

## Statistical Methods for Detection and Analysis of Copy Number Variations

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The detection of change points has attracted a great deal of attention in many fields. Given a sequence of random variables, a change point is a point where the sequence changes in trend. We need to estimate and conduct inference on the locations of the change points. A recent application is the analysis of chromosome copy number variations (CNVs), which account for an abundance of genetic variation and may influence phenotypic differences in diseases. Despite the importance of this topic and attention devoted to it, there is scant literature on the theoretical properties of the algorithms that detect the change points. I will introduce a new algorithm called Screening and Ranking Algorithm (SaRa) and characterize the theoretical properties of SaRa and show its superiority over other commonly used algorithms. In particular, we show a strong sure coverage property and develop a false discovery rate approach for the SaRa. Both simulated and real data analyses will also be presented to demonstrate the use of the SaRa.

**Key Words:** Chang points, next generation sequencing, sure coverage property.