Original Article

Local spatial biclustering and prediction of urban juvenile delinquency and recidivism

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Abstract

Using a novel database, ProDES, developed by the Crime and Justice Research Center at Temple University, this article investigates the relationship between spatial characteristics and juvenile delinquency and recidivism—the proportion of delinquents who commit crimes following completion of a court‐ordered program—in Philadelphia, PA. ProDES was originally a case‐based sample, where the cases were adjudicated in family court, 1994–2004. For our analysis, we focused attention on studying 6768 juvenile males from the data set. To address the difficult issue of nonstationarity in the data, we considered various two‐way clustering algorithms to group the juveniles into 'types' by way of the many variables that described the juveniles. Following different modeling scenarios, we applied the plaid biclustering algorithm in which a sequence of subsets ('layers') of both juveniles and variables are extracted from the data one layer at a time, but where overlapping layers are allowed. This type of 'biclustering' is a new way of studying juvenile‐offense data. We show that the juveniles within each layer can be viewed as spatially clustered. The layers were determined as descriptive tools to aid in identifying subsets of the data that could be useful in policy making. Statistical relationships of the variables and juveniles within each layer are then studied using neural network models. Results indicate that the methods of this paper are more successful in predicting juvenile recidivism in urban environments when different crimes are modeled as separate data sets rather than being pooled together as a single data set. © 2011 Wiley Periodicals, Inc. Statistical Analysis and Data Mining 2011

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