

# Influence Matrix Analysis

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**Abstract:** This paper introduces the influence matrix regression model (IMR), which establishes the relationship between the influence matrix of actors and a set of similarity matrices induced by their associated attributes. This model not only extends the commonly used spatial autoregressive model to incorporate the influence matrix, but also allows the influence matrix to change with time. We then employ the quasi-maximum likelihood estimation method to estimate unknown regression coefficients. The resulting estimator is asymptotically normal without imposing the normality assumption. When the number of similarity matrices is large, a BIC-type criterion is employed to select relevant matrices. To assess the adequacy of the proposed model, we further propose an influence matrix test, and develop a novel approach to obtain the limiting distribution of the test. The simulation studies support our theoretical findings, and an empirical example is presented to illustrate the usefulness of the proposed IMR model.