

# DETECTION OF JOINPOINT USING GENETIC ALGORITHM

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## ABSTRACT

We apply constrained optimization using genetic algorithm (GA) to the joinpoint regression model to detect optimal joinpoints. Joinpoint regression model is piecewise linear (polynomial) model which is useful to represent changes in trend data. Those points where the trend changes are called joinpoints. For given joinpoints, coefficients of the regression model are obtained by maximum likelihood estimation (MLE). However, the number and location of joinpoints usually are unknown. Previously, the grid search method was used to find the estimates of joinpoints. Although the grid search method is the most widely used strategy in optimization problem, the computational cost may grow exponentially depending on the number of joinpoints. Also, we impose the constraints that two joinpoints may not be too close to each other and a joinpoint may not take place too early or too late in the period of data. In the present study, we carry out penalty function method for constrained optimization with GA to find out the optimal number and locations of joinpoints simultaneously. Bayesian Information Criterion (BIC) is used for the fitness measure, so that the optimal joinpoints minimize BIC under the restrictions. We confirm that joinpoint detection using GA is much faster than using grid search.

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