Progic 2025: The 12th Workshop on Combining Probability and Logic, Carnegie Mellon University, Pittsburgh, PA – April 3–5, 2025.
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Abstract

Report on the Conference *Progic 2025: The 12th Workshop on Combining Probability and Logic*, Carnegie Mellon University, Pittsburgh, PA – April 3–5, 2025.

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The twelfth edition of *Progic*, the long-running Workshop on Combining Probability and Logic, took place at Carnegie Mellon University in early April, drawing together scholars working in formal epistemology, logic, probability, and causal inference. This year's meeting was organized by Kevin Kelly, Krzysztof Mierzewski, and Francesca Zaffora Blando, and was held in the Adamson Wing of Baker Hall.

The program began with a plenary talk by Dan Roy (University of Toronto), who presented a paper, coauthored by Haosui Duanmu and David Schrittesser, titled *Admissibility is Bayes Optimality*

with Infinitesimals. Speaking via Zoom due to flight cancellations caused by inclement weather, Roy used tools from nonstandard analysis, allowing for priors which can assign infinitesimal values, in order to show that, in this setting, the admissible decision rules are exactly those (whose nonstandard extensions) minimize Bayes risk.

In the first contributed session, Cameron Freer (MIT) presented joint work with Nate Ackerman and Rehana Patel on *Learning Invariant Measures*. He discussed the with-high-probability, approximate learnability of a special class of probability measures over relational structures.

This was followed by Jeff Barrett (UC Irvine)'s presentation of joint work with Christian Torsell (UC Irvine), on *Learning How to Learn (by Reinforcement)*. In a Humean vein, the focus was on how (perhaps simple) agents might actually successfully learn in various contexts, as opposed to how their learnings can be rationally justifiable.

The afternoon session featured Jürgen Landes (Munich Center for Mathematical Philosophy), who presented joint work with Sebastien Destercke on *The Value of Varied Evidence for Imprecise Probabilities*. Landes revisited the "variety of evidence" thesis in the context of imprecise probabilities, demonstrating that its plausibility is highly sensitive to modeling assumptions.

Jon Williamson (University of Manchester) closed the day with a presentation titled *The Heuristic Use of Conditionalisation*, which sought to reframe Bayesian conditionalization as a useful heuristic rather than a universal epistemic norm. The forwarded alternative was objective Bayesian inductive logic which adopts inference to the highest entropy probability distribution as an epistemic norm replacing the Bayes rule.

Friday's plenary was delivered by Sean Walsh (UCLA), who talked about *The Expressive Power of Counterfactuals and Descriptive Set Theory*. The Lewisian account of counterfactuals takes in a distance metric, which gives rise to a topology. Descriptive set theory then supplies a means through which complexity, of say the counterfactual conditional, can be studied.

Later in the day, Cameron Freer (MIT) returned to present joint work with Nate Ackerman and Dan Roy on *Computability of Properties of Stochastic Processes Used for Learning*. Their work is aimed at effectivizing the result, which exactly characterizes those measures for which conditioning on their tail σ-field yields a measure that is sufficient for prediction and merges with the original.

Sam Eisenstat (Machine Intelligence Research Institute) followed with a discussion of *Logical Uncertainty and Self-Reference in Garrabrant Induction*. He argued that Garrabrant's model of bounded logical reasoning supports a distinctive epistemology for non-omniscient agents and addresses classic challenges such as old evidence and inductive generalization.

In the afternoon, Giovanni Duca (Northeastern/University of Milan) presented *Updating on Uncertain Evidence*: *a formal correspondence between belief revision and Jeffrey conditioning*. His results clarified how odds-thresholds yield preferential orders (themselves all-or-nothing beliefs) which can be used to match probabilistic reasoning, allowing him to give a characterization of Jeffrey conditioning in this setting.

Milan Mossé (UC Berkeley) closed the day with a talk on *Reasoning about Confirmation*. He examined various formal theories of confirmation, from Hempelian logic to probabilistic thresholds, and analyzed the complexity of reasoning in these systems

through the lens of satisfiability.

Saturday's plenary was delivered by Kun Zhang (Carnegie Mellon University), titled *Causal Learning: Why It Matters, How It Works, and Its Implications for Generative AI*. Zhang argued that the study of causal discovery from observational data, especially those involving causally-related hidden variables, was pivotal for the advance of certain scientific fields, and he presented algorithmic advances in this domain, with a particular focus on AI image generation.

This was followed by Sander Beckers (Cornell University), who presented *Nondeterministic Causal Models*, an extension of traditional structural models to allow for multiple possible outcomes to an intervention. Beckers proposed a logic for reasoning about such models and argued that they better capture counterfactual nuance.

Aydin Mohseni (Carnegie Mellon University) then presented joint work with Ben Levinstein, Daniel Herrmann, Gerard Rothfus, and Bruce Rushing which challenged cau-sal fundamentalism. In *Naturalizing Causation in Causal Models*, he argued that causal claims can be fully reduced to probabilistic statements within the framework of structural models.

Next, Siddharth Namachivayam (Carnegie Mellon University) presented *Topological Semantics for Common Inductive Knowledge*, where he gave a formal account of common inductive knowledge, centering the analysis of a Byzantine-generals-like coordination game.

The conference concluded with a talk by Adam Bjorndahl (Carnegie Mellon University), titled *A Logic of Uncertain Interpretation*. Bjorndahl developed a framework for modeling inter-

pretive uncertainty, applying it to both implication and evidential belief, his approach giving rise to Dempster-Shafer belief functions.

More information on the talks can be found at the conference website.

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