DAN SCHUMACHER, HDD249

DA 6823

Kilger

Module 1: Part #1 (50 points)

**The Power of Statistics + the Levels of Measurement + the Different Classes of Variables and Determining Appropriate Statistical Technique + Basic Descriptive Measures**

**General Instructions:** In your own words, answer each of the following questions - don’t copy (e.g. cut and paste) some definition out of a book word for word. This is not a group project – you are expected to complete this module on your own. You may refer to text books, online or other sources but not your fellow classmates. If you don’t understand the question, feel free to ask the instructor in class, in office hours or in an email.

1. Provide a short definition for dependent variable. (3 points)

* The Variable of interest that is *dependent* on another variable.

1. Provide a short definition for independent variable. (3 points)

* The Variable of theoretical importance, it is thought to influence the dependent variable.

1. Provide a short definition for control variable. (3 points)

* It is similar to the independent variable, but it is not theoretically important.

1. Be able to describe the simple criteria for each of the four levels of measurement:
   1. Nominal (2 points)
      1. Categorical variable that has no particular order
   2. Ordinal (2 points)
      1. Categorical variable that *can be ordered*
   3. Interval (2 points)
      1. numeric variables that are equidistant from each other.
   4. Ratio (2 points)
      1. Numeric variables that can’t be negative. Has no true 0 point.
2. Provide an example of a variable for each of the four measurement levels below.
   1. Nominal (2 points)
      1. Gender (male/female)
   2. Ordinal (2 points)
      1. Results of the survey question “On a scale of 1 to 5 how satisfied were you with this experience?”
   3. Interval (be careful – be sure it is interval and not ratio!) (2 points)
      1. Profits/losses for a company
   4. Ratio (2 points)
      1. Amount of rainfall in a month
3. Name at least two criteria from the IDRE chart that are used in determining which statistical technique can be used in a situation. (3 points)
   1. Level of measurements for the Dependent and Independent variable
   2. Number of Dependent and Independent variables
   3. Assumptions of the test
   4. Independence or dependency of groups or observations
4. Briefly explain the difference between descriptive and inferential statistics. (4 points)
   1. Descriptive statistics summarize data with a focus on interpretability. Whereas Inferential statistics uses the sample data to either make predictions of a population or of future events that haven’t been recorded.
5. Almost every statistical technique you will come across has some sort of assumptions – even non-parametric statistics.
   1. Name one benefit that assumptions of a test provide you (2 points)
      1. Checking the assumptions of the test and your dataset, you can confirm that the statistical test you are running is the right choice.
   2. Name one cost that assumptions of a test carry (2 points)
      1. If those assumptions end up not being true about your data, you invalidate your results.
6. What happens if you violate the assumptions of a statistical test? Do the statistical police come and arrest you? (4 points)
   1. Yes, but you also run a higher risk of producing misleading, or simply invalid results.
7. Using the IDRE chart, suggest the appropriate statistical test for each of the following business cases
   1. As a maker of colored contact lenses, you think that there may be relationship between the color of the contact lenses purchased and the gender of the purchaser. (2 points)  
      1. Statistical test I suggest = 2 *independent sample t-test*

|  |  |
| --- | --- |
| IV # | 1, gender |
| DV # | 1, Lense color |
| IV Type | Nominal |
| DV Type | Nominal |

* 1. As an auctioneer of fine art, you think that there may be a different between the price paid for a piece of art between men and women. (2 points)
     1. Statistical test I suggest = 2 independent sample t-test

|  |  |
| --- | --- |
| IV # | 1, gender |
| DV # | 1, Price paid for art |
| IV Type | Nominal |
| DV Type | Ratio |

* 1. You want to better understand how different versions and price mixes of your product – the Vegematic – have on the number of product sold. You hypothesize that color of product, price, region of the country (North, South, East, West), gender of purchaser, household income of purchaser have an effect on the number of pieces sold. You may also want to make some predictions about how many products would be sold under various levels of these variables. (2 points)
     1. Statistical test I suggest = ordered logistic regression
        1. (or factorial ANOVA if normal)

|  |  |
| --- | --- |
| IV # | 5, Color, price, region, gender, household income |
| DV # | 1, number of pieces sold |
| IV Type | Color: nominal  price: ratio  region: nominal  gender: nominal  household income: ratio |
| DV Type | Ratio |

* 1. As publisher of the popular magazine Rabbit Times: you think that there may be a relationship between the number of pages in the magazine and the number of copies of that issue sold. How do you find out the direction and how strong this relationship might be? (2 points)
     1. Statistical test I suggest = Wilcoxon-Mann Whitney test
        1. (or factorial 2 independent sample t-test if normal)

|  |  |
| --- | --- |
| IV # | 1: number of pages |
| DV # | 1: copies of that issue sold |
| IV Type | Ratio |
| DV Type | Ratio |

* 1. You are the maker of FelineHair – a hair growing drug for hairless cats. You want to test your drug against three other drugs to see which one grows the most hairs on the cats in the experiment. You also want to see if there are other differences in the effectiveness depending upon the gender of the cat and what color coat the cat has. You end up with a drug (4) x cat gender (2) by cat coat color (black: white: brown) experimental design. What analysis technique would you use for this experiment? (2 points)
     1. Statistical test I suggest = Factorial Anova

|  |  |
| --- | --- |
| IV # | Color of coat, gender of cat, drug given |
| DV # | 1, Number of hairs grown |
| IV Type | nominal |
| DV Type | ratio |