Hypothesis Test - STAT110 Otago

Students also viewed

ower, Effect Size, Nonparametric T...

3 terms

Bellawealslyeverdeen Preview

week 5: ABA Principles 2

30 terms

ellietaylor316 Preview

Terms in this set (20)

null hypothesis (H0)	*the hypothesis that there is no association, no effect or* ***no difference***
alternative hypothesis (HA)	*the hypothesis that* ***there is an association, effect or difference***
why we need *p-value*	*We measure the "consistency" of the observed data with the claim using a p-value.*
Steps for using a p-value	*1. Set up the null hypothesis (H0) about the population* *parameter of interest* *- e.g. parameter = null value* *2. Propose the alternative hypothesis (HA)* *- e.g. parameter ≠ null value.* *3. Calculate the test statistic.* *4. Calculate the p-value (probability of observing the test statistic from 3, or one more extreme, assuming the null hypothesis is true).* *5. Interpret the p-value.*

What is a test statistic (t - statistic)?	*A test statistic is the standardised value of the sample value* ***T = (observed sample value - null value) / estimated standard error***
what is a p-value	*The p-value is* ***the probability of observing the value of the test statistic, or a value more extreme, calculated under the assumption that H0 is true.*** *A small p-value indicates we would be unlikely to see the data we did if the null hypothesis were true.* i.e., the smaller the p-value is, the easier to reject H_0 *If the p-value is* ***less than α*** *we reject H0.* *If the p-value is* ***greater than or equals to α*** *we do not reject H0.*
When studying hypothesis testing, we usually use ( ) to denote the value of the overall parameter?	the symbol π (lowercase Greek letter pi) , instead of using p.

When to use Z Statistic vs t-statistic	**Z-statistic:** Conditions of applicability: The Z-statistic is suitable for large sample situations, where the sample size is large (usually greater than 30) or the sample comes from an overall population that is approximately normally distributed. Basis of Inference: The Z-statistic is based on the known standard deviation (σ) of the population, and is used for parameter estimation, hypothesis testing and confidence interval construction by comparing the difference between the sample statistic and the population parameter. **The t-statistic (t-statistic):** Applicable conditions: The t-statistic is suitable for small samples where the sample size is small (usually less than 30), or where the sample is from an approximately normally distributed population but the overall standard deviation (σ) is unknown. Basis for Inference: The t-statistic is based on the sample standard deviation (s) and is used for parameter estimation, hypothesis testing and confidence interval construction by comparing the difference between the sample statistic and the overall parameter. In the case of small samples, the sample standard deviation is used to estimate the overall standard deviation. The Z statistic is used for large samples and known overall standard deviation, while the t statistic is used for small samples and unknown overall standard deviation. The z-statistic uses the overall standard deviation as the basis for inference, while the t-statistic uses the sample standard deviation as the basis for inference.

How to conduct a hypothesis test	1. set H_0 and H_A 2. calculate t-statistic(if it is sample) or Z-statistic(if it is population) 3. calculate p-value *4. calculate 95% CI with (3) 5. draw conclusion based on the p-value (reject H_0 or not)
The difference between p and p*	**p denotes the sample proportion:** p denotes the frequency or proportion of events observed to occur from a sample. It is a statistic calculated from the sample data and is used to estimate the probability of an event occurring in the sample. For example, if we observe 50 per cent support for a policy from a sample, the sample proportion p is 0.5. **p* denotes an estimate of the overall proportion:** p* denotes an estimate of the overall proportion. It is an estimate of the overall parameter inferred from the sample data. For example, if we observe 50 per cent support for a policy from a sample and we consider that sample to be randomly drawn from the overall population, then we can use the sample proportion p as an estimate of the overall proportion, i.e., p* = 0.5.
when to use chi square	- When trying to control groups in experiments - looking for differences between men and women in each group, etc. - Looking for differences between categorical variables - maybe you want to know if there is a difference between men and women for favorite type of ice cream

How to conduct chi-square test	1. *Define the Null-Hypothesis and Alternative Hypothesis* *H0 : The treatment and response are independent (i.e. no* *association).* *HA : The treatment and response are dependent in some way (i.e. there is some association).* 2. *Calculating expected cell counts* 3. *Calculating the χ2 test statistic* 4. get the degree of freedom 5. calculate the p-value with R 6. reject / not reject H_0 7. draw conclusion
what is *expected cell counts*	*We work out what we would have expected to see under the null hypothesis in each cell given the observed row and column totals.* $E_{(\text{row i, cc}}$ total, for row *i* mn total, for column number (of trials, pa
formula for chi square	$= \sum_{ij} \frac{(O_{ij} -}{E_{ij}}$
degree of freedom for chi square	*ν = (number of rows - 1) * (number of columns - 1)*
range for p-value	(0, 1)
Belief (interpretation/ decision)	ision) Fail to reject H_0 Correct interpretation (No error) Error (Type II)
Type I error (a false positive result)	*Concluding that there is an association between exposure and outcome, where there is not* *Type I error is controlled when we set the significance level (usually 0.05).*

Type II error (a false negative result)	*Concluding that there is not an association between exposure and outcome, where there is* *Type II error is primarily controlled through the sample size. Ideally power should be between 80 and 90%.*