Assignment 4

Your assignment is to create a tool that allows the user to assess the linguistic properties of major companies' customer service tweets. Your program should first ask the user to specify the type of analysis they would like to perform. Your program should allow the user to perform an unlimited number of analyses.

The dataset is available at customer_service_tweets_full.json file and contains approximately 1,000 tweets for each of twelve major companies' customer service Twitter handles, listed alphabetically below:

@amazonhelp	@AppleSupport	@Ask_Spectrum	@AskPlayStation
@comcastcares	@hulu_support	@SpotifyCares	@sprintcare
@TMobileHelp	@Uber_Support	@UPSHelp	@XboxSupport

The data is formatted as a JSON array, like the datasets you have worked with on your past two assignments. An example of the formatting is below:

[{"Company": "@sprintcare", "Text": "I understand. I would like to assist you. We would need to get you into a private secured link to further assist."},

...

{"Company": "@UPSHelp", "Text": "Hello, please click the link to let us know how we can assist you. Click the link to DM us with your tracking and phone number. ^E.W https://t.co/wKJHDXWGRQ"}]

Your tool should support the following types of analyses:

- Polarity: for each company in the dataset, your tool should calculate the average sentiment polarity across that company's customer service tweets. Ensure that you calculate sentiment scores per-tweet rather than per-sentence. Average polarity values for each company should be printed and displayed visually in a bar graph.

- Subjectivity: for each company in the dataset, your tool should calculate the average sentiment subjectivity across that company's customer service tweets. Ensure that you calculate sentiment scores per-tweet rather than per-sentence. Average subjectivity values for each company should be printed and displayed visually in a bar graph.

- Readability: ask the user whether they would like to analyze by Flesch-Kincaid Grade Level or SMOG index. If the user fails to select one of these options, warn them that their choice was invalid.

    - Flesch-Kincaid Grade Level (FKGL): this metric is an attempt to estimate the grade level (e.g., third grade reading level) of text based upon its word choice and sentence structure. For each company in your dataset, your tool should calculate the average

FKGL across that company's customer service tweets. Average FKGL values for each company should be printed and displayed visually on a bar graph. FKGL is computed as follows:

$$0.39\left(\frac{total\ words}{total\ sentences}\right) + 11.8\left(\frac{total\ syllables}{total\ words}\right) - 15.59$$

To count total syllables, install the syllables module, which can estimate the number of syllables in a word, sentence, or passage. Syllable counts can be estimated using the syllables.estimate() function. For example, using syllables.estimate("coronavirus") returns 5.

- SMOG index: this metric is an attempt to estimate the number of years of education required to understand text based on its word choice and sentence structure. For each company in your dataset, your tool should calculate the average SMOG across that company's customer service tweets. Average SMOG values for each company should be printed and displayed visually on a bar graph. SMOG is computed as follows, where a "polysyllable" refers to a word that is three or more syllables long:

$$1.043\sqrt{number\ of\ polysyllables \times \frac{30}{number\ of\ sentences}} + 3.1291$$

- Formality index: this metric is an attempt to estimate how formally or informally text is written based upon its parts of speech (find the part of speech tagging scheme here). Scores close to 0 reflect very informal text, and scores close to 100 reflect very formal text. For each company in your dataset, your tool should calculate the average formality across that company's customer service tweets. Average formality values for each company should be printed and displayed visually on a bar graph. Formality is computed as follows:

$$f = number\ of\ nouns, adjectives, prepositions, and\ determiners$$
$$c = number\ of\ pronouns, verbs, adverbs, and\ interjections$$

$$50\left(\frac{f-c}{f+c} + 1\right)$$

For the purposes of this assignment, treat any tag that contains "NN" as a noun; any tag that contains "JJ" as an adjective; any tag that contains "IN" as a proposition; any tag that contains "DT" as a determiner; any tag that contains "PR" as a pronoun; any tag that contains "VB" as a verb; any tag that contains "RB" as an adverb; and any tag that contains "UH" as an interjection.

- Search: ask the user which Twitter handle they would like to search. For that Twitter handle, compute and print the average polarity, average subjectivity, average Flesch Kincaid Grade Level, average SMOG index, and average formality index. Your code should handle the case

that the user searches for a Twitter handle that is not in the dataset and print an appropriate warning if this occurs.

Write your code such that the entirety of your program is case insensitive (for example, the program would behave equivalently if the user enters “yes”, “Yes”, or “YES” or if they enter “@sprintcare” or “@SprintCare”). However, do not perform any spellchecking on this assignment (unfortunately, the spellchecker we have used corrects “polarity” to “popularity”).

Some considerations to note:

- There is a freely available module capable of computing readability measures called textstat (find the details here). Although this module is easy to use, its computations make some questionable assumptions. For example, it tokenizes sentences under the assumption that a period always marks the end of a sentence, which textblob and/or nltk handle much more carefully. You may use textstat for testing purposes. However, ensure that your final submission utilizes your own implementation of each readability measure.

- The examples on the following pages use rotated labels on the x-axis to improve the legibility of the bar graphs. To adjust this setting for the x-axis labels in matplotlib, plt.xticks(rotation = 45, ha = "right") was used. This is optional.

- Due to the size of the full dataset, some analyses (particularly those that rely on parts of speech) may run rather slowly. For your testing purposes, you may use a smaller dataset that contains approximately 50 rather than 1,000 tweets per company. This small dataset uses the same format as the full dataset and is located at customer_service_tweets_small.json file. However, ensure that your final submission is built to analyze the full dataset.

- Ensure that your prompts and output are crisp, professional, and well-formatted. For example, ensure that you have used spaces appropriately and checked your spelling. Ensure that graphs are appropriately titled and that axes are appropriately labeled.

- Adding comments in your code is encouraged. You may decide how best to comment your code. At minimum, please use a comment at the start of your code to describe its basic functionality.

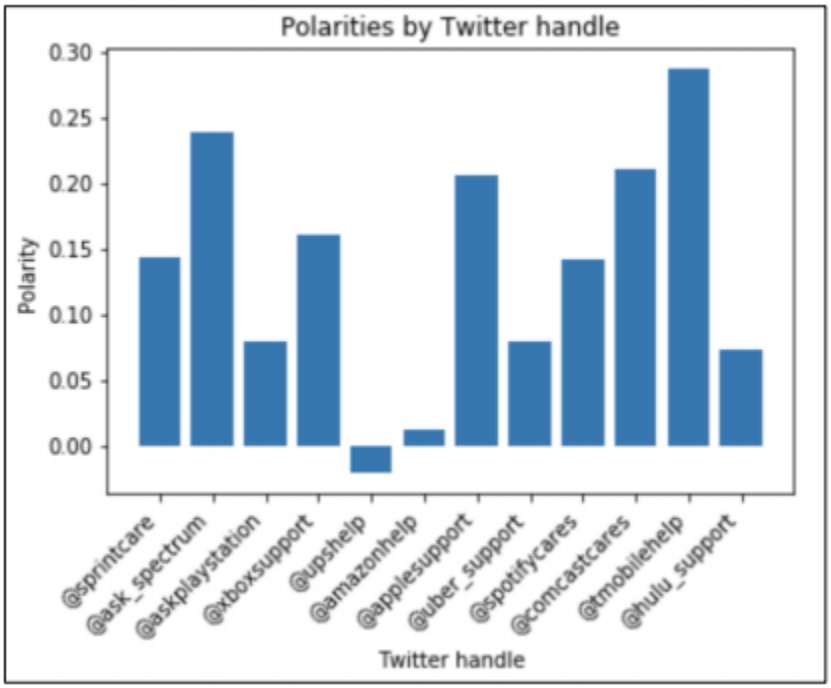
Please use the following as a template for the tool’s expected functionality (full dataset):

Welcome to the customer service linguistics analyzer!

Which analysis would you like to perform (polarity/subjectivity/readability/formality/search)?
Polarity

@sprintcare: 0.1441766155603655
@ask_spectrum: 0.2387153826960076
@askplaystation: 0.0799678848003847

@xboxsupport: 0.16134886649230387
@upshelp: -0.020923390993824426
@amazonhelp: 0.012632791606541599
@applesupport: 0.20552694173881667
@uber_support: 0.07891686147186143
@spotifycares: 0.14145763313406176
@comcastcares: 0.21032808897121366
@tmobilehelp: 0.2874421763768641
@hulu_support: 0.07364242688792685



Would you like to run another analysis (yes/no)? yes

Which analysis would you like to perform (polarity /subjectivity / readability / formality / search)? search

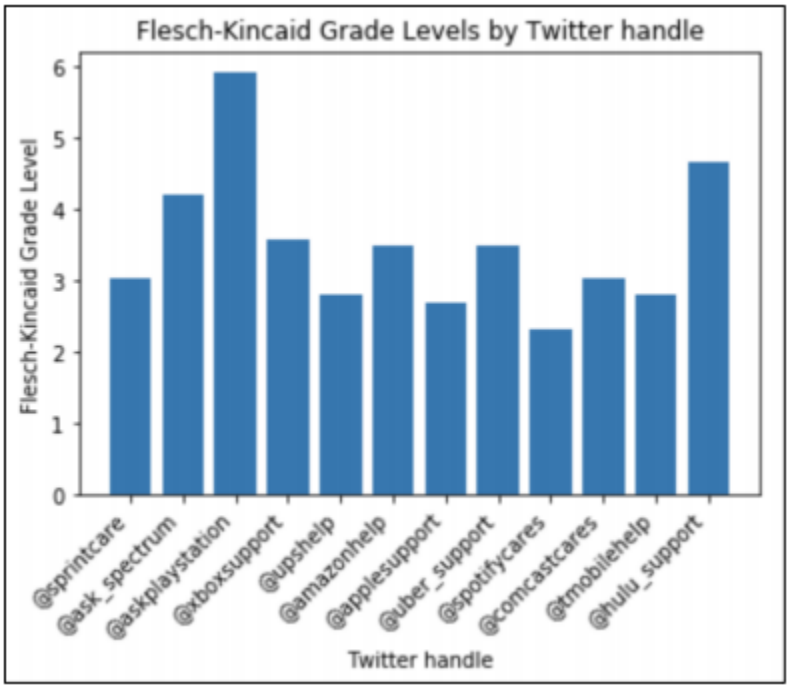
Which Twitter handle would you like to search? @upshelp

Average polarity: -0.020923390993824426
Average subjectivity: 0.4081721997854607
Average Flesch-Kincaid Grade Level: 2.7999036537954005
Average SMOG index: 7.315399000283902
Average Formality index: 62.06277577465332

Would you like to run another analysis (yes/no)? YES
Which analysis would you like to perform (polarity /subjectivity / readability / formality / search)? profit

Sorry, that type of analysis is not supported. Please try again.
Would you like to run another analysis (yes/no)? Yes
Which analysis would you like to perform (polarity /subjectivity / readability / formality / search)? readability
Would you like to analyze FKGL or SMOG? ABCD
Sorry, that type of analysis is not supported. Please try again.
Would you like to run another analysis (yes/no)? yes
Which analysis would you like to perform (polarity /subjectivity / readability / formality / search)? READABILITY
Would you like to analyze FKGL or SMOG? FKGL

@sprintcare: 3.0329275523159693
@ask_spectrum: 4.220037957756203
@askplaystation: 5.916860592588254
@xboxsupport: 3.5803500408234434
@upshelp: 2.7999036537954005
@amazonhelp: 3.480966816998824
@applesupport: 2.7059316297371927
@uber_support: 3.4990759106428193
@spotifycares: 2.310499516709366
@comcastcares: 3.0421282080843373
@tmobilehelp: 2.8096163639219127
@hulu_support: 4.664881752457174



Would you like to run another analysis (yes/no)? YES
Which analysis would you like to perform (polarity /subjectivity / readability / formality / search)? search
Which Twitter handle would you like to search? @cocacola
Sorry, that Twitter handle was not found. Please try again.
Would you like to run another analysis (yes/no)? no