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Detecting non-linear rank via the topology of hyperplane codes.

Non-linear rank of a matrix M is the minimal possible rank of a matrix obtained by applying arbitrary monotone-increasing functions to each row of M . The problem of finding the non-linear rank often arises in neuroscience context. In this talk I will explain how the topology of hyperplane arrangements is closely related to the problem of finding a non-linear rank. This relationship is accomplished via a zigzag of combinatorial codes, not unlike the Dowker complex. I will then present an algebraic approach and computational results for estimating the nonlinear rank.