1145-06-2799 **G. Markowsky*** (markowsky@gmail.com), markowsky@gmail.com, and **L. Markowsky**. *Lattice Data Analytics: Adding Understanding to Machine Learning.* Preliminary report.

Automated and semi-automated systems that derive actionable information from massive, heterogeneous datasets have become essential in many domains, and the reasoning of such systems must be as clear as possible to earn our trust. A new approach to temporal data analysis, which we call lattice data analytics, extends the current bounds of lattice theory and its applications. We describe two novel information-awareness algorithms based on three lattice-theoretic concepts: the event lattice, the temporal poset of irreducibles, and lattice entropy. The two lattice-theoretic algorithms are capable of detecting structure in temporal, multivariate datasets. The algorithms tolerate missing, messy, or otherwise incomplete data and use the concept of a Dedekind-MacNeille completion to clarify important predictive relationships between lattice nodes, which will represent real or virtual events. Markowsky's Poset of Irreducibles will be used to compress the data and will enable the modified Dedekind-MacNeille completion algorithm to run on massive datasets in near-real time. Finally, the algorithm will have a just-in-time component that can produce only those sections of the lattice that show anomalies or display development. (Received September 25, 2018)