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“A Goldilocks Approach to Testing Shape Hypotheses in Nonparametric Models”

Abstract: I develop a framework for testing qualitative shape hypotheses — monotonicity, concavity, inverted-U relationships, and others — nonparametrically in generalized partially linear models. The researcher specifies a target shape and two flanking families: shapes simpler than the target and shapes more complex. The target receives support when the data reject the simpler family but not the target itself, distinguishing, for example, a genuine inverted-U from a monotone trend or an S-curve. The false support rate for the target shape is controlled asymptotically at the nominal level. The procedure extends naturally to ordered sequences of nested shape hypotheses and applies to binary, count, and duration outcomes. An R package implements the method.