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**Statistical Interpretation of Anxiety and Online Gaming**

**Introduction:**

This data analysis report is based on an “Attitude, Personality & Gaming” survey, the requirements for participants included that participant must be at least 18 years old and must play video games regularly. The survey consisted of multiple questionnaires to gather personal data about the participant such as age, gender, country of birth, country of current residence, etc., as well as questions pertaining to mental health and video game usage. The data set contains complete survey responses from 13,464 participants. The layout of this survey includes open-ended, multiple choice, and interval scale questions.

This data was available in raw form, consisting of a spreadsheet of the participant’s answers to each question. In this report, the data will be analyzed, and various problem-solving techniques will be applied to conclude various statistical interpretations of the data.

**Chapter 1**

**1.1 Mean:**

From the 13,464 participants that completed the survey, what is the mean age of the participants?

The average age of the participants who completed the survey is about 21 years old.

**Distribution of Participant’s Ages:**

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This distribution does not have the “normal” bell shaped curve as the survey results from participants under the age of eighteen were not published.

**1.2 Variance:**

What is the variance of participant ages?

The variance of participant ages is 10.9.

**1.3 Standard Deviation:**

What is the standard deviation of participant ages?

The standard deviation of participant ages is 3.3.

**Chapter 2**

**2.7 Permutation:**

Questionnaire A is an interval scale question that contains seven different questions with five possible responses from “Not at all” to “Nearly every day”. How many different ways can all seven questions be answered in which the order of the answers matters?

There are 2,520 ways to answer the seven questions when the order of the answers matters.

**2.8 Combination:**

Questionnaire A is an interval scale question that contains seven different questions with five possible responses from “Not at all” to “Nearly every day”. How many ways can all seven questions be answered?

There are 21 ways to answer the seven questions when the order of the answers does not matter.

**2.9 Conditional Probability:**

What is the probability that a participant strongly disagrees with being satisfied with life given that the participant spends 30 or more hours gaming a week?

\*\*Impossible hours per week have been removed from the set (ex: 8000 hours playing video games out of a possible 168 hours a week).\*\*

.07858

.241162

The probability that a participant strongly disagrees with being satisfied with life given that they spend 30 or more hours gaming a week is 7.86%.

**2.10 Independent Events:**

Prove that strongly disagreeing with being satisfied with life and playing video games for 30 or more hours a week are two independent events.

.07858

.241162

Only one needs to be satisfied for the events to be independent.

**1.** P(A|B) = P(A)

**2.** P(B|A) = P(B)

**3.** P(A∩B) = P(A)P(B)

The two events are independent.

**Chapter 3**

**3.3 Probability Distribution**

Through participant information it was found that 5.3% of participants were female, 94.31% were male, and .39% identified as other. If five participants are randomly chosen from the entire participant list, find the probability distribution for Y, the probability that a female was chosen.

**3.4 Expected Value**

What is the expected value of Y, a participant chosen is a female?

|  |  |
| --- | --- |
| Number of females chosen (Y) | Probability P(Y) |
| 0 | .7618 |
| 1 | .2131 |
| 2 | .0238 |
| 3 | .0013 |
| 4 | .00003 |
| 5 | .00000041 |

**3.5 Variance & Standard Deviation**

Find the variance for the random variable Y, a participant chosen is female.

|  |  |  |
| --- | --- | --- |
| Number of females chosen (Y) | Probability P(Y) | ()2 |
| 0 | .7618 | 0.247086 |
| 1 | .2131 | 0.002665 |
| 2 | .0238 | 0.058043 |
| 3 | .0013 | 0.069391 |
| 4 | .00003 | 0.070062 |
| 5 | .00000041 | 0.070078 |

Find the standard deviation for the random variable Y, a participant chosen is female.

**3.6 Binomial Distribution**

A question from the survey asked participants what gaming platformthey use to play games. What is the probability that from five trials, exactly five participants chose PC as their main platform?

The probability that out of five trials exactly five participants chose PC as their main gaming platform is 91.23%.

**3.7 Expected Value & Variance**

Find the expected value regarding the previous question.

Find the variance regarding the previous question.

**3.8 Geometric Probability Distribution**

20.306% of the survey participants are employed. If participants are chosen sequentially and are selected at random from the pool of survey participants. Find the probability that the first participant that is employed is found on the fifth interview

**3.8 Expected Value & Variance**

Find the expected value regarding the previous question.

4.9247

Find the variance regarding the previous question.

**3.10 Hypergeometric Probability Distribution**

A question from the survey asks participants the county in which they were born. From the total 13,464 participant answers 4,261 participants (or 31.65%) were born in the USA. If 5,000 random participants are chosen and their answers are randomly sampled. What is the probability that 3,000 participants were born in the USA?

N = population size = 13,464 participants

n = sample size = 4,261 participants

r = number of selected items from population size = participants

y = random variable = participants

**3.10 Expected Value & Variance**

**3.11 Poisson Probability Distribution**

**3.11 Expected Value & Variance**

**Chapter 4**

**4.4 Uniform Probability Distribution**

While reading over the survey a response to the question “How many hours a week do you watch player/tournament streams, coach …etc.” an answer, NA, came up within the first 200 responses. Find the probabilities below using this information.

1. The answer was given within the first 100 responses sent in.
2. The answer was given after the 125th response.
3. Given that the NA answer wasn’t given within the first 50 responses find the probability that the response was given between the 50th  and 75th submitted response.

200

175

125

150

100

75

50

255

0

**a)**

Using a number line to break the 200 participants into 8 sections we can see that the answer NA had a 50% chance to be given within the first 100 responses.

b)

Using the same concept, we break the group up into 8 equal sections and since they want the probability the answer was given after the 125th response leaves us with a probability of 37.5% Meaning there is a 37.5% chance the NA was given after the 125th response.

c)

This means that there is a 16.67% chance that the NA answer isn’t given during the first 50 responses and the NA response was given between the 50th and 75th response.

**4.5 Normal Probability Distribution**

**Creating a Salter and Smoother in Java with JFreeCharts**

In making the Salter and Smoother we were successful in implementing the JFreeCharts and had great success when we came across any issues with creating the graph and datasets that are displayed within the graph. To get a basic understanding of how we used JFreeCharts, we can look at the basic structure of the graph class.

Graphical user interface, text

Description automatically generatedThe graph class is used to create the panel by initializing the JPanel method by setting the size of the window in this case (1280x640), how it should be closed, and by adding the layout of the border and the data and other information that a graph needs. We do this by crating two private classes, createGraph() and createGraphData(). These classes do exactly what their names suggest. The createGraphData() class creates three lines within the dataset that we named data. Each of these lines are referred to as a series, whether it be series1, series2 or series3. These series are used to add the datapoints of the ArrayLists that hold the data that is created when the code is run. Using the addValue method defined in the DefaultCategoryDataset class that comes from JFreeCharts, we can tell it the x and y values of the points as well as what series to add this data point to. In this case instead of adding each datapoint like a lot of the examples suggested when learning how to use JFreeCharts, I used a for loop to add each value found in the ArrayLists. This data is taken and added to the createGraph() class that takes into consideration, the title as well as axis titles. This information is sent up to the graph method and graph is created. When the code is run the user is given a prompt to enter the upper and lower bounds of the x-inputs. It looks like this:

As an example, I put in two bounds for the graph and ran it. The output was as follows:

Graphical user interface, chart

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In this graph we have three different lines, one being the original data points in red, the salted data points in blue, and the smoothed data in green. Not only is the graph displayed but each data ArrayList is output as well. Doing this helped with determining whether or not the code was working as intended and as far as what we wanted it to do it worked well.

**Survey Questions Utilized to Obtain Relevant Data**

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**Sources**

Mathematical Statistics With Applications

[**https://www.kaggle.com/datasets/divyansh22/online-gaming-anxiety-data**](https://www.kaggle.com/datasets/divyansh22/online-gaming-anxiety-data)