

# Relational Artificial Intelligence

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In this talk, I will make the case for a first-principles approach to machine learning over relational databases that exploits recent development in database systems and theory. The input to learning classification and regression models is defined by feature extraction queries over relational databases. We cast the machine learning problem as a database problem by decomposing the learning task into a batch of aggregates over the feature extraction query and by computing this batch over the input database. The performance of this approach benefits tremendously from structural properties of the relational data and of the feature extraction query; such properties may be algebraic (semi-ring), combinatorial (hypertree width), or statistical (sampling). This translates to several orders-of-magnitude speed-up over state-of-the-art systems. This work is based on collaboration with Hung Q. Ngo (RelationalAI), Mahmoud Abo-Khamis (RelationalAI), Ryan Curtin (RelationalAI), Dan Olteanu (Oxford), Maximilian Schleich (Oxford), Ben Moseley (CMU), and XuanLong Nguyen (Michigan) and other members of the RelationalAI team and faculty network.