Statistical background

In statistical test theory, the notion of a statistical error is an integral part of hypothesis testing. The test goes about choosing about two competing propositions called null hypothesis, denoted by H0 and alternative hypothesis, denoted by H1 . This is conceptually similar to the judgement in a court trial. The null hypothesis corresponds to the position of defendant: just as he is presumed to be innocent until proven guilty, so is the null hypothesis presumed to be true until the data provide convincing evidence against it. The alternative hypothesis corresponds to the position against the defendant.

If the result of the test corresponds with reality, then a correct decision has been made. However, if the result of the test does not correspond with reality, then an error has occurred. There are two situations in which the decision is wrong. The null hypothesis may be true, whereas we reject H0. On the other hand, the alternative hypothesis H1 may be true, whereas we do not reject H0. Two types of error are distinguished: Type I error and type II error. [3]

Type I error

The first kind of error is the rejection of a true null hypothesis as the result of a test procedure. This kind of error is called a type I error and is sometimes called an error of the first kind.

In terms of the courtroom example, a type I error corresponds to convicting an innocent defendant.

Type II error

The second kind of error is the failure to reject a false null hypothesis as the result of a test procedure. This sort of error is called a type II error and is also referred to as an error of the second kind.

In terms of the courtroom example, a type II error corresponds to acquitting a criminal

2020-07-01