Curriculum Vitae of Lars Relund Nielsen

Current affiliation

Professor at Department of Economics and Business Economics, Business and Social Sciences, Aarhus University. Member of Cluster for Operations Research, Analytics, and Logistics (CORAL).

Personal data

Name: Lars Relund Nielsen
Citizenship: Danish
Born: 18. October 1973 in Herning
Marital status: Married
Children: Two - a son and a daughter

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Education and positions in Denmark

Sep. 2017 - present	Professor at Department of Economics and Business Economics, Business and Social Sciences, Aarhus University.
May 2018 - Oct. 2019	Head of section Logistics at the Department of Economics and Business Economics, Business and Social Sciences, Aarhus University.
July 2011 - July 2017	Associate Professor at Department of Economics and Business Economics, Business and Social Sciences, Aarhus University.
Nov. 2009 - July 2011	Associate Professor at Department of Business Studies, Aarhus School of Business, Aarhus University.
Mar. 2008 - Oct. 2009	Project Scientist at the Research Unit of Bioinformatics, Genetics and Statistics, Department of Genetics and Biotechnology, Faculty of Agricultural Sciences, Aarhus University.
Jan. 2007 - Feb. 2008	Project Scientist at the Statistics and Decision Analysis Research Unit, Department of Genetics and Biotechnology, Faculty of Agricultural Sciences, Aarhus University.
Jan. 2006 - Dec. 2006	Project Scientist at the Statistics and Decision Analysis Research Unit, Department of Genetics and Biotechnology, Danish Institute of Agricultural Sciences (DIAS).

June 2005 - Dec. 2005	Research Assistant at the Department of Accounting, Finance and Logistics, Aarhus School of Business.
Oct. 2004 - May 2005	Project Scientist at the Statistics and Decision Analysis Research Unit, Department of Genetics and Biotechnology, Danish Institute of Agricultural Sciences (DIAS).
July 2004 - Sep. 2004	Assistant Professor (forskningsadjunkt) at the Department of Animal Science and Animal Health, Royal Veterinary and Agricultural University.
Jan. 2004 - June 2004	Project Scientist at the Biometry Research Unit, Department of Animal Breeding and Genetics, Danish Institute of Agricultural Sciences (DIAS).
Aug. 2001 - Dec. 2003	Ph.D. part B scholarship at the Department of Operations Research, University of Aarhus.
Aug. 1999 - May 2001	Ph.D. part A scholarship at the Department of Operations Research, University of Aarhus.
Sep. 1994 - July 1999	M.Sc. in mathematics and economics at University of Aarhus.

Degrees

Feb. 2004	Ph.D. in mathematics and economics, Department of Operations Research, University of Aarhus.
May 2001	M.Sc. in mathematics and economics (cand.scient.oecon, Matematik-Økonom), Department of Operations Research, University of Aarhus.

Research

Main research interests include stochastic time-dependent networks, directed hypergraphs, mathematical programming, network optimization, multi-objective programming and Markov decision processes including approximate dynamic programming.

Present and former Ph.D. students:

Mark Lyngesen	"Multi-objective optimization over a set of pareto fronts" (co-supervisor, current).
Nicolas Forget	"Solution algorithms for multi-objective linear integer programming models" (main supervisor, finished 2022).
Reza Pourmoayed	"Improving welfare and productivity in growing pigs using advanced ICT methods" (main supervisor, finished 2016).
Sune L. Gadegaard	"Multiple Criteria Integer Optimization - with a view towards competitive location problems" (main supervisor, finished 2016).
Aparna Udupi	"Methods for Sensor Based Farrowing Prediction and Floor-heat Regulation" (co-supervisor, finished 2014).

I am considering/have been involved in the following research projects:

Multi-objective optimization over a set of pareto fronts

This project consider generic algorithms for solving multi-objective integer optimization problems. We propose two distinct bound set based branch–and–cut algorithms for bi–objective combinatorial optimization problems, based on implicitly and explicitly stated lower bound sets, respectively.
This project consider generic algorithms for choosing solutions to a number of separate MO problems with a common objective space. The decision maker must choose a solution to each of the MO problems where

the corresponding objective values will be the sum of the objective values for each problem. The decision maker is interested in all combinations of solutions that are non-dominated, we call this set the additive Pareto-front.

Status: Research currently conducted.

Multi-objective integer optimization

This project consider generic algorithms for solving multi-objective integer optimization problems. We propose two distinct bound set based branch–and–cut algorithms for bi–objective combinatorial optimization problems, based on implicitly and explicitly stated lower bound sets, respectively.

Status: Research currently conducted. Four papers have been published. One with extensive computational results obtained for the bi–objective single source capacitated facility location problem [28]. Biobjective branch-and-cut algorithms based on LP relaxation and bound sets were studied in [6]. Solution algorithms for multi-objective linear integer programming models have been considered in [2, 3, 27, 26]. Moreover, maintainer of R package gMIOP with tools for 2D and 3D plots of single and multi-objective linear/integer programming models [42].

Sensitivity of mixed integer programming models

This project consider multi-objective methods for sensitivity analysis of the objective function coefficients in mixed-integer linear programming (MILP)

Status: One paper has been published [1].

Bicriterion stochastic time-dependent knapsack problems

Solutions methods for knapsack problems with stochastic and/or time-dependent parameters are developed.

Status: Research currently conducted.

The single-source capacitated facility location problem (SSCFLP)

We Study an improved cut-and-solve algorithm for the SSCFLP in the form of a three-phase-algorithm. The first phase strengthens the integer program by a cutting plane algorithm to obtain a tight lower bound. The second phase uses a two level local branching heuristic to find an upper bound and, if optimality has not yet been established, the third phase uses the cut-and-solve framework to close the optimality gap.

Status: One paper has been published [7].

A bi-objective approach to discrete cost-bottleneck location problems

This project consider a family of bi-objective discrete facility location problems with a cost objective and a bottleneck objective. A special case is, for instance, a bi-objective version of the (vertex) p-centdian problem. We show that bi-objective facility location problems of this type can be solved eficiently by means of an "ε-constraint method.

Status: One paper has been published [6].

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Inventory control in a lost-sales setting with information about supply lead times

We study, from buyer's perspective the significance of information about the evolution of supply lead times. We consider a periodically reviewed single-item inventory system with lost sales. We compare the performance of the inventory model assuming informed lead times to the model assuming independent and identically distributed lead times.

Status: One paper has been published [12].

Finding the *K* best assignments

This project consider the problem of ranking assignments according to cost in the classical linear assignment problem. That is, we consider the problem of ranking the first *K* assignments in nondecreasing order of cost.

Status: One paper has been published [20].

The bicriterion multi modal assignment problem

The bicriterion multi modal assignment problem is an extension of the bicriterion assignment problem containing, in each assignment cell, several two-dimensional cost vectors/points. The objective is to identify either all efficient assignments or all nondominated criterion points for the problem.

Status: One paper has been published [19].

Finding the *K* best strategies in stochastic time-dependent networks

In a stochastic time-dependent network the travel time between two nodes is stochastic, and furthermore the distribution of this stochastic variable depends on the departure time. Here the best route does not necessarily always corresponds to a path but rather an adaptive strategy. This project focus on ranking the routes in nondecreasing order with respect to some optimality criterion. The case where routes are restricted, i.e. must correspond to a path and the case where routes are unrestricted are examined. In both cases the new algorithms are implemented and tested.

Status: Three papers have been published [23, 22, 11].

Bicriterion problems in stochastic time-dependent networks

Assume that for each possible leaving time from a given node two costs are assigned. That is, using two weighting functions each route corresponds to two costs. The problem now consists in finding the set of efficient routes. Both the unrestricted and the restricted case are considered. New algorithms using the two-phase method are implemented and tested.
Status: Research currently conducted. Three papers have been published [24, 18, 17].

Directed hypergraph models for Markov decision processes

In this project we consider a finite-horizon Markov decision process (MDP). A directed hypergraph model is formulated and it is shown that the problem of finding the optimal policy can be formulated as a minimum weight hyperpath problem and can be solved in linear time, with respect to the input data. Furthermore, an algorithm for finding the K best policies is presented.

Status: Research currently conducted. One paper has been published [21] and one is currently prepared for submission.

Research projects related to agriculture

Improving welfare and productivity in growing pigs using advanced ICT methods

This project is part of larger externally funded research project PigIT. We study model based decision support by, 1) improving integration of data in the decision process by learning parameters from data. 2) Ensuring optimal decisions by integrating indicators of animal welfare and productivity. 3) Developing optimization algorithms, which can handle multiple decision criteria and multiple levels.

Status: Research currently conducted. Four papers has been published [4, 9, 29, 5].

Improved monitoring and management of dairy production based on on-farm biosensors

In this project was externally funded by The Danish Food Industry Agency we develop models for optimizing treatment strategies for dairy cows from an economic point of view. The model will, based on online measurements in milk, be able to calculate when the cow must be treated or replaced.

Status: Four papers have been published [14, 13],[45, 44].

Better detection of lameness in dairy cows

External funded project where we develop models for detecting lameness in dairy cows. The model is based on a wireless animal activity monitoring sensor.

Status: One paper published [15]

Economic optimization of feeding level for high yielding dairy cows

Active project externally funded where we study models for optimizing the feeding level for high yielding dairy cows.

Status: One paper has been published [30].

Risk management in forestry - possible solution approaches

A small project concerning the development of algorithms for monitoring risk in Markov Decision Processes by using/extending existing algorithms for directed hypergraphs. The above project is a spin-off of this project.

Status: Two technical reports have been written [36, 35].

Teaching

I have participated in two courses about university education theory for assistant professors and supervision at university level (2007 and 2008) arranged by the Danish network of university teaching. Furthermore participated in two short courses about teaching large classes (2011) and thesis supervision (2010), respectively. Done a big course about supervision of master and ph.d. students (2013). Finally, I did a big course about online teaching activities (2014).

During my years at the university I have been teaching a variety of courses both as lecturer, supervisor and assistant. An overview is given in Table 1 on the following page. Moreover, I have supervised more than 50 master and bachelor thesis and internship projects.

Course name[a]	Students[b]	Year(s)[c]	Level[d]	Type[e]
Reinforcement Learning for Business	11	2022	M	L
Tools for Analytics (business)	85-140	2020-23	M	L/O
Advanced Excel (business)	200-300	2016-18	M	L
Operations Management (business)	120-350	2016,22-23	U	L
Modelling and solving discrete optimization problems within logistics	30	2015[f]	M	L
Research processes in OR with applications in logistics (Ph.D.)	5	2015-16	P	L
Markov Decision Theory (math-oecon)	15	2014,16,18	M/U	L/S
Transportation and Distribution Systems (business)	40-100	2011-16	U	L
Management Science Models (business)	120-150	2010-14	U	L
Brush up course on LP-models (business)	40-60	2010-14[g]	M	L
Seminars in Management Science (business)	12	2010-12	U	S/L
Advanced Management Science (business)	50-300	2005,10-14	U	L
Mathematical Programming (math-oecon)	30	2002-03	U	A
Management Science and Operations Research 4 (oecon)	25	2000-01	U	A
Mathematics for Chemists	20	2001	U	A
Statistics for Biologists and Chemists	20	2001	U	A
Mathematics for Economics (oecon)	25	1996-99	U	A

[a] business = Business School, math-oecon = Matematics and Economics, oecon = Economics. [b] Approximate numbers. [c] Course length is a semester. [d] U = Undergraduate, M = Master (postgraduate), P = Ph.D. course. [e] L = Lecturer, A = Teaching assistent, S = Supervisor, O = online. [f] University summercourse in July. [g] Course length is one day.

Table 1: Overview over teaching.

Conferences / Workshops / Stays (selected)

Sep. 23, 2021	Recent Advances in Multi-Objective Optimization (RAMOO), Workshop *Wuppertal, Germany, Online*.
Nov. 12-16, 2018	Recent Advances in Multi-Objective Optimization (RAMOO), Workshop and Pre-workshop *Nantes, France*.
Nov. 4-7, 2018	INFORMS Annual conference, *Phoenix US*.
June 10-14, 2017	24nd International Conference on Multiple Criteria Decision Making (speaker), *Ottawa, Canada*.
June 1-8, 2015	Research stay and presentation at *University of Modena and Reggio Emilia, Italy*.
June 17-22, 2013	22nd International Conference on Multiple Criteria Decision Making (speaker), *Malaga, Spain*.
July 8-11, 2012	EURO XXV (speaker), *Lisbon, Portugal*.
June 18-20, 2012	VeRoLog (speaker), *Bologna, Italy*.
July 11-15, 2010	EURO XXIV (speaker), *Lisbon, Portugal*.
July 26-28, 2009	EURO Summer Institute 2009 (invited lecturer), *University of Lleida, Spain*.
Sep 9-11, 2008	OR50 (speaker, chair), *York, UK*.

Stays Abroad

Sep. 2000 - Nov. 2000 Visiting scholar at the University of Camerino, Camerino, Italy.

Administrative Work

2005-present   Involved in writing applications for various research projects.

2007-2019	Board member of "Working Group of Operations Research in Agriculture and Forest Management" under the Association of European Operational Research Societies.
2018-2019	Head of section Logistics at the Department of Economics and Business Economics.
2018-2019	Leadership Programme for Research Managers at Aarhus University.
2018-2019	Leader of Cluster for Operations Research, Analytics, and Logistics (CORAL).
2017	Member of the Board of Studies for Economics and Business Administration.
2011-2018	Deputy chairman of "Departmental forum, Department of Economics".
2012-2017	Board member of "AU Horizon 2020 expert group - Theme 2 Bioeconomics".
2007-2008	Member of the Bachelor committee building The Faculty of Agricultural Sciences own bachelor degree (DJF became a part of Aarhus University primo 2007 and started to offer new degrees mid 2008).
2005-2010	Web-master of the "Research Unit of Statistics and Decision Analysis" web-pages.
2005-2010	Coordinator of the research units weekly meetings.
2007	LOC member of the First Nordic-Baltic Biometric Conference 2007, 6-8 June, Research Centre Foulum, Denmark.
2006-2007	Member of the local social activities committee at Research Centre Foulum.

External funding

I have been involved in writing applications for various external funded research projects and been a member of many. Successful and current applications include

2012-2017	"PigIT - Improving welfare and productivity in growing pigs using advanced ICT methods: A strategic research alliance" funded by the Danish Council for Strategic Research. Grant size total 31 million DKK.
2011-2014	"Optimale fodringsstrategier til malkekøer for miljø, klima, velfærd og økonomi" funded by Fødevareministeriet. Grant size total 18 million DKK.
2010-2013	"NordForsk - Management, design and evaluation of sustainable freight and logistics systems".
2007-2011	"ILSORM - udvikling af inline overvågningsteknologi" funded by Højteknologifonden. Grant size total 20 million DKK.
2007-2011	"Biosens II - Forbedret overvågning og management af mælkeproduktion og mælkekvalitet baseret på on-farm biosensorteknologi" funded by Fødevareministeriet. Grant size total 38 million DKK.

Programming

I am an experienced programmer in C++ and R. Most of the algorithms in my papers have been coded in C++ and are available on request. I am the developer and maintainer of R packages

- "Markov decision processes (MDPs)" which create and optimize MDPs with discrete time steps and state space. Both normal MDPs and hierarchical MDPs can be considered. R package.

- "gMOIP": Tools for 2D and 3D Plots of Single and Multi-Objective Linear/Integer Programming Models. R package.

- Multi-Objective Optimization Repository (MOrepo) which contains instances, results, generators etc. for different MO problems (continuously updated).

For further details, see my research web page under the "Software" tab.

Publications

Refereed work

[1] K.A. Andersen, T.K. Boomsma, and L.R. Nielsen. "MILP Sensitivity Analysis for the Objective Function Coefficients". In: *INFORMS Journal on Optimization* 5.1 (2023), pp. 92–109. DOI: 10.1287/ijoo.2022.0078.

[2] N. Forget, S.L. Gadegaard, and L.R. Nielsen. "Warm-starting lower bound set computations for branch-and-bound algorithms for multi objective integer linear programs". In: *European Journal of Operational Research* 302.3 (2022), pp. 909–924. DOI: 10.1016/j.ejor.2022.01.047.

[3] N. Forget, S.L. Gadegaard, K. Klamroth, L.R. Nielsen, and A. Przybylski. "Branch-and-bound and objective branching with three or more objectives". In: *Computers and Operations Research* 148 (2022), p. 106012. DOI: 10.1016/j.cor.2022.106012.

[4] R. Pourmoayed and L.R. Nielsen. "Optimizing pig marketing decisions under price fluctuations". In: *Annals of Operations Research* (2020). DOI: 10.1007/s10479-020-03646-0.

[5] R. Pourmoayed and L.R. Nielsen. "An approximate dynamic programming approach for sequential pig marketing decisions at herd level". In: *European Journal of Operational Research* 276.3 (2019), pp. 1056–1070. DOI: 10.1016/j.ejor.2019.01.050.

[6] S.L. Gadegaard, L.R. Nielsen, and M. Ehrgott. "Biobjective Branch-and-Cut Algorithms Based on LP Relaxation and Bound Sets". In: *Informs Journal on Computing* 31.4 (2019), pp. 790–804. DOI: 10.1287/ijoc.2018.0846.

[7] S.L. Gadegaard, A. Klose, and L.R. Nielsen. "An improved cut-and-solve algorithm for the single-source capacitated facility location problem". In: *EURO Journal on Computational Optimization* 6.1 (2018), pp. 1–27. DOI: 10.1007/s13675-017-0084-4.

[8] S.L. Gadegaard, A Klose, and L.R. Nielsen. "A bi-objective approach to discrete cost-bottleneck location problems". In: *Annals of Operations Research* 267.1-2 (2018), pp. 179–201. DOI: 10.1007/s10479-016-2360-8.

[9] Reza Pourmoayed, Lars Relund Nielsen, and Anders Ringgaard Kristensen. "A hierarchical Markov decision process modeling feeding and marketing decisions of growing pigs". In: *European Journal of Operational Research* 250.3 (2016), pp. 925–938. DOI: 10.1016/j.ejor.2015.09.038.

[10] L.R. Nielsen and A.R. Kristensen. "Handbook of Operations Research in Agriculture and the Agri-Food Industry". In: *Handbook of Operations Research in Agriculture and the Agri-Food Industry*. Ed. by Lluis M. Plà-Aragonés. Vol. 224. International Series in Operations Research & Management Science. Springer, 2015. Chap. Markov decision processes to model livestock systems, pp. 419–454. DOI: 10.1007/978-1-4939-2483-7_19.

[11] L.R. Nielsen, K.A. Andersen, and D. Pretolani. "Ranking paths in stochastic time-dependent networks". In: *European Journal of Operational Research* 236.3 (2014), pp. 903–914. DOI: 10.1016/j.ejor.2013.10.022.

[12] Abhijit Bhagwan Bendre and Lars Relund Nielsen. "Inventory control in a lost-sales setting with information about supply lead times". In: *International Journal of Production Economics* 142.2 (2013), pp. 324–331. DOI: 10.1016/j.ijpe.2012.12.002.

[13] L.R Nielsen, E. Jørgensen, and S. Højsgaard. "Embedding a state space model into a Markov decision process". In: *Annals of Operations Research* 190.1 (2011), pp. 289–309. DOI: 10.1007/s10479-010-0688-z.

[14]   L.R Nielsen, E. Jørgensen, A.R. Kristensen, and S. Østergaard. "Optimal Replacement Policies for Dairy Cows Based on Daily Yield Measurements". In: *Journal of Dairy Science* 93.1 (2010), pp. 77–92. DOI: 10.3168/jds.2009-2209.

[15]   L.R Nielsen, A.R. Pedersen, M.S. Herskin, and L. Munksgaard. "Quantifying walking and standing behaviour of dairy cows using a moving average based on output from an accelerometer". In: *Applied Animal Behaviour Science* 127.1-2 (2010), pp. 12–19. DOI: 10.1016/j.applanim.2010.08.004.

[16]   C.R. Pedersen, L.R. Nielsen, and K.A. Andersen. "Erratum to "An algorithm for ranking assignments using reoptimization" [Computers and Operations Research 35 (2008) 3714-3726]". In: *Computers and Operations Research* 37 (2010), pp. 426–427. DOI: 10.1016/j.cor.2009.04.009.

[17]   D. Pretolani, L.R. Nielsen, K.A. Andersen, and M. Ehrgott. "Time-adaptive and history-adaptive multicriterion routing in stochastic, time-dependent networks". In: *Operations Research Letters* 37.3 (2009), pp. 201–205. DOI: 10.1016/j.orl.2009.02.001.

[18]   L.R. Nielsen, D. Pretolani, and K.A. Andersen. "Multiobjective Programming and Goal Programming". In: ed. by V. Barichard, M. Ehrgott, X. Gandibleux, and V. T'Kindt. Vol. 618. Lecture Notes in Economics and Mathematical Systems. Springer Berlin Heidelberg, 2009. Chap. Bicriterion shortest paths in stochastic time-dependent networks, pp. 57–67. DOI: 10.1007/978-3-540-85646-7_6.

[19]   C.R. Pedersen, L.R. Nielsen, and K.A. Andersen. "The Bicriterion Multi Modal Assignment Problem: Introduction, Analysis, and Experimental Results". In: *Informs Journal on Computing* 20.3 (2008), pp. 400–411. DOI: 10.1287/ijoc.1070.0253.

[20]   C.R. Pedersen, L.R. Nielsen, and K.A. Andersen. "An algorithm for ranking assignments using reoptimization". In: *Computers and Operations Research* 35.11 (2008), pp. 3714–3726. DOI: 10.1016/j.cor.2007.04.008.

[21]   L.R. Nielsen and A.R. Kristensen. "Finding the K best policies in a finite-horizon Markov decision process". In: *European Journal of Operational Research* 175.2 (2006), pp. 1164–1179. DOI: 10.1016/j.ejor.2005.06.011.

[22]   L.R. Nielsen, D. Pretolani, and K.A. Andersen. "Finding the K shortest hyperpaths using reoptimization". In: *Operations Research Letters* 34.2 (2006), pp. 155–164. DOI: 10.1016/j.orl.2005.04.008.

[23]   L.R. Nielsen, K.A. Andersen, and D. Pretolani. "Finding the K Shortest Hyperpaths". In: *Computers and Operations Research* 32.6 (2005), pp. 1477–1497. DOI: 10.1016/j.cor.2003.11.014.

[24]   L.R. Nielsen, K.A. Andersen, and D. Pretolani. "Bicriterion Shortest Hyperpaths in Random Time-Dependent Networks". In: *IMA Journal of Management Mathematics* 14.3 (2003), pp. 271–303. DOI: 10.1093/imaman/14.3.271.

[25]   L.R. Nielsen. "Route Choice in Stochastic Time-Dependent Networks". PhD thesis. Department of Operations Research, University of Aarhus, Dec. 2003. URL: http://www.imf.au.dk/publs?id=499.

Reports, Working papers and Proceedings (selected)

[26]   N. Forget, S.L. Gadegaard, and L.R. Nielsen. *Linear relaxation based branch-and-bound for multiobjective integer programming with warm-starting*. Tech. rep. Optimizaton Online, 2021. URL: http://www.optimization-online.org/DB_HTML/2021/08/8531.html.

[27] N. Forget, K. Klamroth, S.L. Gadegaard, A. Przybylski, and L.R. Nielsen. *Branch-and-bound and objective branching with three objectives.* Tech. rep. Optimizaton Online, 2020. URL: http://www.optimization-online.org/DB_HTML/2020/12/8158.html.

[28] S.L. Gadegaard, M. Ehrgott, and L.R. Nielsen. *Bi-objective branch-and-cut algorithms: Applications to the single source capacitated facility location problem.* Preprint. Optimization Online, Apr. 2016. URL: www.optimization-online.org/DB_HTML/2016/04/5402.html.

[29] R. Pourmoayed and L.R. Nielsen. *An overview over pig production of fattening pigs with a focus on possible decisions in the production chain.* Tech. rep. PigIT Report No. 4. Aarhus University, 2014. URL: http://www.pigit.ku.dk/publications/PigIT-Report4.pdf.

[30] S. Østergaard, M. Weisbjerg, O. Aaes, N. Friggens, T. Kristensen, A.R. Kristensen, L.R. Nielsen, and D. Bossen. *Udredningsrapport om økonomisk foderoptimering i den enkelte besætning baseret på NorFor Plan.* Intern rapport DJF husdyrbrug 14. Det Jordbrugsvidenskabelige Fakultet, Aarhus Universitet, Feb. 2009.

[31] L.R. Nielsen, D. Pretolani, and K.A. Andersen. *Bicriterion a priori route choice in stochastic time-dependent networks.* Working Paper WP-L-2006-10. Submitted. Department of Business Studies, Aarhus School of Business, 2006. URL: http://www.asb.dk/.

[32] D. Pretolani, L.R. Nielsen, and K.A. Andersen. *A note on "Multicriteria adaptive paths in stochastic, time-varying networks".* Working Paper L-2006-11. Submitted. Department of Business Studies, Aarhus School of Business, 2006. URL: www.asb.dk.

[33] C.R. Pedersen, L.R. Nielsen, and K.A. Andersen. *On the Bicriterion Multi Modal Assignment Problem.* Working Paper WP-2005-3. Submitted. Department of Operations Research, University of Aarhus, Dec. 2005. URL: http://www.imf.au.dk/publs?id=586.

[34] C.R. Pedersen, L.R. Nielsen, and K.A. Andersen. *A note on ranking assignments using reoptimization.* Working Paper WP-2005-2. Department of Operations Research, University of Aarhus, Dec. 2005. URL: http://www.imf.au.dk/publs?id=585.

[35] L.R. Nielsen and A.R. Kristensen. *Risk Management in Forestry - Possible Solution Approaches.* Tech. rep. DINA Notat No. 111. Danish Informatics Network in the Agriculture Sciences (DINA), The Royal Veterinary and Agricultural University, Jan. 2005. URL: www.research.relund.dk.

[36] L.R. Nielsen and A.R. Kristensen. "Risk aversion in Markov decision processes". In: *Proceedings of the European Workshop for Decision Problems in Agriculture and Natural Resources (EWDA-04).* Silsoe Research Institute, Silsoe, England, Sept. 2004. URL: www.research.relund.dk.

[37] L.R. Nielsen, D. Pretolani, and K.A. Andersen. *K shortest paths in stochastic time-dependent networks.* Working Paper WP-L-2004-05. Submitted. Department of Accounting, Finance and Logistics, Aarhus School of Business, 2004. URL: http://www.asb.dk/.

[38] L.R. Nielsen, K.A. Andersen, and D. Pretolani. *Bicriterion Shortest Hyperpaths in Random Time-Dependent Networks.* Tech. rep. WP-2003-1. Department of Operations Research, University of Aarhus, 2003. URL: http://www.imf.au.dk/publs?id=419.

[39] L.R. Nielsen, K.A. Andersen, and D. Pretolani. *Finding the K Shortest Hyperpaths: algorithms and applications.* Tech. rep. WP-2002-2. Department of Operations Research, University of Aarhus, 2002. URL: http://www.imf.au.dk/publs?id=263.

[40] L.R. Nielsen and D. Pretolani. *A Remark on the Definition of a B-Hyperpath.* Tech. rep. University of Aarhus: Department of Operations Research, University of Aarhus, 2001. URL: www.research.relund.dk.

[41] Kim A. Andersen, Lars R. Nielsen, Morten Riis, and Anders J. V. Skriver. *The Facets of the Set Packing Polytope: A Logical Interpretation*. Tech. rep. WP-2000-3. Department of Operations Research, University of Aarhus, 2000. URL: http://www.imf.au.dk/publs?id=146.

Other publications (selected)

[42] L.R. Nielsen. *gMOIP: Tools for 2D and 3D Plots of Single and Multi-Objective Linear/Integer Programming Models*. R package. 2020. URL: https://github.com/relund/gMOIP.

[43] L.R. Nielsen. *TEGP - Time-Expanded Generator with Peaks (v1.66)*. Reference manual. July 2013. URL: http://www.research.relund.dk.

[44] L.R. Nielsen and E. Jørgensen. *Det optimale udskiftningstidspunkt for en malkeko*. Populærvidenskabelig artikel. July 2010. URL: www.research.relund.dk.

[45] L.R. Nielsen and S. Højsgaard. *Koens økonomiske værdi*. Oct. 2009.

[46] L.R. Nielsen and C.R. Pedersen. *APGen - an assignment problem generator*. Reference manual. Dec. 2005. URL: http://www.research.relund.dk.

All papers are available from my research web page http://www.research.relund.dk.