



Technical Report Number BK_TR_01_16, Version 2.0

Catalogue of Outputs from the BAYES-KNOWLEDGE

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Abstract

This document lists the BAYES-KNOWLEDGE project outputs according to classification: Published papers (journals); Published papers (conferences); Submitted papers; Technical Reports (published); Technical Reports (unpublished) including working papers planned to be submitted; Software; Dissemination (including Media, Press releases, posters and online articles)

European Research Council Project ERC-2013-AdG339182-BAYES_KNOWLEDGE

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Published papers (journals)

Constantinou, A. C. and Fenton, N. (2017). Towards Smart-Data: Improving predictive accuracy in long-term football team performance. *Knowledge-Based Systems*, Vol 124, pages 93-104, <http://dx.doi.org/10.1016/j.knosys.2017.03.00>

Fenton NE, Neil M, Lagnado D, Marsh W, Yet B, Constantinou A (2016), "How to model mutually exclusive events based on independent causal pathways in Bayesian network models", *Knowledge-Based Systems*, Dec 2016 Vol 113, pages 39-50. <http://dx.doi.org/10.1016/j.knosys.2016.09.012>

Zhou, Y., Fenton, N. E., Zhu, C. (2016), "An Empirical Study of Bayesian Network Parameter Learning with Monotonic Causality Constraints", *Decision Support Systems* Vol 87, pages 69-79. <http://dx.doi.org/10.1016/j.dss.2016.05.001>

Yet, B., Constantinou, A. C., Fenton, N., Neil, M., Luedeling, E., & Shepherd, K. (2016). A Bayesian Network Framework for Project Cost, Benefit and Risk Analysis with an Agricultural Development Case Study. *Expert Systems with Applications*, Volume 60 Oct 2016, pages 141-155 <http://dx.doi.org/10.1016/j.eswa.2016.05.005>

Smit, N. M., Lagnado, D. A., Morgan, R. M., & Fenton, N. E. (2016). "Using Bayesian networks to guide the assessment of new evidence in an appeal case". *Crime Science*, 2016, 5: 9, DOI 10.1186/s40163-016-0057-6

Fenton N.E, Neil M, Berger D (2016), "Bayes and the Law", *Annual Review of Statistics and Its Application*, Volume 3, 51-77, 2016 <http://dx.doi.org/10.1146/annurev-statistics-041715-033428>.

Constantinou, A. C., Fenton, N.E, & Neil, M. (2016). Integrating expert knowledge with data in causal probabilistic networks: preserving the data-driven expectations when the expert variables remain unobserved. *Expert Systems with Applications*, 56 pp 197-208, <http://dx.doi.org/10.1016/j.eswa.2016.02.050>.

Zhou, Y., Hospedales, T., Fenton, N. E. (2016), "When and where to transfer for Bayes net parameter learning", *Expert Systems with Applications*. 55, 361-373 <http://dx.doi.org/10.1016/j.eswa.2016.02.011>.

Constantinou, A. C., Fenton, N., Marsh, W., & Radlinski, L. (2016). "From complex questionnaire and interviewing data to intelligent Bayesian Network models for medical decision support", *Artificial Intelligence in Medicine*, 2016. Vol 67 pages 75-93. <http://dx.doi.org/10.1016/j.artmed.2016.01.002>

Constantinou, A. C., Yet, B., Fenton, N., Neil, M., & Marsh, W. (2016). Value of Information analysis for interventional and counterfactual Bayesian networks in forensic medical sciences. *Artificial Intelligence in Medicine*. 66, pp 41-52 doi:10.1016/j.artmed.2015.09.002

Constantinou, A., Freestone M., Marsh, W., Fenton, N. E. , Coid, J. (2015) "Risk assessment and risk management of violent reoffending among prisoners", *Expert Systems With Applications* 42 (21), 7511-7529. Pre-publication draft here. Published version: <http://dx.doi.org/10.1016/j.eswa.2015.05.025>

Shepherd, K., Hubbard, D., Fenton, N. E., Claxton, K., Luedeling, E., de Leeuw, J., (2015) "Development goals should enable decision-making", *Nature* 532: 152-154, 9 July 2015, <http://dx.doi.org/10.1038/523152a>

de Zoete, J, Sjerps, M, Lagnado, D, Fenton, N.E. (2015), "Modelling crime linkage with Bayesian Networks" *Law, Science & Justice*, 55(3), 209-217. <http://doi:10.1016/j.scijus.2014.11.005>

Fenton, N. E. (2014). Assessing evidence and testing appropriate hypotheses. *Science & Justice*, 54(6), 502-504. Pre-publication draft. Published version: <http://dx.doi.org/10.1016/j.scijus.2014.10.007>

Published papers (conferences)

Fenton, N. E., Lagnado, D. A., Dahlman, C., & Neil, M. (2017). The Opportunity Prior: A Simple and Practical Solution to the Prior Probability Problem for Legal Cases. In International Conference on Artificial Intelligence and the Law (ICAIL 2017).

Dementiev E and Fenton N E (2016), "Bayesian Torrent Classification by File Name and Size Only", International Conference on Probabilistic Graphical Models, Lugano, Switzerland, 06 Sep 2016 - 09 Sep 2016. Journal of Machine Learning Research. 52: 136-147.

Constantinou A and Fenton NE. "Improving predictive accuracy using Smart-Data rather than Big-Data: A case study of soccer teams' evolving performance" In Proceedings of the 13th UAI Bayesian Modeling Applications Workshop (BMAW 2016), 32nd Conference on Uncertainty in Artificial Intelligence (UAI 2016), New York City, USA, June 25-29, 2016

Zhou, Y., Fenton, N. E., Hospedales, T, & Neil, M. (2015). "Probabilistic Graphical Models Parameter Learning with Transferred Prior and Constraints", 31st Conference on Uncertainty in Artificial Intelligence (UAI 2015), Amsterdam, 13-15 July 2015.

Yet, B., Constantinour A., Fenton N. E., Neil M., Leudeling E., Shepherd, K., "Project Cost, Benefit and Risk Analysis using Bayesian Networks", Bayesian Applications Workshop, 31st Conference on Uncertainty in Artificial Intelligence (UAI 2015), Amsterdam, 16 July 2015.

Chockler, H., Fenton N.E., Koeppens J., Lagnado, D. (2015), "Causal Analysis for Attributing Responsibility in Legal Cases", 15th International Conference on Artificial Intelligence & Law (ICAIL 2015), San Diego, June 8-12, 2015, pp 33-42, ACM ISBN 978-1-4503-3522-5

Zhou, Y., Fenton, N. E., & Neil, M. (2014). An Extended MPL-C Model for Bayesian Network Parameter Learning with Exterior Constraints. In L. van der Gaag & A. J. Feelders (Eds.), Probabilistic Graphical Models: 7th European Workshop. PGM 2014, Utrecht. The Netherlands, September 17-19, 2014 (pp. 581–596). Springer Lecture Notes in AI 8754.

Submitted papers

Neil, M., Fenton, N. E., Lagnado, D. A., & Gill, R. (2017). Modelling competing legal arguments using Bayesian Model Comparison and Averaging.

Fenton, N. E., Constantinou, A. & Neil, M. Combining judgments with messy data to build Bayesian Network models for improved intelligence analysis and decision support. Submitted to Subjective Probability, Utility and Decision Making (SPUDM 26) (2017).

Fenton, N. E., de Zoete, J. & Lagnado, D. A. Modeling complex legal cases as a Bayesian network (BN) using idioms and sensitivity analysis with the Collins case as a complete example. Submitted to Tenth International Conference on Forensic Inference and Statistics (ICFIS 10) (2017).

Yet, B., Neil, M., Fenton, N., Constantinou, A., & Dementiev, E. (2017). An Improved Method for Solving Hybrid Influence Diagrams. Under review, 2016.

Constantinou, A. (2017). Dolores: A temporal mixture-method model for forecasting football outcomes from all over the world. Under review in the Machine Learning journal

Constantinou, A., & Fenton, N. (2017). The future of the London Buy-To-Let property market: Simulation with Temporal Bayesian Networks. Under review, 2016.

Dewett S, Hsu A, Fenton NE, Lagnado D (2016) "A Mixed Methods Analysis of Bayesian Reasoning: Nested Sets vs Causal Framing", Under review

Peng, L, Neil M, Fenton N.E. (2016) "Region Based Approximation for High Dimensional Bayesian Network Models", Under review

Yet, B., Constantinou, A. C., Fenton, N., & Neil, M. (2016). Partial Expected Value of Perfect Information of Continuous Variables using Dynamic Discretisation. Under review

Technical Reports (published)

Peng Lin, Lukasz Radlinski, Eugene Dementiev, Martin Neil, Norman Fenton, Barbaros Yet, Anthony Constantinou, Takao Naguchi, "Interactive incorporation of knowledge and data for parameter learning in Bayesian Networks", BAYES-KNOWLEDGE Technical Report Number BK_TR_01_17, Version 1.0

Balding, D. J., Fenton, N. E., Gill, R., Lagnado, D. A., & Schneps, L. (2017). Guiding Principles and Recommendations for dealing with evidence in criminal law. Isaac Newton Institute

Fenton, N.E., 2015. Debunking report that claims gender diverse executive Boards outperform male-only Boards, Queen Mary University of London, Report Number BK_TR_05_15, <http://dx.doi.org/10.13140/RG.2.1.1221.4160>

Fenton NE, Neil M (2015), "Book Review: Malcom Kendrick "Doctoring Data: How to sort out medical advice from medical nonsense". Download. Also <http://dx.doi.org/10.13140/RG.2.1.4904.8804>

Fenton, N. E, "Another machine learning fable", March 2015 DOI: <http://dx.doi.org/10.13140/RG.2.1.2506.3849>

Fenton, N. E, "Moving from big data and machine learning to smart data and causal modelling: a simple example from consumer research and marketing", March 2015. DOI: <http://dx.doi.org/10.13140/RG.2.1.3292.8166>

Working papers

Fenton, N E (2017) The Gate Crasher Paradox: does a Bayesian solution help?

Osmon, M., Fenton, N. E., Lagnado, D., & Neil, M. (2017). Who do we trust on social policy interventions?

Smit, N., Fenton, N. E., & Wiltshire, P. (2017). Interpretation of palynological evidence using Bayesian Networks.

Fenton, N. E., Lagnado, D. A., & Archer, R. (2017). Using Bayesian networks to debunk claims that probability cannot model legal reasoning.

Alkmeyde, F., Fenton, N. E., & Lagnado, D. A. (2017). On the benefits and limitations of Linear Bayes versus Bayesian networks for legal reasoning.

Fenton, N. E., Neil, M., Archer, R., & Hsu, A. (2017). On the impact of errors in DNA evidence.

Fenton, N. E., Gill, R., & D'Agostini, G. (2017). Revisiting the uncertainty about the trait probability in the "Island problem": making things clear with a Bayesian network solution.

Fenton, N. E., Lagnado, D. A., Mortera, J., & Thompson, W. C. (2017). Handling Novel Facts in legal arguments using Bayesian Networks.

Fenton, N. E. (2017). The problem with small likelihoods, large Likelihood Ratios and non-exhaustive hypotheses.

Fenton NE, Constantinou A, Neil M, "Theoretical and Practical Limitations of 'Big Data' Machine Learning", Working paper 2016

Archer, R and Fenton NE, "Forensic Palynology & Bayesian Nets: Bayes-Knowledge Case Study", Working paper 2016

Fenton NE, "Bayesian network solution for confidence intervals of classification proportion sampling", 2016 has associated model

Fenton, NE and Archer R, "Using Bayesian networks to debunk claims that probability cannot model legal reasoning", Working paper 2016 has associated model

Fenton NE, "To focus on winning one competition or try to win more: Using a Bayesian network to help decide the optimum strategy for a football club", 2016, has associated model

Neil M, Fenton NE, Lagnado D, "Modelling competing legal arguments using Bayesian Model Comparison and Averaging", Working paper 2016

Fenton NE, "Handling Anonymous Witness Evidence using Bayesian Network idioms", has associated model

Fenton NE, "A Bayesian Network model of a problem of international law' has associated model

Fenton NE, "Bayesian network solution to the problem of Bayesian learning of population mean and variance (normal distribution) from sample mean and variance", Working paper 2015 has associated model

Fenton NE, Neil M, .. "Hypothesis testing revisited: why the classical approach will almost certainly give the 'wrong' results", Working paper 2015

Yet B, Fenton N.E., "A pilot study for the use of Bayesian networks to evaluate medical diagnostic devices: a case study of point-of-care C-reactive protein measurement in lower respiratory tract infection". Working paper 2015

Fenton NE, Constantinou A, Neil M, "On using BNs for assessing safety claims for software-based systems", Working paper 2016

Fenton NE, Neil M, Hsu A, "When a lower random match probability for a forensic match has exactly the opposite impact to what you would expect" has associated model

Fenton NE, Archer R, Neil M, Hsu A, "The impact of errors on the statistical analysis of DNA matching", Working paper 2016

Fenton NE, Neil M, Constantinou A (2015) "Simpson's Paradox and the implications for medical trials". Working paper. Associated model. has associated model

Fenton NE, "Witness evidence idiom" 2015 Working paper. has associated model

Fenton NE, "Global Increase in Football Spectator Injuries captured by a Special Hockey Stick"

Fenton NE, "Beyond Likelihood Ratios" AI and Law Presentation, San Diego, California, USA

Fenton NE, "Limitations and opportunities of the likelihood ratio approach for evidence evaluation", Leiden, Netherlands (ICFIS: 9th International Conference on Forensic Inference and Statistics)

Fenton NE, "Improving Probability and Risk Assessment in the Law" Winchester Conference on Trust, Risk, Information and the Law, Winchester

Fenton, N.E, "The BAYES-KNOWLEDGE Problem Framing Method", 2015 Working paper.

Fenton, N.E, "A Bayesian Network for a simple example of Drug Economics Decision Making", 2014 has associated model. Needs to change date to a later date

Fenton, N.E, "Idioms for modelling project risk", 2014 has associated model.

Software

BAYES-KNOWLEDGE Prototype

Dissemination (including Media, Press releases, posters and online articles)

BAYES-KNOWLEDGE website, <http://bayes-knowledge.com/>

Constantinou, A., & Fenton, N. (2016). Smart data – not just big data: Real-world decision making with Bayesian networks. SETforBRITAIN 2016, Engineering and Mathematical Sciences Exhibition, House of Commons, Parliament, Westminster, London, UK, March 7, 2016. [poster]

Constantinou, A.C., Yet, B., Fenton, N.E., Neil, M., Marsh, D.W.R., 2015. What is the value of missing information when assessing decisions that involve actions for intervention? . Atlas Sci. 2015 (see <http://tinyurl.com/zv6fyk2>)

Climate Change By Numbers, 09/03/2015, BBC Television

Quantifying risk in aircraft safety 26/03/2015, BBC Radio Scotland

Probabilistic Analysis (on Punt PI Programme), 02/08/2014, BBC Radio 4

Statisticians question evidence used to convict nurse of murdering patients, 15/02/2015, Guardian Newspaper

Psychologists Uncover It's the Referees, Not the Players, Who Might Secure Soccer World Cup Victory, 18/06/2014, Huffington Post

Probability and Risk, 26/07/2015, Winchester Science Festival

Making Decisions with Less Data, 26/06/2015, Proctor and Gamble, Brussels, Belgium

Risk Assessment in Finance using Bayesian Networks, 18/11/2015, Government Actuary's Department, London

Improved Medical Risk Assessment , 20/05/2014, Department of Surgery and Cancer, Imperial College London

Probability and Risk (Blog), <http://probabilityandlaw.blogspot.co.uk/>

Risk Assessment and Decision Analysis with Bayesian Networks (Blog), <http://bayesianrisk.com/>

Bayes and the Law (blog and forum), <https://sites.google.com/site/bayeslegal/>

An Unusual Pattern, 28/03/2016, ABC (Australian Broadcasting Company)

Fallacies of Probability and Risk, 08/12/2015, University of Warwick ("Mathematics in Action Day 2015")

Impediments and Opportunities to using Statistics and Probability in Legal Arguments, 09/02/2016, City University Law School (under auspices of Turing Gateway to Mathematics and Isaac Newton Inst

The prosecutor's fallacy and other errors of legal reasoning, 24/03/2016, Hilton Hotel London (Investigation and Prosecution of Homicide Conference)

Bayesian networks for legal and forensic applications, 23/03/2016, University College London

Smart data - not just big data: real-world decision making with Bayesian networks, 07/03/2016, Houses of Parliament

Using Bayesian networks to assess and manage risk of violent reoffending among prisoners, 30/08/2015, <http://bayesknowledge.blogspot.co.uk/2016/01/using-bayesian-networks-to-assess-and.html>

Why target setting leads to poor decision-making, 09/07/2015,
<http://bayesknowledge.blogspot.co.uk/2016/01/why-target-setting-leads-to-poor.html>

The risk of flying, 25/03/2015, <http://bayesknowledge.blogspot.co.uk/2016/01/the-risk-of-flying.html>

The Statistics of Climate Change, 26/02/2015,
<http://bayesknowledge.blogspot.co.uk/2016/01/the-statistics-of-climate-change.html>

Misleading DNA evidence and the current damaged winning lottery ticket story, 28/01/2016
<http://bayesknowledge.blogspot.co.uk/2016/01/misleading-dna-evidence-and-current.html>

Ben Geen: another possible case of miscarriage of justice and misunderstanding statistics?, 15/11/2014
<http://bayesknowledge.blogspot.co.uk/2016/01/ben-geen-another-possible-case-of.html>