Appendix

Name _____ Period ____ Date _____

Investigation: Picture as Data

The Problem

Mr. Pineda's class was asked to take a picture of a street or streets near your neighborhood; preferably, an intersection. The picture needed to include at least 1 road but the picture could be of intersection of two or more roads if the students would like. The streets should be of places they typically pass by. Given to the Covid-19 pandemic, many of the students only go out once a week or every other week.

Investigative Questions

What are typical features of the streets of your community?

The Collected Data

Students that participated in the activity were able to go out and take a picture of streets near their home which they pass by regularly. Students were given five days to take a picture. Given that many students are limiting being outdoors due to the pandemic, not every student participated in the data collection.

Fill in the table using the pictures collected. The first five columns are quantifiable therefore you will need to enter a number for the number of streets, cars, traffic lights, street conditions and trees. For street conditions, rate the condition of the street and the area where 5 is excellent, 3 is neutral and 1 is bad. The last five columns are categorical, you will enter an answer based on the category key provided. For day or or night, right D for day and N for night. For street recognition, you will write yes or no on whether you recognize the street or not. Main street you will write yes or no; if the picture includes at least 1 main street write yes. For the safety category, you will write yes if you would feel taking that same picture at that time and location or no if you wouldn't feel safe. For the street type will be categorized by the shape shape of the street or streets:

1. In one street, which is a straight line, the letter I will be used.
2. In an intersection of 2 or more streets the letter X is used.
3. An intersection in which one street ends the letter T will be used.

Picture	Number of Streets	Number of Cars	Number of Traffic Lights	Street Condition	Number of Trees	Day or Night	Recognize the street	Main Street	Streets Type	Would you feel safe?
1	2	8	0	5	11	D	Y	N	T	Y
2	1	8	3	4	0	N	Y	Y	I	N
3	1	15	0	4	9	D	N	N	I	Y
4	2	10	0	4	5	N	Y	Y	X	Y
5	2	4	0	3	9	D	Y	N	T	Y
6	1	9	1	4	12	D	Y	Y	I	Y
7	2	0	3	2	0	N	Y	Y	X	Y
8	3	4	0	1	2	D	Y	Y	X	Y
9	2	15	4	3	10	D	Y	Y	X	Y
10	3	31	1	2	7	D	Y	Y	X	N
11	2	2	1	5	12	N	N	N	X	N
12	2	19	2	2	5	D	Y	Y	X	Y

13	2	2	0	4	12	D	Y	N	X	Y
14	2	13	4	4	0	N	Y	Y	X	N
15	1	2	0	5	10	D	N	Y	I	Y
16	2	0	0	4	14	D	Y	N	Y	Y
17	2	12	0	4	9	D	Y	N	X	N
18	2	3	0	2	0	N	Y	N	T	Y
19	2	4	0	4	10	D	N	N	X	Y
20	2	9	0	4	5	N	Y	Y	X	Y
21	2	13	0	4	16	D	Y	N	T	Y
22	2	4	2	3	14	N	Y	Y	X	N
23	2	12	0	2	13	D	Y	N	X	N
24	3	2	0	4	3	D	Y	Y	T	Y
25	3	5	0	2	12	D	Y	Y	T	Y
26	2	8	0	3	3	N	Y	Y	X	Y
27	2	16	4	5	10	D	Y	Y	X	Y
28	2	7	1	4	9	N	Y	Y	T	Y
29	2	4	3	4	16	D	Y	Y	X	Y
30	2	3	3	5	11	D	N	Y	X	Y
31	2	13	0	3	14	D	Y	N	X	Y
32	2	2	2	4	33	N	Y	Y	T	N

Analyze the Data

1. If you were to choose a picture at random, what would be the most likely number of streets? Justify your answer using data. _____
   _____
2. What is the mean, median and range of the number of cars? _____
   _____
3. What is the mean, median and range of the number of traffic lights? _____
   _____
4. How many of the streets had a condition rating of 4 and 5? _____
5. How many of the streets had a condition rating of 1 and 2? _____
6. Compare the condition of the streets and determine if most of the streets in your neighborhood are in good condition or in bad condition. _____
   _____
7. Predict if the data will demonstrate that our community has a large number of trees or not.
   _____

8. Find the mean and median of number of trees in the pictures. Do you think your community needs more trees?_____
   _____

9. Were most pictures taken during the day or night? Use percentages to justify your answer. _____
   _____

10. How familiar are you with the pictures from your community? Use percentages to justify your answer.
    _____
    _____

11. Do people tend to be near main streets or in residential areas? What percentage of pictures involved main streets? _____
    _____

12. The streets were categorized by the type of street. Some were single straight roads, others were interceptions. What are the common types of roads in your community? Use percentages to support your answer. _____
    _____
    _____

13. Based on the safety data, would you say that your community is safe? _____
    _____
    _____

14. When it comes to safety, is there an association between the time of day the picture was taken? Compare the time of day and safety to justify your answer. _____
    _____
    _____

Interpret the Data

Based on the information about, how would you describe the streets of your community? _____
_____
_____
_____
_____

Graphs: Add pictures of the graphs in the space below.

What is Data Science?

Video Link HERE

What is Data Science? Why is Data Science a growing field? How do you interact with data in your everyday life?

Statistical Investigative Question:

What are the typical features of the environment we see outside of our windows?

Data Collection Method

Students in Ms. Pastor and Mr. Gallegos' class were asked to take pictures outside their windows. In Ms. Pastor's class, students were asked to take the picture on a random Monday and Thursday between 2:00pm and 2:10pm. The pictures are from students living in urban areas (Hollywood and Vermont Square/South LA). The pictures were collected in a google drive folder and labeled numerically picture 1 - picture 28. From the pictures collected in both classes, seven formulated questions were asked with regards to features that we see. They were:

1. What percentage of the photo showed man made features?
2. What percentage of the photo shows nature?
3. How many vehicles are in the picture?
4. Was the picture taken in the 1st floors or 2nd floor?
5. Was the picture taken on a main street or residential?
6. Is your neighbor next to you or not?
7. What type of enclosure surrounds the home? (Wall, Fense, Nothing)

Each question corresponds to a variable. Of these variables, 3 were categorical and 4 were quantitative.

Identify which ones are categorical and which ones are quantitative.

The percentage of man made (variable #1) features and nature (variable #2) were found by overlaying a 10 by 10 grid onto each picture. If the original photograph did not fit in the 10 by 10 grid, then the image was stretched to fit on the grid. Out of 100 squares, Nature was defined as the physical product of the earth such as plants, and landscape.

Try one picture yourself.

Vocabulary

Variable:

Quantitative Variable:

Categorical Variable:

Association:
Correlation:

Hypothesis:

- On average, what percentage of manmade features do you predict each picture will have?
- On average, what percentage of nature features do you predict each picture will have?
- On average, what percentage of cars do you predict each picture will have?

Data

Graphs HERE

Data Analysis

***Single variable analysis**

1. To understand the patterns and features in the photos, determine the typical amount of:
    a. Man made features in the pictures.
        i. What is the mean percentage?
        ii. What is the maximum?
        iii. What is the minimum?
        iv. What is the range?
    b. Nature in the pictures.
        i. What is the mean percentage?
        ii. What is the maximum?
        iii. What is the minimum?
        iv. What is the range?
    c. Vehicles present in pictures
        i. What is the mean percentage?
        ii. What is the maximum?
        iii. What is the minimum?
        iv. What is the range?
    d. Was the picture taken in the 1st floors or 2nd floor?
        i. What percentage are in each category?
        ii. What is the mode of each category? 1st floor
        iii. What is the percent difference between the categories?
    e. Was the picture taken on a main street or residential?
        i. What percentage are in each category? Residential
        ii. What is the mode of each category? Residential
        iii. What is the percent difference between the categories?
    f. Is your neighbor next to you or not?
        i. What percentage are in each category?
        ii. What is the mode of each category?
        iii. What is the percent difference between the categories?
    g. What type of enclosure surrounds the home? (Wall, Fense, Nothing)
        i. What percentage are in each category?
        ii. What is the mode of each category?

iii. What is the percent difference between the categories?

***Two variable analysis**

2. Do the floors impact the percentage of manmade features? Nature?
3. Does the environment (residential or main street) impact the percentage of manmade features? Nature?
4. Does the enclosure impact the percentage of nature?
5. Does the enclosure impact whether or not we can see our neighbor?
6. Is the presence vehicles impacted by whether the picture is in a residential area or main street?

Results

Sentence Stems
The results indicate… This demonstrates… The data shows that… The evidence shows that … This activity has shown that … When looking at the evidence … An example of _____ would be … It is apparent from …

1. With your group, look over your answers on each of the above questions. Then, place a star next to the ideas that appear to suggest insights on patterns or differences between the variables.

2. What are some possible connections (associations) between the pictures taken?

Summary

Using the data collected, respond to statistical investigative question:

- Indicate whether the percentage of manmade and nature features met your expectation? (e.g. High percentage of manmade features).
- Do the results support or challenge expected results?
- What are some areas of further study?
- Provide any recommendations for future implementation.

Sentence Stems
• The study has shown that … • An important finding to emerge in this study is… • Although the study did not show…, it did provide evidence … • Future research should be done to investigate the… • An implication of these findings is that …

Let's Get Outside

An Investigation into Pictures as Data

Introduction

*What is **DATA SCIENCE**? Why is it one of the fastest growing fields today?*
Does data play a significant role in your daily life?

Watch the video, **Women in Data Science Education Outreach, Stanford University**, to better inform your responses to each of the questions posed above.

The Problem

Honors Precalculus students in Ms. Dueck's class were given the task one weekend to get outside to get some fresh air and enjoy some movement away from their computer screens. To document those trips outside and gain a few extra credit homework points, they were asked to take pictures that showed glimpses of their surroundings where they had been able to get out and be active.

Statistical Investigative Question

What are the typical features of where you go to be active outside?

Data Collection

Students that participated in the assignment added their photos to a shared Google drive folder, from which the pictures were copied and numbered from 1-63. The entire class was then asked to complete the following:

Look through your pictures submitted HERE and identify at least 3 features that were shared in multiple pictures. (*Note: Some similar, repeated, or off-topic photos were cleaned to allow for a more concise data set.*)

1.
2.
3.

Consider the table given below and the data for Picture 1 that has been given. Label each of the columns 2-8 as representing either quantitative (Q) or categorical (C) variables. Then, choose 4 pictures to analyze on your own, following the sample provided and asking questions for clarification, if necessary. When asked for % of a picture, use the tool available HERE to calculate.

Picture Number	# of People Visible	Water Present (Y/N)	Dog in Pic (Y/N)	Location (Residential, Town, Nature)	Sporting Equipment Present (Y/N)	% Manmade	% Nature (excluding sky)
1	*2*	*Y*	*N*	*R*	*N*	*36*	*42*

Name: Period: Date:

Compare the data you gathered above to the completed data table available HERE*. How did you do? Do you have any questions regarding how the data was identified?

**Use the completed table linked above imported into CODAP (https://codap.concord.org/, following directions given in this video) to answer the following analysis questions and then justify with sentences and/or graphs.*

Analyze the Data - Single Variable Analysis

If you were to choose a picture at random, would you expect it to be located in town, a residential area, or out in nature? (Justify using the percent of pictures within each and the percent differences between each category).

What is the mean, median and range of the number of people visible?

Mean:

Median:

Range:

What is the mean, median and range of the percentage of manmade features present?

Mean:

Median:

Range:

What is the mean, median and range of the percentage of nature present?

Mean:

Median:

Range:

Does your class tend to be near water when they are active outside? How do you know?