

# Madalina Fiterau

## Curriculum Vitae

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Computer Science Department  
Stanford University

### Objective

Build intelligent systems that aid decision-making by extracting compact models and salient representations from heterogeneous data. Solve problems stemming from multimodal applications; dimensionality reduction, interpretability, transfer learning, hybrid models, vision, pattern detection, time series analysis, healthcare.

### Education

- 2015–now **Postdoctoral Fellowship**, *Stanford University, Computer Science Department and the Mobilize Center, Stanford, CA.*  
Advisor: Christopher Ré (Computer Science); Co-advisor: Scott Delp (Bioengineering).
- Current project Expanding research on interpretable models, in part by applying deep learning to obtain salient representations from biomedical ‘deep’ data, including time series and images. The ultimate goal is to fuse these representations with structured clinical records to form comprehensive models in order to detect clinical instability as well as patterns related to medical conditions such as cerebral palsy, osteoarthritis, obesity and running injuries.
- 2009–2015 **PhD in Machine Learning**, *Carnegie Mellon University, School of Computer Science, Machine Learning Department, Pittsburgh, PA*, PhD advisor: Artur Dubrawski.
- Thesis *Discovering Compact and Informative Structures through Data Partitioning*. CMU, SCS, MLD. Committee: Geoff Gordon, Andreas Krause and Alex Smola.
- Research Uncovering/leveraging structure in data to build compact ensembles of low-dimensional components, such that every sample can be handled using one sub-model or using a sparse mixture of them. The assignment of samples to sub-models and the component dimensionality reduction are performed jointly, using convex formulations. The techniques were successfully applied to medical data, resulting in models which were deemed informative by clinicians, significantly decreasing annotation effort.
- 2009–2012 **MSc in Machine Learning**, *Carnegie Mellon University, School of Computer Science, Machine Learning Department, Pittsburgh, PA.*
- Data Analysis Project *Trade-offs in Explanatory Model Learning*. CMU, MLD, Spring 2012. Committee: Artur Dubrawski, Geoff Gordon and Jeff Schneider.
- Research Explaining datasets: extracting high-accuracy regions in low-dimensional projections of the feature space; context specific models and their connection to compressed sensing and information-theoretical concepts like minimum description length.

Detection of complex anomalous patterns: clinical alarm preemption by vital sign and treatment monitoring; faulty treatment detection; abnormal vital pattern detection and clustering.

Rule learning: introduced learning algorithm for expressions containing conjunctions, disjunctions and negations.

Courses Machine Learning, Intermediate Statistics, Statistical Machine Learning, Advanced Statistical Theory, Graduate Artificial Intelligence, Probabilistic Graphical Models, Graduate Algorithms, Multimedia Databases and Data Mining, Mobile Robot Development, Advanced Mobile Robot Development, Machine Learning Theory (audited), Information Processing and Learning.

2005–2009 **Bachelors Degree in Computer and Software Engineering**, *Politehnica University of Timisoara, School of Automation and Computing*, Romania, GPA: 9.80/10.

Diploma Project *Handover Algorithm Design and Simulation*. Advisors: Dr. Gabriel-Miro Muntean, Prof. Ioan Jurca.

Spring 2009 **Erasmus Exchange Program**, *University of Amsterdam*, The Netherlands.

Courses from Masters track in Grid Computing: Concurrent Systems, Theory and Application of Multithreading.

Project Expression recognition: developed a clustering algorithm that enables features of person-dependent classification to be used in person-independent classification.

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## Internships

Jul–Oct 2014 **Microsoft Research**, *Cambridge*, UK.

Introduced backpropagation in random forests with fuzzy decision trees  
Host: Peter Kontschieder, Microsoft Research (a-pekont@microsoft.com)  
External Collaborator: Samuel Rota-Bulo, (rotabulo@fbk.eu)

Jun–Sep 2013 **Google**, *New York*, NY.

Estimated the creation date for businesses displayed on Google Maps  
Host: Parisa Haghani (parisah@google.com)

Jun–Sep 2011 **Google**, *Pittsburgh*, PA.

Explored impact of commercial intent in content ad selection  
Host: Jonathan Scott (jsco@google.com)

Jun–Aug 2008 **Dublin City University**, *Ireland*.

Odysseus summer school project: Performance of Group Handover in Heterogeneous Wireless Networks. Advisor: Gabriel Miro-Muntean (munteang@eeng.dcu.ie)  
Designed and tested a handoff algorithm for mobile devices equipped with multiple wireless interfaces

2006–2009 **Alcatel-Lucent**, *Timisoara*, Romania.

Part time, software development and maintenance for internal tools;  
MacroWeb – developed application for remote execution of commands scripts on network stations (C++/Java, Python);  
Agora – performed bug fixes and maintenance, enhanced license generation, optimized import of audit files (VB 6.0);

Jul–Sep 2007 **Siemens VDO Automotive**, *Timisoara*, Romania.

Programmed configurable RF receiver for identifying datagrams sent by car keys (C)

Jul-Sep 2006 **Siemens VDO Automotive**, *Timisoara*, Romania.  
Built an equipment management tool using Visual Basic 6 and T-SQL

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## Publications

### Conference and Journal Papers

- MLHC **Madalina Fiterau**, Suvrat Bhooshan, Jason Fries, Charles Bournhonesque, Jennifer Hicks, Eni Halilaj, Christopher Ré and Scott Delp. ShortFuse: Biomedical Time Series Representations in the Presence of Structured Information. 3rd Conference on Machine Learning for Healthcare, MLHC 2017. Also presented at the Women in Statistics and Data Science Conference, WSDS, October 2017
- IJCAI Invited paper: Peter Kotschieder, **Madalina Fiterau**, Antonio Criminisi and Samuel Rota-Bulo. Deep Neural Decision Forests. Sister Conference Best Paper Track at the 25th International Joint Conference in Artificial Intelligence 2016  
Lujie Chen, Artur Dubrawski, Donghan Wang, **Madalina Fiterau**, Mathieu Guillemebert, Eliezer Bose and Ata M. Kaynar. Using Supervised Machine Learning to Classify Real Alerts and Artifact in Online Multisignal Vital Sign Monitoring Data. Journal of Critical Care Medicine, July 2016
- ICCV Peter Kotschieder, **Madalina Fiterau**, Antonio Criminisi and Samuel Rota-Bulo. Deep Neural Decision Forests. International Conference in Computer Vision, ICCV 2015 \* **Marr Prize for Best Paper**
- AAAI **Madalina Fiterau** and Artur Dubrawski. Active learning for Informative Projection Recovery. Conference of the Association for the Advancement of Artificial Intelligence, AAAI 2015
- AAAI Nick Gisolfi, **Madalina Fiterau** and Artur Dubrawski. Finding Meaningful Gaps to Guide Data Acquisition for a Radiation Adjudication System. Conference of the Association for the Advancement of Artificial Intelligence, AAAI 2015
- AAAI Matt Barnes, Nick Gisolfi, **Madalina Fiterau** and Artur Dubrawski. Leveraging Common Structure to Improve Prediction across Related Datasets. Conference of the Association for the Advancement of Artificial Intelligence, AAAI 2015
- ICMLA **Madalina Fiterau** and Artur Dubrawski. Informative projection recovery for classification, clustering and regression. International Conference on Machine Learning and Applications, ICMLA 2013
- NIPS **Madalina Fiterau** and Artur Dubrawski. Projection retrieval for classification. Advances in Neural Information Processing Systems, NIPS 2012
- LCN **Madalina Fiterau**, Olga Ormond and Gabriel-Miro Muntean. Performance of Handover for Multiple Users in Heterogeneous Wireless Networks. IEEE Conference on Local Computer Networks, LCN 2009

### Conference Extended Abstracts

- Ferdinand Legros, **Madalina Fiterau**, Jennifer Hicks, Michael Schwartz and Scott Delp. Predicting the Outcome of Hamstring Surgery in Patients with Cerebral Palsy via Bayesian Networks. Big Data in Biomedicine, May 2017, Stanford
- JSM Manisha Desai, **Madalina Fiterau**, Jennifer Hicks and Thomas Robinson. Accelerometer Wear and Non-wear Classification using an Ensemble of Unsupervised Predictors. Joint Statistical Meeting, August 2016

- SCCM **Fiterau M**, Wang J, Dubrawski A, Clermont G, Hravnak M, Pinsky MR. Using expert review to calibrate semi-automated adjudication of vital sign alerts in step-down units. Society of Critical Care Medicine Annual Congress, SCCM 2016 ★ **Star Research Award**
- ESICM **Fiterau M**, Dubrawski A, Wang D, Chen L, Guillame-Bert M, Hravnak M, Clermont G, Bose E, Holder A, Murat Kaynar A, Wallace D, Pinsky MR. Semi-automated Adjudication of Vital Sign Alerts in Stepdown Units. Annual Congress of the European Society of Intensive Care Medicine, ESICM 2015
- SCCM **Fiterau M**, Dubrawski A, Chen L, Hravnak M, Bose E, Gilles C, Pinsky MR. Archotyping artifacts in monitored noninvasive vital signs data. Society of Critical Care Medicine Annual Congress 2015
- SCCM Wang D, **Fiterau M**, Dubrawski A, Hravnak M, Clermont G and Pinsky MR. Interpretable active learning in support of clinical data annotation. Society of Critical Care Medicine Annual Congress 2015
- RCCM Hravnak M, Chen L, **Fiterau M**, Dubrawski A, Clermont G, Guillame-Bert M, Bose E, Pinsky MR. Active machine learning to increase annotation efficiency in classifying vital sign events as artifact or real alerts in continuous noninvasive monitoring. American Journal of Respiratory and Critical Care Medicine 2014
- ESICM **Fiterau M**, Dubrawski A, Chen L, Hravnak M, Clermont G, Bose E, Guillame-Bert M, Pinsky MR. Artifact adjudication for vital sign step-down unit data can be improved using Active Learning with low-dimensional models. Annual Congress of the European Society of Intensive Care Medicine 2014
- ESICM Wang D, Chen L, **Fiterau M**, Dubrawski A, Hravnak M, Bose E, Wallace D, Kaynar M, Clermont G, Pinsky MR. Multi-tier ground truth elicitation framework with application to artifact classification for predicting patient instability. Annual Congress of the European Society of Intensive Care Medicine 2014
- ESICM Hravnak M, Chen L, Dubrawski A, Clermont G, Bose E, **Fiterau M**, Guillame-Bert M, Pinsky MR. Supervised Machine learning can classify artifact in multi-signal vital sign monitoring data from Step-Down Unit (SDU) Patients. Annual Congress of the European Society of Intensive Care Medicine 2014
- Nicholas Gisolfi, **Madalina Fiterau** and Artur Dubrawski. Finding Gaps in Data to Guide Development of a Radiation Threat Adjudication System. 2014 Symposium on Radiation Measurements and Applications
- ESICM **Fiterau M**, Dubrawski A, Chen L, Hravnak M, Clermont G, Pinsky MR. Automatic identification of artifacts in monitoring critically ill patients. Annual Congress of the European Society of Intensive Care Medicine 2013
- iSDS **Madalina Fiterau**, Artur Dubrawski, Can Ye. Real-time Adaptive Monitoring of Vital Signs for Clinical Alarm Preemption. International Society for Disease Surveillance Annual Conference 2011
- Demonstrations**
- IJCAI Donghan Wang, **Madalina Fiterau** and Artur Dubrawski, VIPR: An Interactive Tool for Meaningful Visualization of High-Dimensional Data. Demonstration at the International Joint Conference in Artificial Intelligence, IJCAI 2016
- NIPS **Madalina Fiterau**, Artur Dubrawski, Donghan Wang. An Interactive System for the Extraction of Meaningful Visualizations from High-Dimensional data. Demonstration at the Neural Information Processing Systems Conference, NIPS 2015. URL: <http://www.autonlab.org/ipe/>

## Refereed Workshop Contributions

- MED-NIPS Ke Xiao, Heliodoro Tejeda, **Madalina Fiterau**, Jason Fries, James Priest and Christopher Ré, Automated Classification of Aortic Valve Morphology from Phase-Contrast Cardiac MRI Using an Augmented CNN, Medical Imaging Workshop at the Association of Neural Information Processing Systems Conference (MED-NIPS) 2017. Poster.
- MED-NIPS Vincent Chen, Paroma Varma, **Madalina Fiterau**, Seung-Pyo Lee and James Priest and Christopher Ré, Generating Training Labels for Cardiac Phase-Contrast MRI Images, Medical Imaging Workshop at the Association of Neural Information Processing Systems Conference (MED-NIPS) 2017. Poster.
- IML-NIPS Ferdinand Legros, **Madalina Fiterau**, Jennifer Hicks, Michael Schwartz and Scott Delp, Interpretable Hamstring Surgery Outcome Prediction with Linear Continuous Bayesian Networks. Interpretable Machine Learning Symposium at the Association of Neural Information Processing Systems Conference (IML-NIPS) 2017. Poster.
- Madalina Fiterau**, Jason Fries, Eni Halilaj, Nopphon Siranart, Suvrat Bhooshan and Christopher Ré. Similarity-based LSTMs for Time Series Representation Learning in the Presence of Structured Covariates. NIPS 2016 Recurrent Neural Networks Symposium, Barcelona, Spain, December 2016. Poster.
- WiML **Madalina Fiterau**. Learning representations from time series data through contextualized LSTMs. Women in Machine Learning Workshop, Barcelona, Spain, December 2016. Oral Presentation.
- Madalina Fiterau**, Artur Dubrawski, Karen Chen, Donghan Wang, Gilles Clermont, Marilyn Hravnak and Michael R. Pinsky, Detecting Artifacts in Clinical Alerts from Vital Signs. NIPS 2015 Workshop on Machine Learning in Healthcare, Montreal, Quebec, Canada, December 2015. Paper and poster.
- WiML **Madalina Fiterau** and Artur Dubrawski, Theoretical Guarantees for the Construction of Informative Projection Ensembles using k-NN Classifiers. Women in Machine Learning Workshop. Montreal, Canada, December 2015. Poster.
- WiML **Madalina Fiterau** and Artur Dubrawski. Reducing Annotation Effort through Projection Retrieval in an Active Learning Setting. Women in Machine Learning Workshop, Montreal, Quebec, Canada, December 2014. Poster.
- Madalina Fiterau** and Artur Dubrawski. Detecting Artifacts in Clinical Data through Projection Retrieval. ICML Workshop on the Role of Machine Learning in Transforming Healthcare: Recent progress, Challenges and Opportunities, Atlanta, June 2013. Poster.
- Madalina Fiterau** and Artur Dubrawski. An Application of Divergence Estimation to Projection Retrieval for Semisupervised Classification and Clustering, ICML Workshop on Divergences and Divergence Learning. Atlanta, June 2013. Oral Presentation.
- WiML **Madalina Fiterau** and Leila Wehbe. Feature-Task Bi-clustering in Multitask Regression. Women in Machine Learning Workshop, Lake Tahoe, Nevada, December 2012. Poster.
- WiML **Madalina Fiterau** and Artur Dubrawski. Explaining Datasets through High-Accuracy Regions. Women in Machine Learning Workshop, Granada, Spain, December 2011. Oral presentation.

## Technical Reports

**Madalina Fiterau** and Artur Dubrawski. Explanation-Oriented Classification via Subspace Partitioning. Spring 2012

**Madalina Fiterau**, Andrew Sheng, Venkat Senapati, Nagasrikanth Kallakuri, Robert Walzer. Real-time Algorithmic Detection of a Landing Site using Sensors aboard a Lunar Lander, Technical Report, Advanced Mobile Robot Development, CMU, 2011

**Madalina Fiterau**, Andrew Sheng. Pinpoint Landing through Landscape Matching and Terrain Evaluation, Technical Report, Mobile Robot Development, CMU, 2010

[Manuscript under review \(available upon request\)](#)

**Madalina Fiterau**, Ruth Urner and Artur Dubrawski, Informative Projection Ensembles: Theory and Algorithms for Interpretable Models.

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## Awards

- 2017 **LATTICE Symposium**, Invited Participant, Seattle, WA
- 2016 **Rising Stars Workshop**, Invited Participant, Carnegie Mellon University
- 2016 **Star Research Award at SCCM**, the Annual Congress of the Society of Critical Care Medicine, "Using expert review to calibrate semi-automated adjudication of vital sign alerts in StepDown Units", project in collaboration with Profs. Gilles Clermont, Marilyn Hravnak and Michael R. Pinsky at the University of Pittsburgh
- 2015 **Marr Prize for the best paper at ICCV**, the International Conference in Computer Vision for the paper "Deep Neural Decision Forests", joint work with Peter Kotschieder, Samuel Rota-Bulò and Antonio Criminisi from MSR Cambridge
- 2009 Carnegie Mellon University PhD Scholarship in Machine Learning
- 2007 **General Electric Scholar Leader Award**, 3-year scholarship, one of 15 in Romania
- 2005–2009 Study Scholarship, Politehnica University of Timisoara, awarded to top 10% of class

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## Teaching

- Spring 2014 Teaching Assistant, CMU, Advanced Optimization and Randomized Methods (Alex Smola, Suvrit Sra)  
Taught lecture on Compressed Matrix Multiplications and recitations for the Advanced Optimization course.
- Spring 2013 Teaching Assistant, CMU, Introduction to Machine Learning (Alex Smola, Barnabas Poczos)
- Fall 2011 Teaching Assistant, CMU, Multimedia Databases and Data Mining (Christos Faloutsos)

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## Activities

- 2017 Organizer of the NIPS Workshop on Machine Learning for Health, Long Beach, CA, 8th December
- 2016 Organizer of the NIPS Workshop on Machine Learning for Health, Barcelona, Spain, 9th of December
- 2014–2015 CMU Machine Learning Department Admissions Committee Member
- 2014 Organizer of the NIPS Workshop on Clinical Data Analysis, Genomics and Healthcare, Montreal, 12th of December

- 2014 Organizer of the Machine Learning Student Research Symposium, CMU
- 2013 Organizer of the NIPS Workshop on Clinical Data Analysis and Healthcare, Lake Tahoe, 10th of December
- 2013 Social Activities Organizer for the Machine Learning Department at CMU
- 2011 Volunteer at the Neural Information Processing Systems Conference
- Reviewing Machine Learning Journal 2017; JMLR 2016; NIPS (2014, 2015, 2016, 2017); AAAI (2016, 2017); IJCAI (2016); AMIA (2016); MLHC (2016, 2017); ICML (2015); Sub-reviewer for ICML 2012, NIPS 2012
- Mentoring Advised Auton Lab students Nick Gisolfi and Matt Barnes, resulting in publications at AAAI 2015 and SORMA 2014. Advised graduate students in the Mobilize Center – Ferdinand Legros, Suvrat Bhooshan, Charles Bournhonesque, resulting in publications at conferences and workshops on Machine Learning for Healthcare

## Computer skills

### Programming Languages:

- C/C++/C#, Java, Python, Visual Basic, SQL (MySQL, T-SQL, Oracle SQL)
- Basic knowledge of: Perl, Lisp, Prolog, FoxPro, VHDL, ASM

### Scientific computing:

- Matlab, R, NetworkSimulator2, MicroSim Pspice

### Web design:

- MS Visual Interdev, VS .NET, VB Script, JavaScript

## Languages

Romanian	<b>Native</b>	
English	<b>Advanced</b>	<i>Cambridge Certificate in Advanced English – grade A</i>
French	<b>Beginner</b>	<i>Basic comprehension and usage</i>

## References

Artur Dubrawski, Carnegie Mellon University, School of Computer Science (awd@cs.cmu.edu)

Christopher Ré, Stanford University, Computer Science Department (chrismre@cs.stanford.edu)

Scott Delp, Stanford University, Bioengineering Department (delp@stanford.edu)

Manisha Desai, Stanford University, Quantitative Sciences Unit, School of Medicine (manishad@stanford.edu)

Alex Smola, Carnegie Mellon University, School of Computer Science (alex@smola.org)

Peter Kontschieder, Mapillary Research (pkontschieder@mapillary.com)

Gilles Clermont, University of Pittsburgh, Department of Critical Care Medicine (cler@pitt.edu)

## Other Interests

- Sci-Fi
- Photography
- Computer Games
- Image editing (Photoshop CS3)