

# KRZYSZTOF DEMBCZYŃSKI

## *Curriculum Vitae*



*Office Address* Politechnika Poznańska (Poznań University of Technology – PUT)  
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## Research Interests

*Current* Machine learning with a particular focus on extreme classification, multi-label classification, structured output prediction, and preference learning.

*Past* Multi-criteria decision aiding, decision rule models.

## Personal Information

*Date and Place of Birth* February 10, 1977, Poznań, Poland

*Citizenship* Polish

*Sex* Male

*Marital status* Married to Katarzyna Habersack (since, July 23, 2005)

*Children* Marianna (September 17, 2006) and Hanna (July 21, 2009)

## Employment

*2011–present* Assistant Professor in the Faculty of Computing at PUT.

*2009–2011* Post-doctoral Researcher in the Knowledge Engineering & Bioinformatics (KEBI) Lab at Philipps Universität Marburg.

*2001–2009* Research Assistant and Lecturer in the Laboratory of Intelligent Decision Support Systems at PUT.

## Education

*March 31, 2009* Ph.D. degree with honors obtained from Faculty of Computing Science and Management at PUT.

*1996–2001* Bachelor and Master studies in Computer Science at PUT.

*1992–1996* Secondary School, Adam Mickiewicz Lyceum No. 8 in Poznań.

## Interests

*Hobby* alternative rock music, philosophy, family :)

*Sport* swimming, basketball.

## Language Skills

<i>Native language</i>	Polish
<i>Foreign languages</i>	English, German

## Computer Skills

<i>Operating systems</i>	Unix/Linux, Windows, Mac OS
<i>Computer programming</i>	Java, C++, SQL, R

## Lecturing

<i>Mining of Massive Datasets</i>	Lecturer responsible for the entire course
<i>Processing of Massive Datasets</i>	Lecturer responsible for the entire course
<i>Data Warehouses</i>	Lecturer responsible for the entire course
<i>Statistics and data analysis</i>	Instructor (labs and exercises)

## Grants and Projects

<i>2014-2017</i>	Project leader in a research project granted by Narodowe Centrum Nauki (NCN, National Science Centre), "Consistent and scalable algorithm for structured output prediction."
<i>2012-2014</i>	Project leader in a research project granted by FNP, "Collective Learning and Inference in Multi-Target Prediction Problems."
<i>2011 - 2013</i>	Internal grant for young scientists of the Faculty of Computing at PUT, "Beyond standard machine learning problems."
<i>2013</i>	Project leader in an R&D project with Orange Labs, "Algorithms for Adaptive Learning Solution for SLU."
<i>2011 - 2012</i>	Participant in an R&D project supported by Polish Agency for Enterprise Development (PARP), "Open platform for on-line navigation."
<i>February-June 2009</i>	Project leader in the research project for NaviExpert, a GPS navigation company, "Prediction of Travel Times in a Traffic Communication Network."

## Scholarships and Awards

<i>2012-2014</i>	Laureate of the Foundation for Polish Science (FNP) in the HomingPlus Programme, Poland.
<i>2011-2013</i>	Scholarship for Outstanding Polish Young Scientists, Poland.
<i>November, 2015</i>	Best Paper Award (Surrogate regret bounds for generalized classification performance metrics, Kotłowski, W., Dembczyński, K.) at Asian Conference on Machine Learning (ACML) 2015, Hong Kong.
<i>2012</i>	The co-authored article “On label dependence and loss minimization in multi-label classification” (with Waegeman, W., Cheng, W., Hüllermeier, E., published in Machine Learning 88, 5-45) has been selected as a notable paper in computing in 2012 by ACM Computing Reviews.
<i>August, 2012</i>	Best Paper Award (An Analysis of chaining in multi-label classification, Dembczyński, K., Waegeman, W., Hüllermeier, E.) at European Conference on Artificial Intelligence (ECAI) 2012, Montpellier, France.
<i>August 2012</i>	2nd prize in the JRS 2012 Data Mining Competition: Topical Classification of Biomedical Research Papers (with Weiwei Cheng, Eyke Hüllermeier, Adrian Jaroszewicz, and Willem Waegeman), Chengdu, China.
<i>October 2008</i>	Team Award for the research in the area of intelligent decision support systems granted by the Rector of PUT.
<i>January–August 2008</i>	Microsoft Research grant in the Beyond Search program (with Wojciech Kotłowski and Dawid Weiss).
<i>September 2007</i>	1st prize in the ECML/PKDD Discovery Challenge 2007 (with Wojciech Kotłowski and Marcin Sydow), Warsaw, Poland.
<i>December 2005</i>	10-day visit at Université Paris IX Dauphine under the Polonium 2005 programme, France.
<i>October 2003 – September 2004</i>	Stipend under subsidy 11/2001 of Foundation for Polish Science (Fundacja na rzecz Nauki Polskiej, FNP) granted to Professor Roman Słowiński.
<i>June–August 2002</i>	Participant in Young Scientist Summer Program in International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.
<i>October 1999–July 2000</i>	DAAD (Deutscher Akademischer Austauschdienst) Scholarship for studying (2 semesters) at Brandenburg University of Technology (BTU) in Cottbus, Germany.

## Scientific Activities and Distinctions

- Invited talks*
- Invited talk “Extreme Multi-Label Classification” at the XIX International Conference on Systems Science, September 7-9, 2016, Wrocław, Poland
  - Plenary talk “Decision-theoretic Approach to Multi-label Classification” at the Theoretical Foundations Foundations of Machine Learning conference, February 16-21, 2015, Będłowo, Poland
  - Invited talk “Surrogate loss functions for preference learning” at From Decision Analysis to Preference Learning (DA2PL) Workshop, November 20-21, Paris, France
  - Invited talk “Ranking Problems, Task Losses and their Surrogates” at From Decision Analysis to Preference Learning (DA2PL) Workshop, November 15-16, 2012, Mons, Belgium
- Tutorials*
- Invited tutorial on Multi-Target Prediction Problems (with Willem Waegeman), Discovery Sciences 2013, October 6, 2013, Singapore
  - Tutorial on Multi-Target Prediction Problems (with Willem Waegeman and Eyke Hüllermeier), International Conference on Machine Learning, June 16, 2013, USA
- Organization of scientific events*
- Co-organizer (with Salvatore Greco and Roman Słowiński) of the Preference Learning stream, European Conference on Operational Research, July 3-6, 2016, Poznań, Poland
  - Co-organizer (with Willem Waegeman, Grigorios Tsoumakas, Tapio Pahikkala, Antti Airola, Giorgio Valentini, Massih-Reza Amini) of the International Workshop on Big Multi-Target Prediction, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery, September 7-11, 2015, Porto, Portugal
  - Co-organizer (with Salvatore Greco and Roman Słowiński) of the Preference Learning stream, European Conference on Operational Research, July 12-15, 2015, Glasgow, Scotland
  - Co-organizer (with Willem Waegeman, Tapio Pahikkala, Antti Airola) of the International Workshop on Multi-Target Prediction, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery, September 15-19, 2014, Nancy, France
  - Co-organizer (with Salvatore Greco and Roman Słowiński) of the Preference Learning stream, Conference of the International Federation of Operational Research Societies, July 13-18, 2014, Barcelona, Spain
  - Co-organizer (with Willem Waegeman and Roman Słowiński) of the Preference Learning stream, EURO/Informs Conference, July 1-4, 2013, Rome, Italy
  - Co-organizer (with Willem Waegeman and Roman Słowiński) of the Preference Learning stream, European Conference on Operational Research, July 8-11, 2012, Vilnius, Lithuania
- Memberships*
- International Machine Learning Society (IMLS), Institute of Electrical and Electronics Engineers (IEEE) (2002–2008).

## Reviewing

*Reviewer  
for conferences*

International Joint Conference on Artificial Intelligence (IJCAI), AAAI Conference on Artificial Intelligence (AAAI), Neural Information Processing Systems (NIPS), International Conference on Machine Learning (ICML), International Conference on Artificial Intelligence and Statistics (AISTATS), Knowledge Discovery and Data Mining (KDD), European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD), European Conference on Artificial Intelligence (ECAI).

*Reviewer  
for journals*

Journal of Machine Learning Research, Machine Learning Journal, Data Mining and Knowledge Discovery, Neural Computation, ACM Transactions on Knowledge Discovery from Data, IEEE Pattern Analysis and Machine Intelligence, IEEE Knowledge and Data Engineering, IEEE Neural Networks and Learning Systems, Information Sciences, Fuzzy Sets and Systems, European Journal of Operational Research, Neurocomputing.

## Journal Publications

Kotłowski, W., Dembczyński, K.: Surrogate regret bounds for generalized classification performance metrics. *Machine Learning Journal* (2016)

Stock, M., Dembczyński, K., Baets, B.D., Waegeman, W.: Exact and efficient top-k inference for multi-target prediction by querying separable linear relational models. *Data Mining and Knowledge Discovery* **30**(5) (2016) 1370–1394

Waegeman, W.W., Dembczynski, K., Jachnik, A., Cheng, W., Hüllermeier, E.: On the Bayes-optimality of F-measure maximizers. *Journal of Machine Learning Research* **15**(1) (2014) 3333–3388

Senge, R., Bösner, S., Dembczynski, K., Haasenritter, J., Hirsch, O., Donner-Banzhoff, N., Hüllermeier, E.: Reliable classification: Learning classifiers that distinguish aleatoric and epistemic uncertainty. *Inf. Sci.* **255** (2014) 16–29

Dembczyński, K., Waegeman, W., Cheng, W., Hüllermeier, E.: On loss minimization and label dependence in multi-label classification. *Machine Learning* **88** (2012) 5–45

Fallah, A., Cheng, W., Dembczynski, K., Hüllermeier, E.: Learning monotone nonlinear models using the Choquet integral. *Machine Learning* **89**(1-2) (2012) 183–211

Dembczyński, K., Kotłowski, W., Słowiński, R.: ENDER – a statistical framework for boosting decision rules. *Data Mining and Knowledge Discovery* **21**(1) (2010) 52–90

Dembczyński, K., Kotłowski, W., Słowiński, R.: Learning rule ensembles for ordinal classification with monotonicity constraints. *Fundamenta Informaticae* **94**(2) (2009) 163–178

Dembczyński, K., Greco, S., Słowiński, R.: Rough set approach to multiple criteria classification with imprecise evaluations and assignments. *European Journal of Operational Research* **198**(2) (2009) 626–636

Kotłowski, W., Dembczyński, K., Greco, S., Słowiński, R.: Stochastic Dominance-based Rough Set Model for Ordinal Classification. *Information Sciences* **178**(21) (2008) 4019–4037

Dembczyński, K., Kotłowski, W., Sydow, M.: Effective prediction of web user behaviour with user-level models. *Fundamenta Informaticae* **89**(2–3) (2008) 189–206

Błaszczczyński, J., Dembczyński, K., Kotłowski, W., Słowiński, R., Szelaż, M.: Ensembles of Decision Rules. *Foundations of Computing and Decision Sciences* **31**(3–4) (2006) 221–232

Dembczyński, K., Pindur, R., Susmaga, R.: Generation of Exhaustive Set of Rules within Dominance-based Rough Set Approach. *Electr. Notes Theor. Comput. Sci.* **82**(4) (2003)

Dembczyński, K., Pindur, R., Susmaga, R.: Dominance-based Rough Set Classifier without Induction of Decision Rules. *Electr. Notes Theor. Comput. Sci.* **82**(4) (2003)

Dembczyński, K., Greco, S., Słowiński, R.: Methodology of rough-set-based classification and sorting with hierarchical structure of attributes and criteria. *Control & Cybernetics* **31**(4) (2003) 891–920

## Peer-reviewed Papers at Top Conferences

- Jasinska, K., Dembczynski, K., Busa-Fekete, R., Pfannschmidt, K., Klerx, T., Hüllermeier, E.: Extreme F-measure maximization using sparse probability estimates. In: ICML. (2016)
- Dembczyński, K., Kotłowski, W., Waegeman, W., Busa-Fekete, R., Hüllermeier, E.: Consistency of probabilistic classifier trees. In: ECMLPKDD. Springer (2016)
- Kotłowski, W., Dembczyński, K.: Surrogate regret bounds for generalized classification performance metrics. In: ACML. (2015)
- Busa-Fekete, R., Szörényi, B., Dembczynski, K., Hüllermeier, E.: Online F-measure optimization. In: NIPS 29, Curran Associates, Inc. (2015)
- Dembczynski, K., Jachnik, A., Kotłowski, W., Waegeman, W., Hüllermeier, E.: Optimizing the F-measure in multi-label classification: Plug-in rule approach versus structured loss minimization. In: Proc. of 30th Annual International Conference on Machine Learning (ICML 2013). (2013)
- Dembczyński, K., Waegeman, W., Cheng, W., Hüllermeier, E.: An analysis of chaining in multi-label classification. In: 20th European Conference on Artificial Intelligence. Volume 242 of Frontiers in Artificial Intelligence and Applications. (2012) 294–299
- Dembczynski, K., Kotłowski, W., Hüllermeier, E.: Consistent multilabel ranking through univariate losses. In: Proc. of 29th Annual International Conference on Machine Learning (ICML 2012). (2012)
- Dembczyński, K., Waegeman, W., Cheng, W., Hüllermeier, E.: An exact algorithm for f-measure maximization. In: Advances in Neural Information Processing Systems 25. (2011)
- Kotłowski, W., Dembczynski, K., Hüllermeier, E.: Bipartite ranking through minimization of univariate loss. In Gettor, L., Scheffer, T., eds.: Proc. of 28th Annual International Conference on Machine Learning (ICML 2011), Omnipress (2011)
- Fallah, A., Cheng, W., Dembczynski, K., Hüüllermeier, E.: Learning monotone nonlinear models using the choquet integral. In Hofmann, T., Malerba, D., Gunopulos, D., Vazirgiannis, M., eds.: Machine Learning and Knowledge Discovery in Databases. Lecture Notes in Artificial Intelligence, Springer-Verlag (2011)
- Dembczyński, K., Waegeman, W., Cheng, W., Hüllermeier, E.: Regret analysis for performance metrics in multi-label classification: The case of Hamming and subset zero-one loss. In Balcázar, J.L., Bonchi, F., Gionis, A., Sebag, M., eds.: Machine Learning and Knowledge Discovery in Databases. Volume 5783 of Lecture Notes in Artificial Intelligence., Springer-Verlag (2010) 280–295
- Dembczyński, K., Cheng, W., Hüllermeier, E.: Bayes optimal multilabel classification via probabilistic classifier chains. In Fürnkranz, J., Joachims, T., eds.: Proc. of 27th Annual International Conference on Machine Learning (ICML 2010), Omnipress (2010) 279–286
- Cheng, W., Dembczyński, K., Hüllermeier, E.: Graded multilabel classification: The ordinal case. In Fürnkranz, J., Joachims, T., eds.: Proc. of 27th Annual International Conference on Machine Learning (ICML 2010), Omnipress (2010) 223–230
- Cheng, W., Dembczyński, K., Hüllermeier, E.: Label ranking methods based on the plackett-luce model. In Fürnkranz, J., Joachims, T., eds.: Proc. of 27th Annual International Conference on Machine Learning (ICML 2010), Omnipress (2010) 215–222
- Dembczyński, K., Kotłowski, W., Słowiński, R.: Maximum likelihood rule ensembles. In Cohen, W.W., McCallum, A., Roweis, S.T., eds.: Proc. 25th of International Conference on Machine Learning (ICML 2008). Omnipress (2008) 224–231
- Dembczyński, K., Greco, S., Kotłowski, W., Słowiński, R.: Statistical model for rough set approach to multicriteria classification. In Kok, J.N., Koronacki, J., de Mántaras, R.L., Matwin, S., Mladenić, D., Skowron, A., eds.: Knowledge Discovery in Databases: PKDD 2007. Volume 4702 of Lecture Notes in Artificial Intelligence., Springer-Verlag (2007) 164–175

## Peer-reviewed Workshop Papers at Top Conferences

- Pfannschmidt, K., Jasinska, K., Busa-Fekete, R., Dembczyński, K.: Extreme f-measure maximization. In: The NIPS Workshop on Extreme Classification. (2015)
- Jasinska, K., Dembczynski, K.: Consistent label tree classifiers for extreme multi-label classification. In: The ICML Workshop on Extreme Classification. (2015)
- Dembczyński, K., Waegeman, W., Hüllermeier, E.: Joint mode estimation in multi-label classification by chaining. In: Collective Learning and Inference on Structured Data, ECML PKDD 2011 Workshop. (2011)
- Dembczyński, K., Waegeman, W., Cheng, W., Hüllermeier, E.: On label dependence in multi-label classification. In: 2nd Int. Workshop on Learning from Multi-Label Data (MLD 2010), ICML/COLT 2010 Workshop. (2010)
- Dembczyński, K., Kotłowski, W.: Decision rule-based algorithm for ordinal classification based on rank loss minimization. In: Preference Learning, ECML/PKDD 2009 Workshop. (2009)
- Dembczyński, K., Kotłowski, W., Słowiński, R.: A general framework for learning an ensemble of decision rules. In: LeGo '08: From Local Patterns to Global Models, ECML/PKDD 2008 Workshop. (2008) 17–36
- Dembczyński, K., Kotłowski, W., Weiss, D.: Predicting ads' click-through rate with decision rules. In: TROA '08: Workshop on Targeting and Ranking for Online Advertising, WWW 2008 Workshop. (2008)

## Book Chapters

- Dembczyński, K., Kotłowski, W., Słowiński, R.: Beyond sequential covering – boosted decision rules. In Koronacki, J., Ras, Z.W., Wierzchon, S.T., Kacprzyk, J., Kacprzyk, J., eds.: Advances in Machine Learning I. Volume 262 of Studies in Computational Intelligence. Springer-Verlag (2010) 209–225
- Dembczyński, K., Kotłowski, W., Słowiński, R., Szeląg, M.: Learning of rule ensembles for multiple attribute ranking problems. In Fürnkranz, J., Hüllermeier, E., eds.: Preference Learning. Springer-Verlag (2010) 217–247

## Thesis

- Dembczyński, K.: Decision Rule Model for Ordinal Classification Problems with Incomplete Information. PhD thesis, Poznań University of Technology (2009)

## Other Peer-reviewed Conference Papers

- Jasinska, K., Dembczyński, K.: Predicting diverse rankings in extreme multi-label classification. In: From Multi-criteria Decision Aid to Preference Learning (DA2PL) 2016. (2016)
- Dembczynski, K., Kotlowski, W., Gawel, P., Szarecki, A., Jaszkievicz, A.: Matrix factorization for travel time estimation in large traffic networks. In: Artificial Intelligence and Soft Computing – 12th International Conference (ICAISC 2013). Volume 7895 of Lecture Notes in Computer Science., Springer (2013) 500–510
- Gawel, P., Dembczynski, K., Susmaga, R., Wesolek, P., Zielniewicz, P., Jaszkievicz, A.: Adapting travel time estimates to current traffic conditions. In: ADBIS Workshops. (2012) 79–88
- Gawel, P., Dembczynski, K., Kotlowski, W., Kubiak, M., Susmaga, R., Zielniewicz, P., Jaszkievicz, A.: Community traffic: A technology for the next generation car navigation. In: ADBIS Workshops. (2012) 339–348
- Cheng, W., Dembczynski, K., Hüllermeier, E., Jaroszewicz, A., Waegeman, W.: F-measure maximization in topical classification. In: Rough Sets and Current Trends in Computing. Volume 7413 of Lecture Notes in Computer Science., Springer (2012) 439–446

- Dembczyński, K., Kotłowski, W., Słowiński, R.: Solving regression by learning an ensemble of decision rules. In Rutkowski, L., Tadeusiewicz, R., Zadeh, L., Zurada, J., eds.: *International Conference on Artificial Intelligence and Soft Computing (ICAISC 2008)*. Volume 5097 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2008) 533–544
- Dembczyński, K., Kotłowski, W., Słowiński, R.: Ensemble of decision rules for ordinal classification with monotonicity constraints. In Wang, G., Li, T., Grzymała-Busse, J.W., Miao, D., Skowron, A., Yao, Y., eds.: *Rough Sets and Knowledge Technology 2008*. Volume 5009 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2008) 260–267
- Dembczyński, K., Kotłowski, W., Słowiński, R.: Ordinal Classification with Decision Rules. In Raś, Z.W., Tsumoto, S., Zighed, D., eds.: *Mining Complex Data 2007*. Volume 4944 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2008) 169–181
- Dembczyński, K., Greco, S., Kotłowski, W., Słowiński, R.: Relationship between loss functions and confirmation measures. In An, A., Stefanowski, J., Ramanna, S., Butz, C.J., Pedrycz, W., Wang, G., eds.: *Rough Sets, Fuzzy Sets, Data Mining and Granular Computing*. Volume 4482 of *Lecture Notes in Computer Science*, Springer-Verlag (2007) 338–345
- Błaszczczyński, J., Dembczyński, K., Kotłowski, W., Pawłowski, M.: Mining direct marketing data by ensembles of weak learners and rough set methods. In Tjoa, A.M., Trujillo, J., eds.: *Data Warehousing and Knowledge Discovery*. Volume 4081 of *Lecture Notes in Computer Science*, Springer-Verlag (2006) 218–227
- Błaszczczyński, J., Dembczyński, K., Kotłowski, W., Słowiński, R., Szelaż, M.: Ensembles of Decision Rules for Solving Binary Classification Problems in the Presence of Missing Values. In Greco, S., Hata, Y., Hirano, S., Inuiguchi, M., Miyamoto, S., Nguyen, H.S., Słowiński, R., eds.: *Rough Sets and Current Trends in Computing*. Volume 4259 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2006) 224–234
- Błaszczczyński, J., Dembczyński, K., Słowiński, R.: Interactive Analysis of Preference-Ordered Data using Dominance-based Rough Set Approach. In Rutkowski, L., Tadeusiewicz, R., Zadeh, L., Zurada, J., eds.: *International Conference on Artificial Intelligence and Soft Computing (ICAISC 2006)*. Volume 4029 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2006) 489–498
- Dembczyński, K., Kotłowski, W., Słowiński, R.: Additive Preference Model with Piecewise Linear Components Resulting from Dominance-based Rough Set Approach. In Rutkowski, L., Tadeusiewicz, R., Zadeh, L., Zurada, J., eds.: *International Conference on Artificial Intelligence and Soft Computing (ICAISC 2006)*. Volume 4029 of *Lecture Notes in Artificial Intelligence*, Springer-Verlag (2006) 499–508
- Dembczyński, K., Greco, S., Kotłowski, W., Słowiński, R.: Quality of rough approximation in multi-criteria classification problems. In Greco, S., Hata, Y., Hirano, S., Inuiguchi, M., Miyamoto, S., Nguyen, H.S., Słowiński, R., eds.: *Rough Sets and Current Trends in Computing*. Volume 4259 of *Lecture Notes in Artificial Intelligence*. Springer-Verlag (2006) 318–327
- Dembczyński, K., Greco, S., Słowiński, R.: Second-order rough approximations in multi-criteria classification with imprecise evaluations and assignments. In Ślęzak, D., Wang, G., Szczuka, M., Düntsch, I., Yao, Y., eds.: *Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing*. Volume 3641 of *Lecture Notes in Artificial Intelligence*. Springer-Verlag (2005) 54–63
- Dembczyński, K., Hapke, M., Przybył, D.: Flexible Querying with Fuzzy Projection. In Szczepaniak, P., Kacprzyk, J., Niewiadomski, A., eds.: *Advances in Web Intelligence*. Volume 3528 of *Lecture Notes in Artificial Intelligence*. Springer-Verlag (2005) 439–444