A Unified Association Analysis Approach for Family and Unrelated Samples Correcting for Stratification

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There are two common designs for association mapping for complex diseases: case-control and family based designs. Case-control analysis is often more powerful than family based analysis, although additional markers are required to control for false positive rate. When both family and unrelated samples are available, statistical analyses are often performed in family and unrelated samples separately, therefore, power is reduced. In this report, we propose a unified approach allowing for both family and case-control samples and meanwhile correcting for population stratification. We apply the principal components of marker data to adjust for the effect of population stratification. This unified approach is more powerful than the analysis for unrelated and family samples separately, or meta-analysis by combing the results of separated analyses. This property is demonstrated in both simulations and real data. The proposed approach can be applied in the analysis of both qualitative and quantitative traits.

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