摘要1 2

1

In response to question 1, we are required to make decisions about the total number of tests, false positive rate and false negative rate, establish a mathematical model, and perform preliminary calculations on the premise of determining the number of variable stages and the number of groups in each stage. test. First consider the decision objective, including the total number of tests, false positive rate, and false negative rate. Secondly, consider the number of two variable stages and the group size of each stage. The characteristics of the overall sample are used to estimate part of the sample again, and the diagnosis rate in Hong Kong is used to simulate the number of patients in the sample. The number of patients randomly distributed among different numbers of groups determines the total number of tests, so we use expectations to represent the average number of tests. Finally, we conduct a comprehensive gray correlation evaluation on the three decision goals. By adjusting the number of stages and the number of groups to reduce the comprehensive evaluation index, the optimal group detection program is finally obtained. Among them, the total number of detections is 20,000, the prevalence rate is 0.001, the best grouping is: 20,000, the number of detections is: 1251, and the comprehensive score is: 0.027861071.

2

In response to the second question, the question asked us to test asymptomatic infected people and establish a mathematical model to find a reasonable way to reduce the number of asymptomatic infected people in the population. The first step is to determine how to reduce the impact of asymptomatic infections on the population. Secondly, this article establishes the SIR model based on the infectious disease model. The model relies on the transformation relationship between asymptomatic people, positive people, and negative people. The length of time when the number of asymptomatic people is in a small state is used as the standard of the quality of the program. In the end, the parameter change ratios of the two programs were 30% and 60%. Observing the result images, we found that the time needed to implement the program is less than the original plan when there is no asymptomatic population before and after the implementation.

假设

Assumption:

1. The error of the instrument and reagent is stable.

2. If the samples are fused together, their properties will not change.

3. Once someone is diagnosed as positive, they will be taken in by the hospital without transmission.

4. People diagnosed as negative will not be restricted from activities.