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LATTICE CONDITIONAL INDEPENDENCE MODELS AND HIBI RINGS

Abstract: Lattice Conditional Independence (LCI) Models are an important class of models based on lattices of commuting projections. They use in the Gaussian setting and are related via an isomorphism to transitive directed acyclic graphs (TDAGs). Following joint work by the speaker with the second author [1], the construction is proving useful in spatio-temporal times series, both to express causation and to meld the spatial (cross-sectional) effects with the temporal. (See Monika Jozsa, 2019, PhD, University of Groningen.) The link of LCI to Hibi rings is that they are both predicated on distributive (Boolean) lattices, generated by a specific set of margins form the joint distributions for which the distributivity condition gives conditional independence. The third author's joint work [3] on Hibi rings is highly relevant and develops much of the necessary ring theory. The environment is also important for exploiting the connection with Gaussoids.

This talk is based on joint work with Peter E Caines, Mcgill University, Canada; Fatemeh Mohammadi, University of Bristol, UK; Eduardo Saënz de Cabazön, University of Rioja, Spain

References:

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[2] Caines, P.E. and Wynn, H.P., 2007. An algebraic framework for Bayes nets of time series. In Modeling, Estimation and Control (pp. 45-57). Springer, Berlin, Heidelberg.

[3] Ene, V., Herzog, J. and Mohammadi, F., 2011. Monomial ideals and toric rings of Hibi type arising from a finite poset. European Journal of Combinatorics, 32(3), pp.404-421.