

# Bibliography

- J. Abernethy, E. Hazan, and A. Rakhlin. Competing in the dark: An efficient algorithm for bandit linear optimization. In *COLT*, 2008.
- Kim D. Anderson. Targeting recovery: Priorities of the spinal cord-injured population. *Journal of Neurotrauma*, 21(10):1371–1383, 2004.
- M. Antri, D. Orsal, and J.-Y. Barthe. Locomotor recovery in the chronic spinal rat: Effects of long-term treatment with a 5-HT<sub>2</sub> agonist. *European Journal of Neuroscience*, 16(3):467–476, 2002.
- N. Aronszajn. Theory of reproducing kernels. *Transactions of the American Mathematical Society*, 68(3):337–404, May 1950.
- Michael Athans. The role and use of the stochastic linear-quadratic-Gaussian problem in control system design. *IEEE Transactions on Automatic Control*, 16(6):529–552, 1971.
- P. Auer, N. Cesa-Bianchi, and P. Fischer. Finite-time analysis of the multiarmed bandit problem. *Mach. Learn.*, 47(2-3):235–256, 2002.
- Peter Auer. Using confidence bounds for exploitation-exploration trade-offs. *JMLR*, 3, 2002.
- J. Azimi, A. Fern, and X. Fern. Batch Bayesian optimization via simulation matching. In *NIPS*, 2010.
- Javad Azimi, Alan Fern, Xiaoli Fern, Glencora Borradaile, and Brent Heeringa. Batch active learning via coordinated matching. In *Proceedings of the 29th International Conference on Machine Learning*, 2012a.
- Javad Azimi, Ali Jalali, and Xiaoli Fern. Hybrid batch Bayesian optimization. In *ICML*, 2012b.
- Florence M. Bareyre, Martin Kerschensteiner, Oliver Raineteau, Thomas C. Mettenleiter, Oliver Weinmann, and Martin E. Schwab. The injured spinal cord spontaneously forms a new intraspinal circuit in adult rats. *Nature Neuroscience*, 7(3):269–277, 2004.

- D. Michele Basso, Michael S. Beattie, and Jacqueline C. Bresnahan. A sensitive and reliable locomotor rating scale for open field testing in rats. *Journal of Neurotrauma*, 12(1):1–21, 1995.
- Elizabeth J. Bradbury and Stephen B. McMahon. Spinal cord repair strategies: Why do they work? *Nature Reviews Neuroscience*, 7:644–653, August 2006.
- E. Brochu, M. Cora, and N. de Freitas. A tutorial on Bayesian optimization of expensive cost functions, with application to active user modeling and hierarchical reinforcement learning. In *TR-2009-23, UBC*, 2009.
- S. Bubeck and N. Cesa-Bianchi. Regret analysis of stochastic and nonstochastic multi-armed bandit problems. *Foundations and Trends in Machine Learning*, 5(1):1–122, 2012.
- S. Bubeck, R. Munos, G. Stoltz, and C. Szepesvári. Online optimization in X-armed bandits. In *NIPS*, 2008.
- S. Bubeck, R. Munos, and G. Stoltz. Pure exploration in multi-armed bandits problems. In *ALT*, 2009.
- Lance L. Cai, Andy J. Fong, Chad K. Otsoshi, Yongqiang Liang, Joel W. Burdick, Roland R. Roy, and V. Reggie Edgerton. Implications of assist-as-needed robotic step training after a complete spinal cord injury on intrinsic strategies of motor learning. *Journal of Neuroscience*, 26(41):10564–10568, 2006.
- Shayok Chakraborty, Vineeth Balasubramanian, and Sethuraman Panchanathan. Dynamic batch mode active learning. In *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2011.
- Christopher and Dana Reeve Foundation. One degree of separation: Paralysis and spinal cord injury in the United States. 636 Morris Turnpike, Suite 3A, Short Hills, NJ 07078, 2009.
- Jean V. Coumans, Ted Tai-Sen Lin, Hai Ning Dai, Linda MacArthur, Marietta McAtee, Carmen Nash, and Barbara S. Bregman. Axonal regeneration and functional recovery after complete spinal cord transection in rats by delayed treatment with transplants and neurotrophins. *The Journal of Neuroscience*, 21(23):9334–9344, 2001.
- Grégoire Courtine, Roland R. Roy, Joseph Raven, John Hodgson, Heather McKay, Hong Yang, Hui Zhong, Mark H. Tuszynski, and V. Reggie Edgerton. Performance of locomotion and foot grasping following a unilateral thoracic corticospinal tract lesion in monkeys (*Macaca mulatta*). *Brain*, 128(10):2338–2358, 2005.
- Grégoire Courtine, Bingbing Song, Roland R. Roy, Hui Zhong, Julia E. Herrmann, Yan Ao, Jingwei Qi, V. Reggie Edgerton, and Michael V. Sofroniew. Recovery of supraspinal control of stepping

- via indirect propriospinal relay connections after spinal cord injury. *Nature Medicine*, 14(1):69 – 74, 2008.
- Grégoire Courtine, Yury Gerasimenko, Rubia van den Brand, Aileen Yew, Pavel Musienko, Hui Zhong, Bingbing Song, Yan Ao, Ronaldo M Ichiyama, Igor Lavrov, et al. Transformation of non-functional spinal circuits into functional states after the loss of brain input. *Nature neuroscience*, 12(10):1333–1342, 2009.
- Grégoire Courtine, Rubia van den Brand, and Pavel Musienko. Spinal cord injury: Time to move. *The Lancet*, 377:1896–1898, June 2011.
- T. M. Cover and J. A. Thomas. *Elements of Information Theory*. Wiley Interscience, 1991.
- D. D. Cox and S. John. SDO: A statistical method for global optimization. *Multidisciplinary Design Optimization: State of the Art*, 1997.
- Eric D. Crown and James W. Grau. Preserving and restoring behavioral potential within the spinal cord using an instrumental training paradigm. *Journal of Neurophysiology*, 86(2):845–855, 2001.
- V. Dani, T. P. Hayes, and S. M. Kakade. Stochastic linear optimization under bandit feedback. In *COLT*, 2008.
- Glen M. Davis, Nur A. Hamzaid, and Ché Fornusek. Cardiorespiratory, metabolic, and biomechanical responses during functional electrical stimulation leg exercise: Health and fitness benefits. *Artificial organs*, 32(8):625–629, 2008.
- Thomas Desautels, Andreas Krause, and Joel Burdick. Parallelizing exploration–exploitation trade-offs with Gaussian process bandit optimization. In *Proceedings of the 29th International Conference on Machine Learning*, 2012.
- Milan R. Dimitrijevic, Yury Gerasimenko, and M. M. Pinter. Evidence for a spinal central pattern generator in humans. *Annals of the New York Academy of Sciences*, 860:360, 1998.
- M. Dudik, D. Hsu, S. Kale, N. Karampatziakis, J. Langford, L. Reyzin, and T. Zhang. Efficient optimal learning for contextual bandits. In *UAI*, 2011.
- V. Reggie Edgerton, Soo J. Kim, Ronaldo M. Ichiyama, Yury P. Gerasimenko, and Roland R. Roy. Rehabilitative therapies after spinal cord injury. *Journal of Neurotrauma*, 23(3-4):560–570, 2006.
- Jeremy L. Emken, Susan J. Harkema, Janell A. Beres-Jones, Christie K. Ferreira, and David J. Reinkensmeyer. Feasibility of manual teach-and-replay and continuous impedance shaping for robotic locomotor training following spinal cord injury. *IEEE Transactions on Biomedical Engineering*, 55(1):322–334, January 2008.

- Christie Engesser-Cesar, Ronaldo M. Ichiyama, Amber L. Nefas, Mary Ann Hill, V. Reggie Edgerton, Carl W. Cotman, and Aileen J. Anderson. Wheel running following spinal cord injury improves locomotor recovery and stimulates serotonergic fiber growth. *European Journal of Neuroscience*, 25(7):1931–1939, 2007.
- J. W. Fawcett, A. Curt, J. D. Steeves, W. P. Coleman, M. H. Tuszynski, D. Lammertse, P. F. Bartlett, A. R. Blight, V. Dietz, J. Ditunno, B. H. Dobkin, L. A. Havton, P. H. Ellaway, M. G. Fehlings, A. Privat, R. Grossman, J. D. Guest, N. Kleitman, M. Nakamura, M. Gaviria, and D. Short. Guidelines for the conduct of clinical trials for spinal cord injury as developed by the ICCP panel: Spontaneous recovery after spinal cord injury and statistical power needed for therapeutic trials. *Spinal Cord*, 45:190–205, 2007.
- Andy J. Fong, Lance L. Cai, Chad K. Otoshi, David J. Reinkensmeyer, Joel W. Burdick, Roland R. Roy, and V. Reggie Edgerton. Spinal cord-transected mice learn to step in response to quipazine treatment and robotic training. *The Journal of neuroscience*, 25(50):11738–11747, 2005.
- Joan Fruitet, Alexandra Carpentier, Remi Munos, and Maureen Clerc. Bandit algorithms boost brain computer interfaces for motor-task selection of a brain-controlled button. In *Advances in Neural Information Processing Systems 25*, pages 458–466, 2012.
- Joan Fruitet, Alexandra Carpentier, Rémi Munos, and Maureen Clerc. Automatic motor task selection via a bandit algorithm for a brain-controlled button. *Journal of neural engineering*, 10(1):016012, 2013.
- Parag Gad, Jaehoon Choe, Mandheerej Singh Nandra, Hui Zhong, Roland R. Roy, Yu-Chong Tai, and V. Reggie Edgerton. Development of a multi-electrode array for spinal cord epidural stimulation to facilitate stepping and standing after a complete spinal cord injury in adult rats. *Journal of neuroengineering and rehabilitation*, 10(1):2, 2013.
- Yury Gerasimenko, Roland R. Roy, and V. Reggie Edgerton. Epidural stimulation: Comparison of the spinal circuits that generate and control locomotion in rats, cats and humans. *Experimental neurology*, 209(2):417–425, 2008.
- D. Ginsbourger, R. Riche, and L. Carraro. Kriging is well-suited to parallelize optimization. In Yoel Tenne and Chi-Keong Goh, editors, *Computational Intelligence in Expensive Optimization Problems*, volume 2 of *Adaptation, Learning, and Optimization*, pages 131–162. Springer Berlin Heidelberg, 2010.
- John Gittins. Bandit processes and dynamic allocation indices. *Journal of the Royal Statistical Society, B*, 41(2):148–177, 1979.

- Tayfun Gürel and Carsten Mehring. Unsupervised adaptation of brain-machine interface decoders. *Frontiers in neuroscience*, 6, 2012.
- Susan Harkema, Yury Gerasimenko, Jonathan Hodes, Joel Burdick, Claudia Angeli, Yangsheng Chen, Christie Ferreira, Andrea Willhite, Enrico Rejc, Robert G. Grossman, and V. Reggie Edgerton. Effect of epidural stimulation of the lumbosacral spinal cord on voluntary movement, standing, and assisted stepping after motor complete paraplegia: A case study. *The Lancet*, 377 (9781):1938–1947, 2011.
- Elad Hazan and Satyen Kale. Better algorithms for benign bandits. In *Proceedings of the twentieth Annual ACM-SIAM Symposium on Discrete Algorithms*, pages 38–47. Society for Industrial and Applied Mathematics, 2009.
- Philipp Hennig and Christian J. Schuler. Entropy search for information-efficient global optimization. *Journal of Machine Learning Research (JMLR)*, 13:1809–1837, June 2012.
- R. Herman, J. He, S. D’Luzansky, W. Willis, and S. Dilli. Spinal cord stimulation facilitates functional walking in a chronic, incomplete spinal cord injured. *Spinal Cord*, 40:65–68, 2002.
- M.L. Hines and N.T. Carnevale. NEURON: A tool for neuroscientists. *The Neuroscientist*, 7: 123–135, 2001.
- Jr. John F. Ditunno and Christopher S. Formal. Chronic spinal cord injury. *New England Journal of Medicine*, 330(8):550–556, February 1994.
- D. R. Jones, M. Schonlau, and W. J. Welch. Efficient global optimization of expensive black-box functions. *J Glob. Opt.*, 13:455–492, 1998.
- Rudolph Emil Kalman. A new approach to linear filtering and prediction problems. *Transactions of the ASME—Journal of Basic Engineering*, 82(Series D):35–45, 1960.
- Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum, and A. J. Hudspeth. *Principles of Neural Science*. McGraw-Hill, 5th ed. edition, 2012.
- Soheila Karimi-Abdolrezaee, Desiree Schut, Jian Wang, and Michael G. Fehlings. Chondroitinase and growth factors enhance activation and oligodendrocyte differentiation of endogenous neural precursor cells after spinal cord injury. *PloS one*, 7(5):e37589, 2012.
- R. Kleinberg, A. Slivkins, and E. Upfal. Multi-armed bandits in metric spaces. In *STOC*, pages 681–690, 2008.
- K. John Klose, Patrick L. Jacobs, James G. Broton, Rosalind S. Guest, Belinda M. Needham-Shropshire, Nathan Leibold, Mark S. Nash, and Barth A. Green. Evaluation of a training program

- for persons with SCI paraplegia using the Parastep® 1 ambulation system: Part 1. Ambulation performance and anthropometric measures. *Archives of physical medicine and rehabilitation*, 78(8):789–793, 1997.
- L. Kocsis and C. Szepesvári. Bandit based Monte-Carlo planning. In *ECML*, 2006.
- Alojz Kralj and Slobodan Grobelnik. Functional electrical stimulation—A new hope for paraplegic patients? *Bulletin of prosthetics research*, 20:75–102, 1973.
- A. Krause and C. Guestrin. Near-optimal nonmyopic value of information in graphical models. In *UAI*, 2005.
- A. Krause and C. S. Ong. Contextual Gaussian process bandit optimization. In *NIPS*, 2011.
- A. Krause, A. Singh, and C. Guestrin. Near-optimal sensor placements in Gaussian processes: Theory, efficient algorithms and empirical studies. *Journal of Machine Learning Research (JMLR)*, 9:235–284, February 2008.
- W. T. Liberson, H. J. Holmquest, David Scot, and Margot Dow. Functional electrotherapy: Stimulation of the peroneal nerve synchronized with the swing phase of the gait of hemiplegic patients. *Archives of Physical Medicine and Rehabilitation*, 42:101–105, 1961.
- D. Lizotte, T. Wang, M. Bowling, and D. Schuurmans. Automatic gait optimization with Gaussian process regression. In *IJCAI*, pages 944–949, 2007.
- Lennart Ljung. *System Identification: Theory for the User*. Prentice Hall PTR, 1999.
- S. Mangold, T. Keller, A. Curt, and V. Dietz. Transcutaneous functional electrical stimulation for grasping in subjects with cervical spinal cord injury. *Spinal Cord*, 43(1):1–13, 2004.
- Anitha Manohar, Robert D. Flint III, Eric Knudsen, and Karen A. Moxon. Role of neuronal plasticity after spinal cord injury for neurorobotic control. In *Proceedings of the 5th International IEEE EMBS Conference on Neural Engineering*, 2011.
- K. Minassian, I. Persy, F. Rattay, M. M. Pinter, H. Kern, and Milan R. Dimitrijevic. Human lumbar cord circuitry can be activated by extrinsic tonic input to generate locomotor-like activity. *Human Movement Science*, 26:275–295, 2007.
- M. Minoux. Accelerated greedy algorithms for maximizing submodular set functions. *Optimization Techniques, LNCS*, pages 234–243, 1978.
- J. Mockus. *Bayesian Approach to Global Optimization*. Kluwer Academic Publishers, 1989.
- J. Mockus, V. Tiesis, and A. Zilinskas. The application of Bayesian methods for seeking the extremum. In *Toward Global Optimization*, volume 2, pages 117–129. Elsevier, 1978.

- Mandheerej S. Nandra, Igor A. Lavrov, V. Reggie Edgerton, and Yu-Chong Tai. A parylene-based microelectrode array implant for spinal cord stimulation in rats. In *Micro Electro Mechanical Systems (MEMS), 2011 IEEE 24th International Conference on*, pages 1007–1010. IEEE, 2011.
- Ana Paula Pêgo, Sarka Kubinova, Dasa Cizkova, Ivo Vanicky, Fernando Milhazes Mar, Mónica Mendes Sousa, and Eva Sykova. Regenerative medicine for the treatment of spinal cord injury: More than just promises? *Journal of Cellular and Molecular Medicine*, 16(11):2564–2582, 2012.
- Thomas E. Prieto, J.B. Myklebust, R.G. Hoffmann, E.G. Lovett, and B.M. Myklebust. Measures of postural steadiness: Differences between healthy young and elderly adults. *Biomedical Engineering, IEEE Transactions on*, 43(9):956–966, 1996.
- Arthur Prochazka, Vivian K. Mushahwar, and Douglas B. McCreery. Neural prostheses. *The Journal of physiology*, 533(1):99–109, 2001.
- C. E. Rasmussen and C. K. I. Williams. *Gaussian Processes for Machine Learning*. MIT Press, 2006.
- Carl Edward Rasmussen and Hannes Nickisch. Gaussian processes for machine learning (GPML) toolbox. *The Journal of Machine Learning Research*, 11:3011–3015, 2010.
- H. Robbins. Some aspects of the sequential design of experiments. *Bul. Am. Math. Soc.*, 55, 1952.
- Roland R. Roy, John A. Hodgson, Sharlene D. Lauret, David J. Pierotti, Richard J. Gayek, and V. Reggie Edgerton. Chronic spinal cord-injured cats: Surgical procedures and management. *Laboratory Animal Science*, 42(4):335–343, August 1992.
- Ilya O. Ryzhov, Warren B. Powell, and Peter I. Frazier. The knowledge gradient algorithm for a general class of online learning problems. *Operations Research*, 60(1):180–195, 2012.
- Sabato Santaniello, Giovanni Fiengo, Luigi Glielmo, and Warren M. Grill. Closed-loop control of deep brain stimulation: A simulation study. *Neural Systems and Rehabilitation Engineering, IEEE Transactions on*, 19(1):15–24, 2011.
- Brenda R. Santos, Alain Delisle, Christian Larivière, André Plamondon, and Daniel Imbeau. Reliability of centre of pressure summary measures of postural steadiness in healthy young adults. *Gait & posture*, 27(3):408–415, 2008.
- Burr Settles. *Active Learning*. Synthesis Lectures on Artificial Intelligence and Machine Learning. Morgan and Claypool, 2012.

- W.J.W. Sharrard. The distribution of the permanent paralysis in the lower limb in poliomyelitis: A clinical and pathological study. *Journal of Bone & Joint Surgery, British Volume*, 37(4):540–558, 1955.
- W.J.W. Sharrard. The segmental innervation of the lower limb muscles in man: Arris and Gale lecture delivered at the Royal College of Surgeons of England on 2nd January 1964. *Annals of the Royal College of Surgeons of England*, 35(2):106, 1964.
- C. Norman Shealy, J. Thomas Mortimer, and James B. Reswick. Electrical inhibition of pain by stimulation of the dorsal columns: Preliminary clinical report. *Anesthesia and Analgesia*, 46: 489–491, July-August 1967a.
- C. Norman Shealy, Normal Taslitz, J. Thomas Mortimer, and Donald P. Becker. Electrical inhibition of pain: Experimental evaluation. *Anesthesia and Analgesia*, 46(3):299–305, May-June 1967b.
- Aleksandrs Slivkins. Contextual bandits with similarity information. Technical report, arXiv, 2011.
- N. Srinivas, A. Krause, S. Kakade, and M. Seeger. Gaussian process optimization in the bandit setting: No regret and experimental design. Technical report, arXiv, 2009.
- N. Srinivas, A. Krause, S. Kakade, and M. Seeger. Gaussian process optimization in the bandit setting: No regret and experimental design. In *ICML*, 2010.
- Adam Thrasher, Geoffrey M. Graham, and Milos R. Popovic. Reducing muscle fatigue due to functional electrical stimulation using random modulation of stimulation parameters. *Artificial Organs*, 29(6):453–458, 2005.
- Sandrine Thuret, Lawrence D.F. Moon, and Fred H Gage. Therapeutic interventions after spinal cord injury. *Nature Reviews Neuroscience*, 7(8):628–643, 2006.
- G. E. Uhlenbeck and L. S. Ornstein. On the theory of Brownian motion. *Physical Review*, 36: 823–841, 1930.
- Rubia van den Brand, Janine Heutschi, Quentin Barraud, Jack DiGiovanna, Kay Bartholdi, Michèle Huerlimann, Lucia Friedli, Isabel Vollenweider, Eduardo Martin Moraud, Simone Duis, Nadia Dominici, Silvestro Micera, Pavel Musienko, and Grégoire Courtine. Restoring voluntary control of locomotion after paralyzing spinal cord injury. *Science*, 336(6085):1182–1185, 2012.
- Carmen Vidaurre, Claudia Sannelli, Klaus-Robert Müller, and Benjamin Blankertz. Co-adaptive calibration to improve BCI efficiency. *Journal of neural engineering*, 8(2):025009, 2011.
- Grace Wahba. *Spline models for observational data*, volume 59. Society for industrial and applied mathematics, 1990.



- Joseph M. Waltz. Spinal cord stimulation: A quarter century of development and investigation. *Stereotactic and functional neurosurgery*, 69(1-4):288–299, 1997.
- Charles Watson, George Paxinos, and Gulgun Kayalioglu. *The Spinal Cord*. Academic Press, 2008.
- L. C. Weaver and C. Polosa, editors. *Autonomic Dysfunction After Spinal Cord Injury*, 2006. Elsevier.
- Anton Wernig and S. Müller. Laufband locomotion with body weight support improved walking in persons with severe spinal cord injuries. *Spinal Cord*, 30(4):229–238, 1992.
- C. Widmer, N. Toussaint, Y. Altun, and G. Rätsch. Inferring latent task structure for multitask learning by multiple kernel learning. *BMC Bioinformatics*, 11(Suppl 8:S5), 2010.
- Jun Wu, Tiansheng Sun, Chaoqun Ye, Jianhua Yao, Bing Zhu, and Hongying He. Clinical observation of fetal olfactory ensheathing glia transplantation (OEGT) in patients with complete chronic spinal cord injury. *Cell Transplantation*, 21(Supplement 1):S33–S37, 2012.
- Shihao Zhang, Rishi Wadhwa, Justin Haydel, Jamie Toms, Kendrick Johnson, and Bharat Guthikonda. Spine and spinal cord trauma. *Neurologic Clinics*, 31:183–206, 2013.