Minimum Detectable Difference (MDD) in Hypothesis Testing

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1   Introduction

In this notes, we talk about minimum detectable difference (MDD) and other related concepts in hypothesis testing. First, we will use a test for normal mean when variance is known as an example. So for an i.i.d. sample $x_1, \cdots, x_n$ with $x_i \sim N\left(\mu, \sigma^2\right)$ with known σ, we want to test

$$H_0: \ \mu = \mu_0 \quad \text{v.s.} \quad H_1: \ \mu \neq \mu_0.$$

A two-sided test with significant level α can be constructed as to reject H_0 when

$$\left| \frac{\bar{x} - \mu_0}{\sqrt{\sigma^2/n}} \right| \geq z_{1-\alpha/2},$$

since $\bar{x} \sim N\left(\mu_0, \sigma^2/n\right)$ under H_0.

References