not useful biomarkers in ovarian cancer. Clinical Chemistry, 56: p. 262-271, 2010.

53. John F. Timms, Rainer Cramer, Stephane Camuzeaux, Ali Tiss, Celia Smith, Brian Burford, Ilia Nouretdinov, Musarat Kabir, Aleksandra Gentry-Maharaj, Jeremy Ford, Zhiyuan Luo, Alex Gammerman, Usha Menon and Ian Jacobs. Proteomics analysis of ovarian cancer serum samples (Part 2): Serum MALDI-TOF MS profiling and CA125 immunoassay as diagnostic tools.
Accepted for publication in Clinical Chemistry.

54. Peter McCullagh, Vladimir Vovk, Ilia Nouretdinov, Dmitry Devetyrov, Alexander Gammerman. Conditional Prediction Intervals for Linear Regression. International Conference on Machine Learning and Applications ICMLA 2009: 131-138

55. Fedor Zhdanov, Vladimir Vovk, Brian Burford, Dmitry Devetyarov, Ilia Nouretdinov and Alex Gammerman. Online Prediction of Ovarian Cancer. Lecture Notes in Computer Science Volume 5651/2009 Artificial Intelligence in Medicine DOI 10.1007/978-3-642-02976-9; 2009.

56. F- M. Schleif, T. Willmann, A. Gammerman, M. Kostrzewa, B. Hammer Cancer informatics by prototype networks in mass spectrometry. Artificial Intelligence in Medicine 45(2-3): 215-228, 2009.

57. A. Lambrou, H. Papadopoulos, A. Gammerman Evolutionary Conformal Prediction for Breast Cancer Diagnosis Information Technology and Applications in Biomedicine, 2009. ITAB 2009. 9th International Conference on; 12/2009; DOI:10.1109/ITAB.2009.5394447

58. H. Papadopoulos, A. Gammerman and V. Vovk. Confidence Predictions for the Diagnosis of Acute Abdominal Pain. In L. Iliadis, I. Vlahavas and M. Bramer (Eds.), Artificial Intelligence Applications & Innovations III, Volume 296 of IFIP International Federation for Information Processing, 175 - 184. Springer, 2009.

59. A.Gammerman, V.Vovk, B.Burford, I.Nouretdinov, Z.Luo, A.Chervonenkis, M.Waterfield, R.Cramer, P.Tempst, J.Villanueva, M.Kabir, S.Camuzeaux, J.Timms, U.Menon and I.Jacobs. Serum proteomic abnormality predating screen detection of ovarian cancer . The Computer Journal Volume 52, Issue 3 Pp. 326-333, 2009.

60. Ramus SJ, Elmasry K, Luo Z, Gammerman A, Lu K, Ayhan A, Singh N, McCluggage WG, Jacobs IJ, Whittaker JC, and Gayther SA. Predicting clinical outcome in patients diagnosed with synchronous ovarian and endometrial cancer. Clinical cancer research : an official journal of the American Association for Cancer Research 14(18):5840-8, 2008 Sep 15

61. B.Ryabko, J.Astola and A.Gammerman. Adaptive Coding and Prediction of Sources with Large and Infinite Alphabets, IEEE Transaction on Information Theory, v.54, No.8, pp.3808–3813, August 2008.

62. H. Papadopoulos, V. Vovk and A.Gammerman. Normalized Nonconformity Measures for Regression Conformal Prediction. Artificial Intelligence and Applications - AIA 2008 Conference, Innsbruck, Austria, pp.64-69, 2008.

63. H. Papadopoulos, V. Vovk and A. Gammerman. Conformal Prediction with Neural Networks. In Proceedings of the 19th IEEE International Conference on Tools with Artificial Intelligence (ICTAI'07), Volume 2, 388 - 395. IEEE Computer Society, 2007.

64. S.Busutill, Y.Kalnishkan and A.Gammerman. Improving the Aggregating Algorithm for Regression. *Artificial Intelligence and Applications*, In Proceedings of the 25th IASTED Conference Artificial Intelligence and Applications (AIA 2007), pp.347–352, Innsbruck, Austria, (2007), Editor: V.Devedzic.

65. John F. Timms, Elif Arslan-Low, Aleksandra Gentry-Maharaj, Zhiyuan Luo, Davy T.Jampens, Vladimir N. Podust, Jeremy Ford, Eric T. Fung, Alex Gammerman, Ian Jacobs, and Usha Menon. Preanalytic Influence of Sample Handling on SELDI-TOF Serum Protein Profiles *Clinical Chemistry*, **53**, 645–656, April 2007.

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158. Spectra analysis system – documentation (with B.Burford, I.Nouretdinov, D.Devetyarov, Z.Luo, A.Chervonenkis, V.Vovk), RHUL, London, 2009.

Selected Grants

- Engineering and Physical Sciences Research Council (EPSRC), grant GR/L35812, PI. "Support Vector and Bayesian Learning Algorithms: Analysis and Applications" (with V. Vovk and V. Vapnik), £142,360*. 1997–2000.
- Engineering and Physical Sciences Research Council (EPSRC), grant GR/M16856, PI. "Comparison of the Support Vector Machine and Minimum Message Length methods for induction and prediction" (with V. Vovk and C. Wallace), £132,787* 1999–2002.
- Engineering and Physical Sciences Research Council (EPSRC), grant GR/R46670/01, PI. "Complexity Approximation Principle and Predictive Complexity: Analysis and Applications" (with Prof. V. Vovk), £142,996*, 2001–2004.
- Biotechnology and Biological Sciences Research Council (BBSRC), grant 111/BIO14428, PI. "Pattern Recognition Techniques for Gene and Promoter Identification and Classification in Plant Genomic Sequences" (with J. Hancock and V. Solovyev), £145,210*, 2002– 2005.

- European Union (EU), grant IST-1999-10226, PI. "EurEdit: The Development and Evaluation of New Methods for Editing and Imputation" (with European partners from Italy, the Netherlands, Switzerland, Portugal), RHUL part: £86,809*, 2000–2003.

- Royal Society grant, PI, "Efficient randomness testing of random and pseudorandom number generators" (with B. Ryabko), £4,961, 2003–2005.

- Medical Research Council (MRC), grant G0301107 (S505/65), PI. "Proteomic Analysis of the Human Serum Proteome" (with I. Jacobs, M. Waterfield, R. Cramer, V. Vovk, S. Gayther, Z. Luo, U. Menon, J. Timms), RHUL part: £170,091*, 2005–2008. (total funding £959,954).

- QinetiQ grant: "Automated Target Identification". £47,000 2006–2007. (total funding £47,000).

- Research Promotion Foundation of Cyprus. "ASPIDA project: Development of New Conformal Prediction Methods with Applications in Medical Diagnosis", PI, (with H. Papadopoulos and V. Vovk), £30,770, 2007–2010.

- Engineering and Physical Sciences Research Council "Practical competitive prediction" (with V. Vovk and Y. Kalnishkan), co-PI, £406,000, 2007-2010.

- Department for Environment, Food and Rural Affairs (Defra), Veterinary Laboratories Agency, "Application of Pattern Recognition techniques to Bioinformatics." PI, £82,000, 2007–2010.

- European Union EU FP7 programme: "Post-translational modification, O-PTM", HEALTH-2007-2.4.1-2: Translating clinical 'omics'-technology (genomics, proteomics, metabolomics) into innovative cancer biomarkers aiding in early diagnosis, prognosis and treatment selection of cancer patients. (with Dr Joy Burchell, Prof Joyce Taylor-Papadimitriou, KCL; Z.Luo and V.Vovk from RHUL and 5 other institutions), PI, £193,046, 2008-2011. (total funding £5 mln euros).

- Medical Research Council (MRC) Application of conformal predictors to functional magnetic resonance fMRI imaging research; PI, £85,581, 2009–2010.

- Royal Society grant, "Trace Detection with Confidence for Odor Capture Hybrid Sensor System co-PI, (with Z.Luo), £7,800, 2009-2010.

- Department for Environment, Food and Rural Affairs (Defra), Veterinary Laboratories Agency (VLA). Machine learning algorithms for analysis of large veterinary datasets; PI, £52,000, 2010–2013.

- BBSRC (and EU) programme: Living with uninvited guests: comparing plant and animal responses to endocytic invasions (ERASysBio). BBSRC project (with VLA, SGUL, Spain, Germany and France); co-PI; over £700,000 for RHUL part, 2010–2013. (total funding 5,200 000 euros).
- Zhejiang University, China: Machine learning methods for coal quaility analysis based on NIR technology, 2011-2013 (co-PI with Z.Luo).
- Thales UK; Development of automated methods for helping detection of anomalous behaviour. £85,000; 2012-2015.
- EPSRC: Mining the Network Behaviour of Bots (with L.Cavalarro, V.Vovk, H.Shanahan and Z.Luo); £680,623 from 1-06-13 for 3 years until 2016.
- EPSRC iCASE award: "Applications of Machine Learning using Priviledged Information"; 2015 –2018.
- EU Horizon 2020 grant: "Exascale Compound Activity Prediction Engine"; 2015 – 2018.

Other publications

- Learning by Support Vector Machine (with V. Vovk). Tutorial. Uxbridge, Middlesex: UNICOM Seminars Ltd., 1998.

Patents

Data classification apparatus and method thereof (with V. Vovk).

- European Patent Application No. 99 954 200.4: the application was allowed in July 2004.
- US Patent Application No. 09/831,262: allowed.

Teaching

I have taught at all levels of Computer Science at different Universities mainly in England and Scotland but also in Spain and France. My aim has been to teach students a mathematical/computational culture, i.e. how to approach a problem and solve it in a certain logical way, rather than to "drill down"into a specific topic. I have taught a wide variety of different courses from first year students to Master level students and from theory of computation to very practical programming courses. I was involved (as HoD) in several reviews of Computer Science curriculum. I developed myself or with my colleagues six new courses: Inference Systems; Inductive Learning; Intelligent Decision-Making Systems; Bayesian Inference; Computational Finance; Computer Learning and participated in developing three teaching programmes, including a very successful Business Information Systems programme (with School of Management). I was invited and gave courses in Machine Learning in University of Madrid (Spain) and University of Paris 9 (France).

I taught the following courses:

- CS120 (Autumn 1993, Autumn 1994): C++ programming course.
- CS356 (Autumn 1995 and 1996): developed a new course on Intelligent Decision Systems (postgraduate course, Spring 1997 and Spring 1998): developed and taught this course.
- Business Information Systems MSc course (Spring 1999): developed and taught (jointly with V. Vovk) a course on Intelligent Decision Systems.
- CS392 (Spring 1998, Spring 1999, Autumn 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009) a course on modern machine learning techniques (SVM, transduction, algorithmic randomness).
- CS393 (Spring 2001, 2002, 2003, 2004, 2005): a course (jointly with V. Vovk) on Computational Finance; includes mathematical and computational models of financial markets and numerical methods for valuation of derivative securities.
- Supervising final year projects in machine learning.
- Supervising final projects of MSc in Big Data students – 2014.

Administration

- **Computer Science Department**

  From 1995 to 2005 I was serving as Head of the Computer Science. Over this period, the department expanded in research and teaching activities and moved from grade 4 in 1996 to 5 in 2001 RAE (Research Assessment Exercise). Several new research directions and new research groups were

established including **Machine Learning** and **Bioinformatics** and a number of postgraduate and undergraduate programmes were developed. Among them a Master course in Business Information Systems – **BIS** (with School of Management) and a Master course in Computer Science by Research.

- **Computer Learning Research Centre – CLRC**

  In 1998 in recognition of our research in machine learning, the College established the **Computer Learning Research Centre** (CLRC) for fundamental and applied research in machine learning and I was appointed as the Director of the Centre. We hired for CLRC a very strong team of researchers in machine learning: V.Vapnik and A.Chervonenkis – co-founders of statistical learning theory; V.Vovk – inventor of prediction with expert advice and co-inventor (with A.Gammerman) of conformal predictors; C.Watkins –co-inventor of reinforcement learning).
  We also employed the distinguished visiting fellows: Ray Solomonoff (USA) – co-founder of Kolmogorov Complexity; Jorma Rissanen (USA and Finland) – inventor of MDL inductive principle; Chris Wallace (Australia) – inventor of MML principle; Leonid Levin (USA) – one of 3 founders of the theory of NP-completness; Glenn Shafer (USA) – co-founder of the Dempster–Shafer theory of evidence). CLRC has become a world leader in developing machine learning algorithms that are used in many applications. Powerful evidence of CLRC international standing are the citation rate for the staff and the global distribution of our software used by over 500 institutions around the world. Our impact in machine learning research was reflected in various Research Assessments (RAE-REF) in 2001, 2008 and 2014. One of the Panel Feedback Report says: *The Panel were impressed by the strength within the Computer Learning Group and the profound impact that their work has had on theory and applications.*

  For details, see *http* : *//clrc.rhul.ac.uk*

- **Kolmogorov Lecture and Medal**

  I have organised and acted as co-Chair of the annual **University of London Kolmogorov Lecture and Medal** run by CLRC. This is a public lecture delivered at the Royal Holloway, University of London and is given since 2003 by distinguished researchers in the field of theoretical computer science, or related mathematical sciences, who made outstanding contributions to developing research directions initiated by Andrei N. Kolmogorov. [1] More details can be found at:
  http : *//www.kolmogorov.clrc.rhul.ac.uk/*
  One of the recent Lecture was presented by Professor Robert Merton (Harvard Business School), winner of the 1997 Nobel Prize in Economics. His topic: "Observations on the Science of Finance in the Practice of Finance: Past, Present and Future".

[1] Kolmogorov (1903–1987): Soviet mathematician, computer scientist, and scientist. Kolmogorov complexity and randomness are among our research directions.