Sprachverarbeitung: Übung

SoSe 24

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Please submit your solution via Ilias, either as a Jupyter Notebook (`.ipynb`, you can export your Notebook in Jupyter by going to File > Download) or as a Python script (`.py`) if you are not working in Jupyter. You do not need to submit the output file `chars.tsv` or the plot of the last exercise, only the Python code that generates these outputs.

Exercise 1.

Download the file `romeo.txt` from `https://lehre.idh.uni-koeln.de/site/assets/files/5151/romeo.txt` and write a function `read_file()` in Python takes as an argument a path to a file, reads in that file and returns the file contents as a string. Write a second function `count_chars()` that counts all the characters (except for newline `"\n"` and tab `"\t"`) in a given string and returns the result as a dictionary with the characters as the keys and their counts as values. Apply it to the output of `read_file()`. Write a third function `write_chars_file()` that takes the output of `count_chars()` as input and writes it into a file called `chars.tsv` with the following format:

- First line: Header names with two columns separated by a tab (the string symbol for the tab in Python is `"\t"`), called "character" and "count"
- Subsequent lines: the characters and their counts, one character and count per line, separated with a tab

so that your output file looks something like this:

```
character       count
a       34
b       2
c       500
...
```

(These counts are made up examples and the order of the characters in your resulting file is not important)

Hint 1: In order to exclude newlines and tabs in the function `count_chars()`, you can use nested if statements and the "not-equal-to" operator `!=`, for example `if x != "a":` means that the if statement is only true if the value of `x` is not `"a"`

Hint 2: For the function `write_chars_file()` it might make sense to first convert the input dictionary into a list of strings with a single line per item and then write the contents of this list into a file.

Exercise 2.

Read the file from the previous exercise (`chars.tsv`) into a pandas dataframe (if you did not solve Exercise 1, you can download and use the file under the following link: `https://lehre.idh.uni-koeln.de/site/assets/files/5151/chars.tsv`). The `read_csv` function of pandas can read tab-separated data (`tsv`), inform yourself online how to read such a file with `read_csv`.

Add a new column to the dataframe called "alpha", that contains the value `True` if the character is a letter and `False` if the character is not a letter. To solve this task, inform yourself about the pandas methods "isalpha()" (`https://pandas.pydata.org/docs/reference/api/pandas.Series.str.isalpha.html`) and how to use it. Also inform yourself about how to add the output of "isalpha()" to a new column in the dataframe.

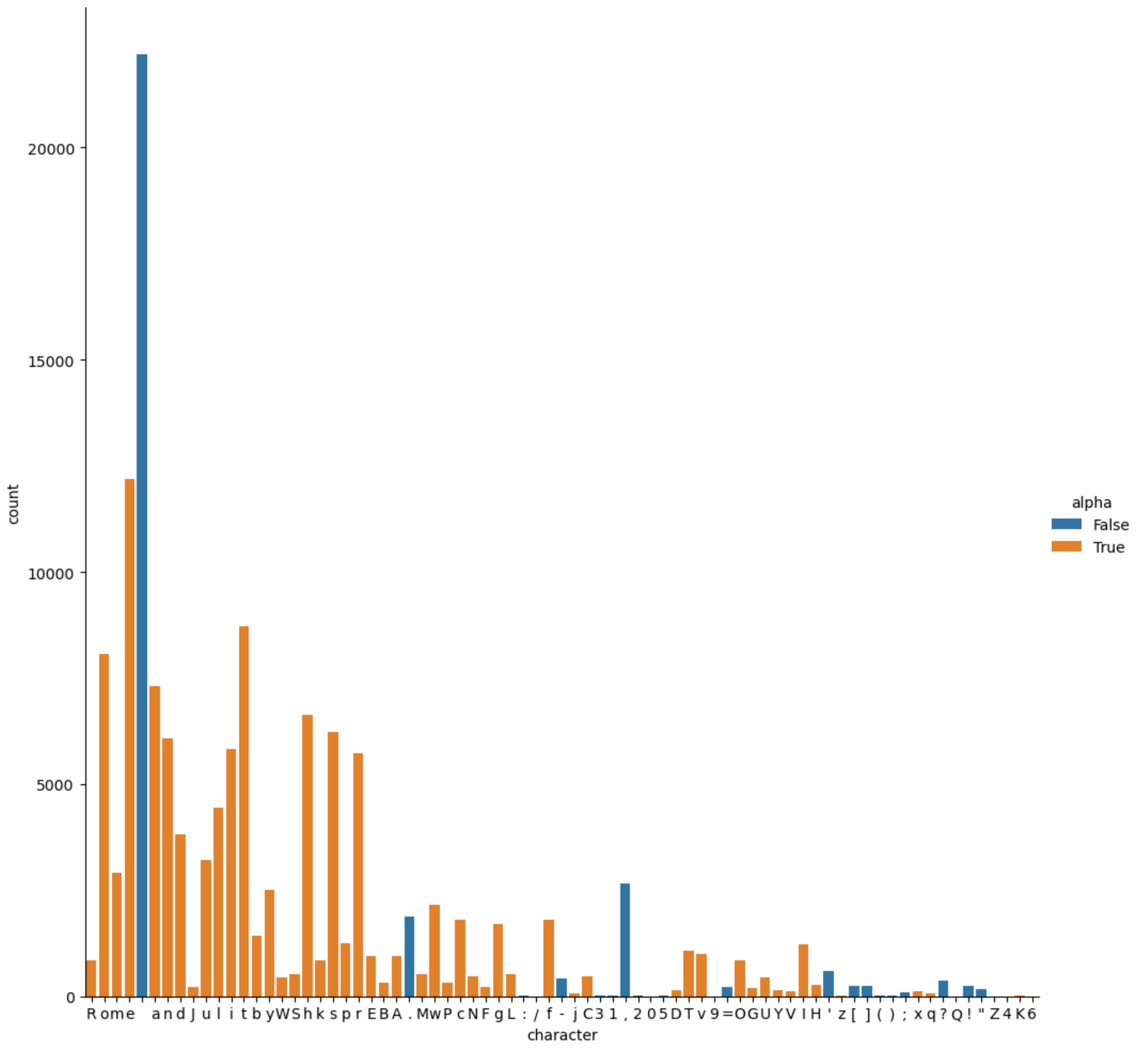
Finally, produce a new dataframe that contains the mean counts for two groups: "alpha is True" and "alpha is False".

Hint 1: You have to set `quoting=3` as a parameter for the `read_csv` function of pandas in order to handle the double and single quotes in the data.

Hint 2: In order to create the dataframe with the mean values, you only need the columns "count" and "alpha", not the column "character"

Exercise 3.

Use the dataframe from the previous exercise (with the added alpha column) and create a barplot with seaborn's "catplot()" function that has each character on the x-axis, its count on the y axis and is colored according to the value in the "alpha" column. Adjust the size of the resulting plot to your liking in case it is too small, via the `height=value` parameter of "catplot()". Your resulting plot should look something like this:


count
20000
15000
10000
5000
0
R o m e a n d J u l i t b y W S h k s p r E B A . M w P c N F g L : / f - j C 3 1 , 2 0 5 D T v 9 = O G U Y V I H ' z [ ] ( ) ; x q ? Q ! " Z 4 K 6
character
alpha
False
True