## NONPARAMETRIC STATISTICAL METHOD FOR PARTIAL AREAS UNDER RECEIVER OPERATING CHARACTERISTIC CURVES, WITH APPLICATION TO GENOMIC STUDIES

 $\underline{\mathbf{Y}.\ \mathbf{H}\mathbf{e}^{\dagger}},\,\mathbf{M}.$  Escobar

University of Toronto, Toronto, Canada

<sup>†</sup>E-mail: *yaohua.he@utoronto.ca* 

Recently ROC<sub>50</sub> index the partial area under the lower portion of the receiver operating characteristic (ROC) curve up to the first 50 false positives, has been widely used in genomic research. Unfortunately, statistical inferences on the ROC<sub>50</sub> index are not commonly drawn due to a lack of handy statistical inference methods and/or software tools. In this paper, we reviewed developments in statistical methods for the partial areas under ROC curves (ROC<sub>50</sub> index) and using nonparametric methods we derived a simple and direct variance calculation formula for the partial areas, different from existing methods in the literature. As well, we have verified our method through simulation studies and compared our method to existing bi-normal approaches. Moreover, we have formally shown that the partial area has an asymptotic normal distribution using trimmed U-statistics theory. Based on this asymptotic normality, we have given formulas for the confidence interval and the test statistic and we reported on their application to a genomic study of sample size approximately 10,000.