# Biographical Sketch for Marco Valtorta

Professor, Department of Computer Science and Engineering, University of South Carolina

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# Professional preparation

Politecnico di Milano (Italy) Electrical Engineering “Laurea” 1980

Duke University Computer Science M.A. 1984

Duke University Computer Science PhD 1987

# APPOINTMENTS

2008 - present *Professor,* Dept. of Computer Science and Engineering, Univ. of South Carolina

08/17- 08/19 *Chair of the Faculty Senate*, University of South Carolina

1994 – 2008 *Associate Professor*, Dept. of Computer Science and Engineering, Univ. of South Carolina (Department of Computer Science before expansion and renaming of department in 2000)

1993 - 1999 *Director of Undergraduate Studies*, Dept. of Computer Science, Univ. of South Carolina

1988 - 1994 *Assistant Professor*, Dept. of Computer Science, Univ. of South Carolina

1985 - 1988 *Project Officer*, ESPRIT, Commission of the European Communities, Brussels, Belgium

1980 - 1985 *Research Assistant* for prof. D.W. Loveland, Dept. of Computer Science, Duke Univ.

# PRODUCTS

1. Five publications closely related to the project (student coauthors underlined)

1) Mohammad Ali Javidian, Marco Valtorta, and Pooyan Jamshidi. “AMP ChainGraphs: Minimal Separators and Structure Learning Algorithms.” *Journal of Artificial Intelligence Research*, 69 (2020), 419-480.

2) Mohammad Ali Javidian, Zhiyu Wang, Linyuan Lu, and MarcoValtorta. “On a Hypergraph Probabilistic Graphical Model.”*Annals of Mathematics and Artificial Intelligence*, 88 (2020), 1003-1033.

3) Mohammad Ali Javidian, Marco Valtorta, and Pooyan Jamshidi. “Learning LWF Chain Graphs: A Markov Blanket Discovery Approach.” Proceedings of the 36th Conference on Uncertainty in Artificial Intelligence (UAI-20), Toronto, Canada,August 3-6, 2020.

4) Allman, E.S., Rhodes, J.A., Stanghellini, E., and Valtorta, M. “Parameter Identifiability of Discrete Bayesian Networks with Hidden Variables." *Journal of Causal Inference*, 3, 2 (2015), 189-205.

5) Yimin Huang and Marco Valtorta. “On the Completeness of an Identifiability Algorithm for Semi-Markovian Models.” *Annals of Mathematics and Artificial Intelligence*, 54, 4, 363-408, 2009.

5) Moninder Singh and Marco Valtorta. “Construction of Bayesian Belief Networks from Data: a Brief Survey and an Efficient Algorithm.” *International Journal of Approximate Reasoning*, 12, 2, 111-131, 1995.

1. Five other publications (student coauthors underlined)

1) Emad Alsuwat, Hatim Alsuwat, Marco Valtorta, and Csilla Farkas. “Adversarial Data Poisoning Attacks aganist the PC Learning Algorithm.” *International Journal of General Systems*, 49:1, 3-31, 2000.

2) Yimin Huang and Marco Valtorta. “Pearl’s Calculus of Intervention is Complete.” Proceedings of the 22nd Conference on Uncertainty in Artificial Intelligence (UAI-06), Cambridge, MA, July 13-15, 437-444, 2006 (winner of the best student paper award, shared with “Identification of Conditional Interventional Distributions,” by I. Spitser and J. Pearl).

3) Jingsong Wang and Marco Valtorta. "On the Combination of Logical and Probabilistic Models for Information Analysis." *Applied Intelligence*, 36, 2 (2012), 472-497.

4) Subramani Mani, Marco Valtorta, and Susanne McDermott, “Building Bayesian Network Models in Medicine: the MENTOR Experience.” *Applied Intelligence*, 22, 2 (March/April 2005), 93-108, 2005.

5) Marco Valtorta, Young-Gyun Kim, and Jiri Vomlel. “Soft Evidential Update for Probabilistic Multiagent Systems.” *International Journal of Approximate Reasoning*, 29, 1, 71-106, 2002.

# Synergistic activities:

1. Dr. Valtorta has a unique connection to many of the pioneers in the field of Bayesian networks (and other Probabilistic Graphical Models) , from the very beginning of the field. He started corresponding with 2011 Turing Award winner Judea Pearl, who coined the phrase “Bayesian networks” in 1981, in the context of the result descrived in item 2, which Pearl included in the celebrated book \_Heuristics\_. While a project officer for the European Community’s ESPRIT program from 1985-1988, Valtorta was for a while in charge of the MUNIN project (ESPRIT P599) on interpretation of electromyography data, arguably the first large industrial application of Bayesian networks. In that capacity, he started a collaboration with the University of Aalborg Decision Support Systems group led by Finn V. Jensen and interacted with Steffen Lauritzen, Stig Andersen, Christian Olesen, Steen Andreassen, Uffe Kjaerulff, and many of their students and post-docs, including, among others, Anders Madsen, Olav Bangso, Jirka Vomlel, and Thomas Nielsen. These acquaintances (in some cases, friendships) result in stimulating discussions and a considerable saving of time when dealing with issues that have been addressed in the past.
2. “Valtorta’s Theorem,” proved in 1980 (with publication in the journal *Artificial Intelligence* in 1984) was described in 2011 as “seminal” and “an important theoretical limit of usefulness” for heuristics computed by search in an abstracted problem space.
3. Dr. Valtorta created the course “Bayesian Networks and Decision Graphs” (cross-listed as a Computer Science and Statistics course) at the University of South Carolina.
4. Dr. Valtorta is a senior member of the American Association for the Advancement of Artificial Intelligence (AAAI), IEEE, and ACM.
5. Dr. Valtorta and his Ph.D. student, Yimin Huang, proved the completeness of Pearl’s do-calculus of interventions in 2006, thus resolving a conjecture proposed by Judea Pearl in 1993.