DIPARTIMENTO DI
INFORMATICA, SISTEMISTICA E
COMUNICAZIONE
Viale Sarca, 336
20126 Milano

ReGAInS

SEMINAR ANNOUNCEMENT

Tuesday, 10th June 2025, at 2:00 pm
Room "03" - Tellus Building (ex U4)

Credal Networks and Probabilistic Circuits

Speaker: Prof. Cassio de Campos
TU Eindhoven, The Netherlands

Abstract
This tutorial presents a view on two important related credal models. Credal networks are a generalization of Bayesian networks to allow for representation and reasoning with sets of models sharing some properties. The graph gives a visual representation which is exploited for efficiency of inferences as well as explainability. A recent connection of credal networks and some causal inferences is of special interest. Probabilistic circuits are a class of probabilistic generative models that represent computations explicitly and can be seen as a bridge between interpretative (credal) Bayesian networks and high-performing neural networks. We discuss the relations between these models as well as to other models, including Markov networks, random forests, mixture models, and neural networks. We look at their capabilities for large-scale uncertainty treatment, neuro-symbolic inferences, fairness, and causality. The seminar also illustrates possible applications using cases in image analysis, multi-typed tabular benchmarks, fairness measures, and data imputation over a variety of domains.

Short bio
Cassio de Campos obtained his degrees from the University of Sao Paulo (Brazil) in Computer Science and Mechatronics. His habilitation and doctorate theses were carried out on the topic of Uncertainty in Artificial Intelligence, in particular related to algorithms and complexity of robust and interpretative machine learning models. He works on foundations of artificial intelligence and machine learning, including probabilistic generative models and imprecise probability. Cassio has worked in multiple countries and universities starting from 2001, and he is currently a full professor in Cautious Artificial Intelligence at TU Eindhoven, The Netherlands. Cassio has served as reviewer and panelist of multiple research foundations and senior committee/senior area chair of major AI/ML conferences, as well as area editor of IJAR and senior associate editor of ACM Transactions on Probabilistic ML. He organized multiple events including ISIPTA, PGM and UAI. He is a senior member of ACM and board member of AUAI.

Contact person for the seminar: fabio.stella@unimib.it