**ML Major 1**

**Submmiters:**

**Husain Azaqy: 213382104**

**Galor Lazar: 325028876**

1. Load the dataset into a Pandas DataFrame.

**Answer** (in your report)**:** how many rows and columns are in the dataset?

**25 columns**

**1250 rows**

1. Print the value\_counts of the conversations\_per\_day feature (see Tutorial 01).   
   Copy the obtained output to your report. Describe in one short sentence what you think this feature refers to in the real world.

This feature’s type is “ordinal”. Explain briefly why.

conversations\_per\_day

3 218

2 204

5 179

4 168

1 108

6 107

7 94

8 54

9 42

10 29

11 16

13 8

12 7

14 6

16 5

15 3

17 1

29 1

Name: count, dtype: int64

I think this feature refers to how many times a personb spoke to other people that he can to infect in the virus. Its ordinal variable because the count of conversations is natural number with natural order as a counting variable.

1. In your report, write a table describing each feature. The columns must be:
   1. Feature name: the name of the feature as it is written in the dataset.
   2. Description: a short sentence with your understanding of the feature’s meaning in the real world.
   3. Type: Continuous, Categorical, Ordinal, or Other.

Don’t overthink this (especially the “ordinal” type), some variable may be suitable for two types.

Note: do not include the target columns (“spread” and “risk”).

|  |  |  |
| --- | --- | --- |
| Name | Description | Type |
| patient\_id | Unique identifier for each patient | Ordinal |
| age | Patient's age in years | Ordinal |
| sex | Patient's gender | Categorical |
| weight | Patient's weight in kilograms | Continuous |
| blood\_type | Patient's blood group | Categorical |
| current\_location | Patient's present location | Categorical |
| num\_of\_siblings | Number of patient's siblings | Ordinal |
| happiness\_score | Patient's self reported happiness level | Ordinal |
| household\_income | Annual income of patient's household | Continuous |
| conversations\_per\_day | Daily conversations count for patient | Ordinal |
| sugar\_levels | Patient's blood sugar levels | Ordinal |
| sport\_activity | Frequency of patient's sports participation | Ordinal |
| pcr\_date | Date of PCR test | Ordinal |
| PCR\_01 | PCR test result 1 | Continuous |
| PCR\_02 | PCR test result 2 | Continuous |
| PCR\_03 | PCR test result 3 | Continuous |
| PCR\_04 | PCR test result 4 | Continuous |
| PCR\_05 | PCR test result 5 | Continuous |
| PCR\_06 | PCR test result 6 | Continuous |
| PCR\_07 | PCR test result 7 | Continuous |
| PCR\_08 | PCR test result 8 | Continuous |
| PCR\_09 | PCR test result 9 | Continuous |
| PCR\_10 | PCR test result 10 | Continuous |

1. [Split](https://scikit-learn.org/stable/modules/generated/sklearn.model_selection.train_test_split.html) the data randomly into a training set (80% of the data) and a test set (20% of the data). As the random\_state, use the sum of the last two digits of each of your IDs[[1]](#footnote-1) (two or three IDs).

The random state will ensure that you get the same split every time.   
Answer: Why is it important that we use the exact same split for all our analyses?

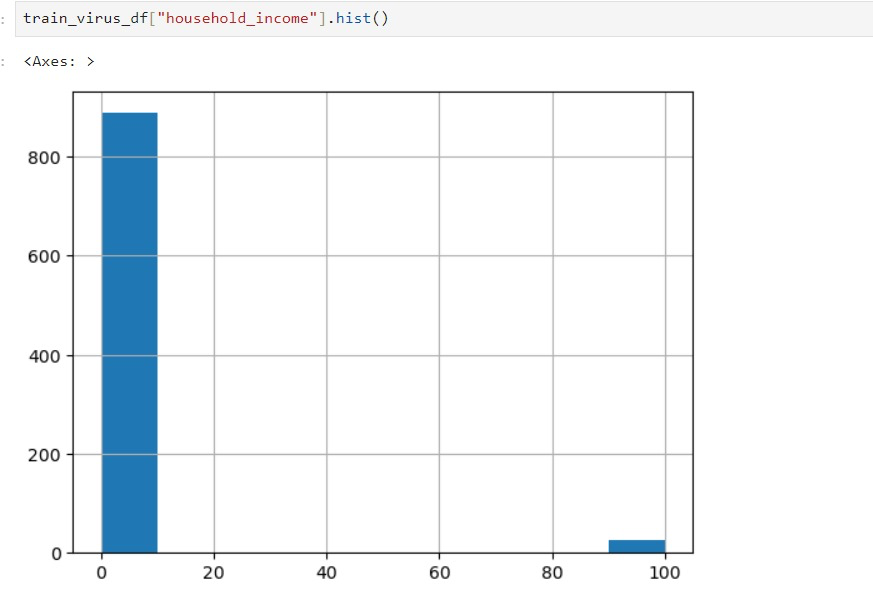
* Since the default split is random, we want the same random selection between multiple analyses to be able to compare them reliably and easily.

1. For **both the training set and test set**, report which fields have missing values and how many missing values there are. You can use Panda's function [isnull()](https://pandas.pydata.org/docs/reference/api/pandas.isnull.html).

* The only field that has missing values is “ household\_income” with 109 missing values.
* 86 of them are in the training set.
* 23 of them are in the test set.

1. Plot a histogram (see Tutorial 01) for each field where you found missing values in **‎(Q5)**. Add these plots to your report. Answer: Can you recognize outliers?

**Reminder:** Create plots using only the training set.



There are outliers as we can see in the far-right corner of the plot.

1. For each field where you found missing values, calculate the median and the mean in the training set, **and report it**.

If there is a significant difference between the mean and median values, explain the reason. Which filling method do you prefer to use in our case, and why?

* The mean household income 3.535886214442013
* The median household income 0.7

We found that 888 of the 914 values in the training set are under the mean household-income. It means that the mean value doesn’t represent a good separation of an average household-income value. That is in corollary to the extremely far outliers in the train data plot.

As a result we choose to fill the NaN’s with the median, that in closer to most of the current elements.

1. [↑](#footnote-ref-1)