data_cleaning

November 30, 2023

1 Data cleaning and preprocessing

1. Validate the reviews in `Reviewed` and `The Ramen Rater - Big List Of A`
    - Reviews #428 and #138 are different due to input error, and the version in `Reviewed` seems to be the corrected version.
    - Use `Reviewed` as the reference dataset.
2. Merge top 10 ranks from `The Ramen Rater - Big List Of A` to `Reviewed`
    - Extract the years and ranks from the `Top Ten` column and store them in `T_year` and `T_rank`.
3. Clean up inconsistent country names
    - For the simplicity of the report, assign countries with less than `20` reviews in `Reviewed` to a new category `Other`.
    - Create a custom dictionary to catch spelling and input errors and assign them to the correct country names.
4. Standardize `stars` to the closest 0.25 increment
    - Reassign values like `4.5/5` and `5/4.5` as `4.5`.
    - Reassign values like `4-4` and `5-5` as `4` and `5`, respectively.
    - Round values that are not divisible by `0.25` to the nearest `0.25` increment.
    - Take the average of values like `2.5/3.5`, then round to the nearest `0.25` increment.
    - `Stars` with values like `NR` are replaced as missing values.
    - **Handling missing values**: There are very few rows with missing values in `Stars` and `Style`, so we can drop these rows without affecting key trends.
5. Clean up the `Variety` column
    - Convert all characters to lowercase and remove special characters
6. Group rare `Style` categories into `Other`
    - Rare categories include `Restaurant`, `Bottle`, `Can`, and `Bar`.
7. Exploratory data analysis with autoviz
8. Create a new `Flavor` column for common meat flavors based on the word cloud generated from the `Variety` column
9. Export `Reviewed` dataset as the working dataset

[ ]:
```
from autoviz import AutoViz_Class
import pandas as pd
from openpyxl import load_workbook
import numpy as np
import matplotlib.pyplot as plt
import re
%matplotlib inline
AV = AutoViz_Class()
file_name = "data/4300The-Big-List.xlsx"
```

```
Imported v0.1.732. After importing autoviz, execute '%matplotlib inline' to
display charts inline.
    AV = AutoViz_Class()
    dfte = AV.AutoViz(filename, sep=',', depVar='', dfte=None, header=0,
verbose=1, lowess=False,
                chart_format='svg',max_rows_analyzed=150000,max_cols_analyzed=30,
save_plot_dir=None)
```

[ ]:
```
# Define a function to get the sheet names from an Excel file
def get_sheetnames_xlsx(filepath):
    wb = load_workbook(filepath, read_only=True, keep_links=False)
    return wb.sheetnames


# Get the sheet names from the specified Excel file
sheet_names = get_sheetnames_xlsx(file_name)
print(sheet_names)
```

```
['Reviewed', 'The Ramen Rater - Big List Of A', 'Re-Reviewed', 'Awaiting
Review']
```

[ ]:
```
# Read data from Excel file into a dictionary
data = {}
for sheet in sheet_names:
    data[sheet] = pd.read_excel(
        "data/4300The-Big-List.xlsx", sheet_name=sheet, dtype={"Stars": str}
    )
```

[ ]:
```
for df_name, df in data.items():
    print(df_name)
    print(df.info())
    print("\n")
```

```
Reviewed
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4300 entries, 0 to 4299
Data columns (total 7 columns):
 #   Column    Non-Null Count  Dtype
```

```
---  ------    --------------  -----
 0   Review #  4300 non-null   int64
 1   Brand     4300 non-null   object
 2   Variety   4300 non-null   object
 3   Style     4300 non-null   object
 4   Country   4300 non-null   object
 5   Stars     4299 non-null   object
 6   T         0 non-null      float64
dtypes: float64(1), int64(1), object(5)
memory usage: 235.3+ KB
None


The Ramen Rater - Big List Of A
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2700 entries, 0 to 2699
Data columns (total 7 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   Review #  2700 non-null   int64
 1   Brand     2700 non-null   object
 2   Variety   2700 non-null   object
 3   Style     2698 non-null   object
 4   Country   2700 non-null   object
 5   Stars     2700 non-null   object
 6   Top Ten   41 non-null     object
dtypes: int64(1), object(6)
memory usage: 147.8+ KB
None


Re-Reviewed
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 80 entries, 0 to 79
Data columns (total 6 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   Date     80 non-null     object
 1   Brand    80 non-null     object
 2   Variety  80 non-null     object
 3   Style    80 non-null     object
 4   Country  80 non-null     object
 5   Stars    80 non-null     object
dtypes: object(6)
memory usage: 3.9+ KB
None
```

```
Awaiting Review
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 25 entries, 0 to 24
Data columns (total 4 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   Brand    25 non-null     object
 1   Variety  25 non-null     object
 2   Style    25 non-null     object
 3   Country  25 non-null     object
dtypes: object(4)
memory usage: 928.0+ bytes
None
```

- Found missing values in `Reviewed` and `The Ramen Rater - Big List of A`

1.1 Validate reviews in the sheets `Reviewed` and `The Big List`

[ ]:
```
# Return the reviews that are different
df1 = data["Reviewed"]
df2 = data["The Ramen Rater - Big List Of A"]
diff = []
for idx in df2["Review #"]:
    different = False
    for col in ["Brand", "Variety", "Style", "Country", "Stars"]:
        if (
            df1[df1["Review #"] == idx][col].values[0]
            != df2[df2["Review #"] == idx][col].values[0]
        ):
            different = True
            diff += [idx]
            break
        continue
```

[ ]:
```
print("These 2 reviews are different:")
diff
```

```
These 2 reviews are different:
```

[ ]:
```
[428, 138]
```

[ ]:
```
print(df1[df1["Review #"] == 428])
print(df2[df2["Review #"] == 428])
```

```
      Review #  Brand     Variety     Style Country Stars   T
3872     428    Kamfen  E Men Chicken  Pack   China  3.75 NaN
```

```
      Review #  Brand       Variety      Style Country Stars Top Ten
2272      428    Kamfen  E Menm Chicken   NaN    China  3.75    NaN
```

[ ]:
```
print(df1[df1["Review #"] == 138])
print(df2[df2["Review #"] == 138])
```

```
      Review # Brand      Variety       Style Country Stars   T
4162      138    Unif   100 Furong Shrimp  Pack  Taiwan     3  NaN
      Review # Brand      Variety       Style Country Stars Top Ten
2562      138    Unif   100 Furong Shrimp   NaN  Taiwan     3     NaN
```

Reviews #428 and #138 are different due to input error, and the version in `Reviewed` seems to be the corrected version. Use `Reviewed` as the reference dataset.

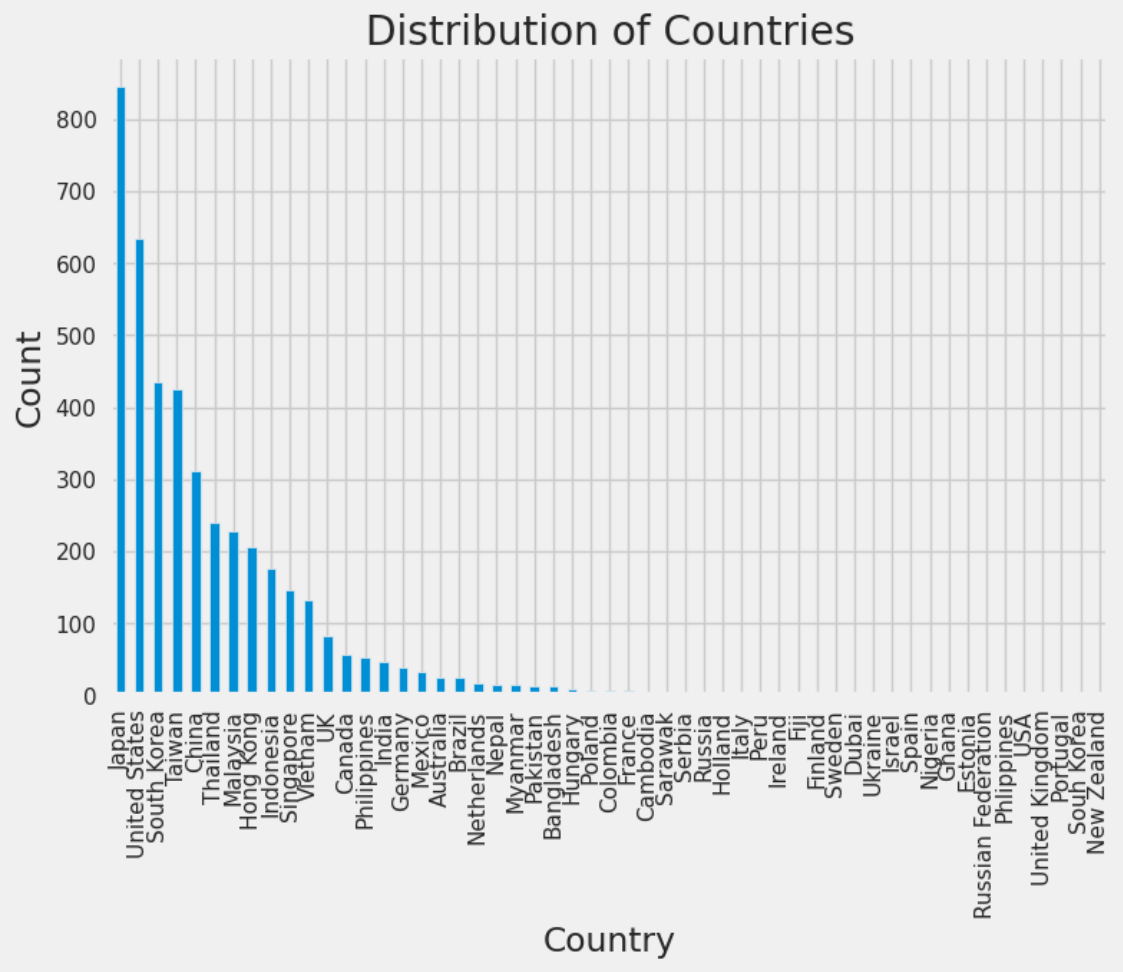
1.2 Merge top 10 ranks from `The Ramen Rater - Big List Of A` to `Reviewed`

Extract the years and ranks from the `Top Ten` column and store them in `T_year` and `T_rank`

[ ]:
```
data["Reviewed"]["T_year"] = data["The Ramen Rater - Big List Of A"][
    "Top Ten"
].str.extract(r"(\d{4})")
data["Reviewed"]["T_rank"] = data["The Ramen Rater - Big List Of A"][
    "Top Ten"
].str.extract(r"#(\d{1,2})")
```

1.3 Clean up inconsistent country names

[ ]:
```
data["Reviewed"]["Country"].value_counts().plot(kind="bar")
plt.xlabel("Country")
plt.ylabel("Count")
plt.title("Distribution of Countries")
plt.show()
```



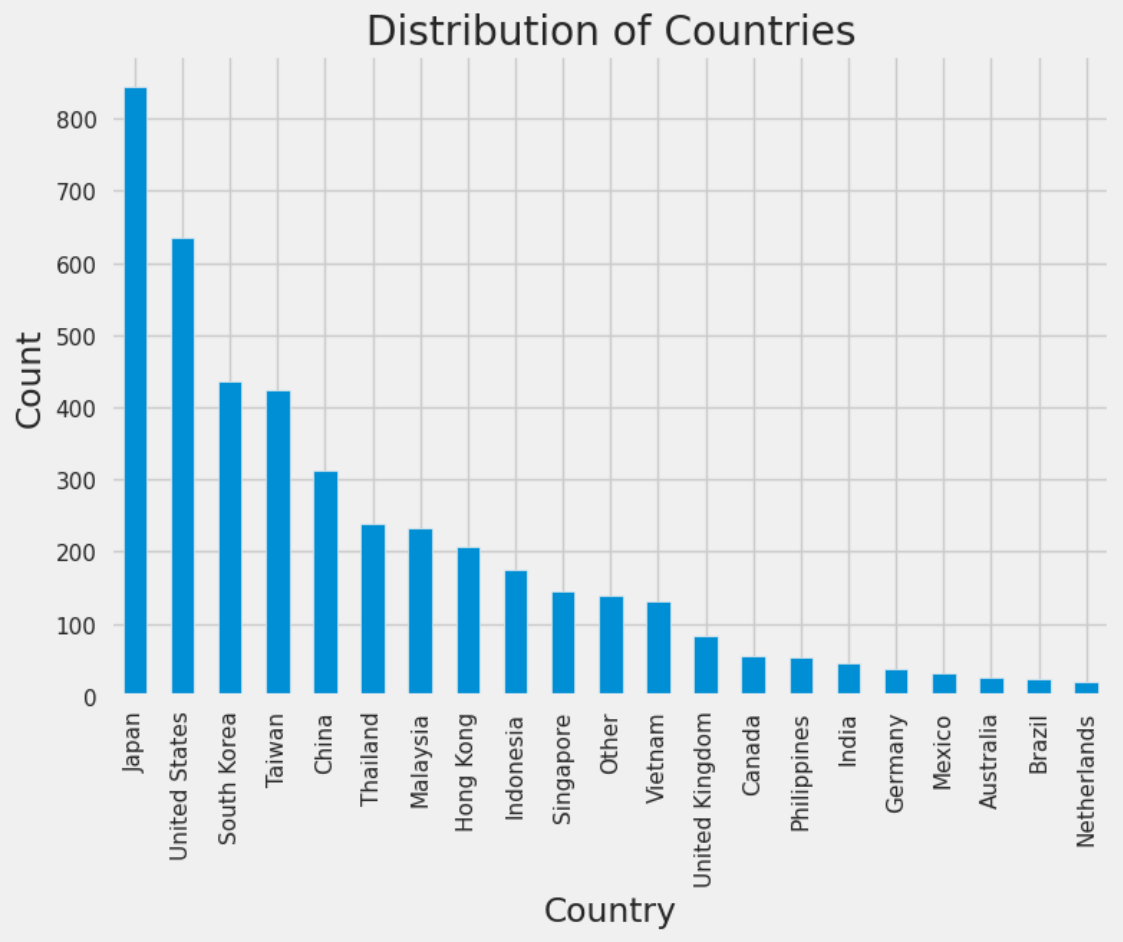
[ ]:
```python
# Create dictionary to catch rare mistakes
exceptions = {
    "Russia": ["Russia", "Russian Federation"],
    "United States": ["United States", "US", "USA"],
    "UAE": ["Dubai"],
    "Netherlands": ["Holland"],
    "Malaysia": ["Sarawak"],
    "South Korea": ["South Korea", "Souh Korea"],
    "United Kingdom": ["UK"],
    "Philippines": ["Phlippines", "Phlippines"],
    "United Kingdom": ["UK"],
}
```

[ ]:
```python
# Define a function to correct exceptions in country names
def correct_exception(input_country: str, exceptions: dict = exceptions):
    for key, val in exceptions.items():
        if input_country in val:
```

```
            return key
    else:
        return input_country


# Apply the correct_exception function to the "Country" column in each sheet
for sheet in sheet_names:
    data[sheet]["Country"] = data[sheet]["Country"].apply(
        lambda x: correct_exception(x)
    )
```

[ ]:
```
# Get the countries with counts less than 20
other_countries = pd.DataFrame(
    {
        "Counts": data["Reviewed"]["Country"].value_counts(),
        "Country": data["Reviewed"]["Country"].value_counts().index,
    }
)
other_countries = other_countries[other_countries["Counts"] < 20]["Country"]

# Update the country values to "Other" for countries with counts less than 20
for sheet in sheet_names:
    data[sheet]["Country"] = data[sheet]["Country"].apply(
        lambda x: "Other" if x in other_countries else x
    )
```

[ ]:
```
data["Reviewed"]["Country"].value_counts().plot(kind="bar")
plt.xlabel("Country")
plt.ylabel("Count")
plt.title("Distribution of Countries")
plt.show()
```



1.4 Standardize stars to the closest 0.25 incremental rating

- Reassign values like `4.5/5` and `5/4.5` as `4.5`.
- Reassign values like `4-4` and `5-5` as `4` and `5`, respectively.
- Round values that are not divisible by `0.25` to the nearest `0.25` increment.
- Take the average of values like `2.5/3.5`, then round to the nearest `0.25` increment.

[ ]:
```
# Standardize stars to closest 0.25 incremental rating
stars = []


def standardize_stars(x: str):
    def conditions(x1, x2):
        if x1 == 5 and x2 <= 5:
            return float(x2)
        elif x2 == 5 and x1 <= 5:
            return float(x1)
        elif x1 == x2:
```

```
            return float(x1)
        elif x1 != x2:
            x = (x1 + x2) / 2  # average the 2 values
            x = 0.25 * np.round(float(x) / 0.25, 0)  # round to nearest 0.25
            return x
        else:
            return np.nan

    try:
        if float(x) % 0.25 != 0:  # if not divisible by 0.25
            x = 0.25 * np.round(float(x) / 0.25, 0)  # round to nearest 0.25
            return x
        return float(x)
    except ValueError:
        if "/" in x:
            x1, x2 = [float(i) for i in x.split("/")]
            return conditions(x1, x2)
        if "-" in x:
            x1, x2 = [float(i) for i in x.split(" ")[0].split("-")][1:3]
            return conditions(x1, x2)
        else:
            return np.nan


for sheet in sheet_names:
    try:
        stars += list(data[sheet]["Stars"].apply(lambda x:␣
 ↪standardize_stars(x)))
    except KeyError:
        pass
```

[ ]:
```
# Check to see if there are any star ratings that are not divisible by 0.25 or␣
 ↪are not np.nan
for i in list(set(stars)):
    if i % 0.25 != 0 and not np.isnan(i):
        print(i)
```

[ ]:
```
# Standardize stars in each sheet
for sheet in sheet_names:
    try:
        # Apply the standardize_stars function to the "Stars" column
        data[sheet]["Stars"] = data[sheet]["Stars"].apply(
            lambda x: standardize_stars(x)
        )
        # Convert the "Stars" column to float
        data[sheet].astype({"Stars": "float"}).dtypes
    except KeyError:
```

```
        pass
```

Handling missing values: There are very few rows with missing values in `Stars` and `Style`, so we can drop these rows without affecting key trends.

[ ]:
```
# Drop the row with a missing `Stars` value in `Review`
data["Reviewed"].dropna(subset=["Stars"], inplace=True)

# Drop the 2 rows with missing `Style` values in `The Ramen Rater - Big List Of␣
↪A`
data["The Ramen Rater - Big List Of A"].dropna(subset=["Style"], inplace=True)
```

1.5 Clean up the `Variety` column by converting all to lowercase and removing special characters

[ ]:
```
# Clean up the `Variety` column by replacing non-alphanumeric characters and␣
↪converting to lowercase
def replace_non_alphanumeric(string):
    string = re.sub(r"\W+", " ", string)
    return string.lower()


for sheet in sheet_names:
    data[sheet]["Variety"] = data[sheet]["Variety"].apply(
        lambda x: replace_non_alphanumeric(x)
    )
```

2 Group rare `Style` categories into `Other`

Rare categories include `Restaurant`, `Bottle`, `Can`, and `Bar`.

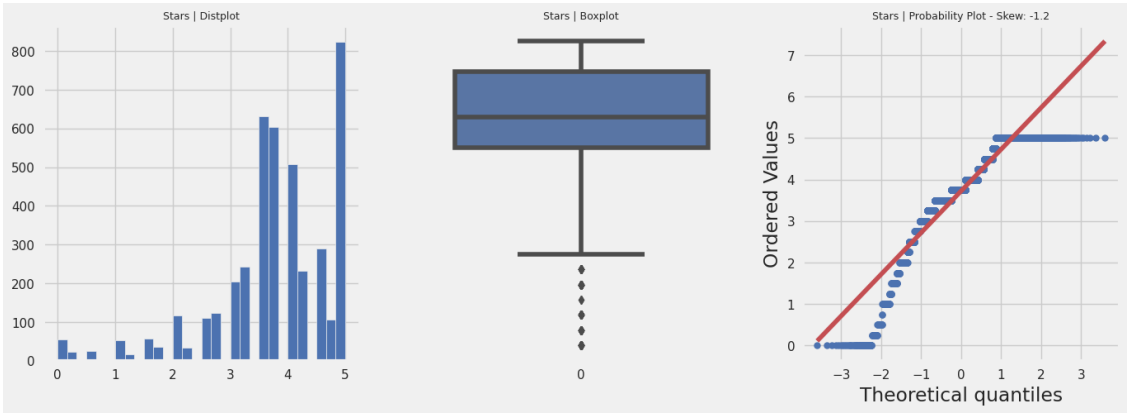
[ ]:
```
def group_style(x):
    if x in ["Restaurant", "Bottle", "Can", "Bar", "Box"]:
        return "Other"
    else:
        return x


for sheet in sheet_names:
    data[sheet]["Style"] = data[sheet]["Style"].apply(lambda x: group_style(x))
```

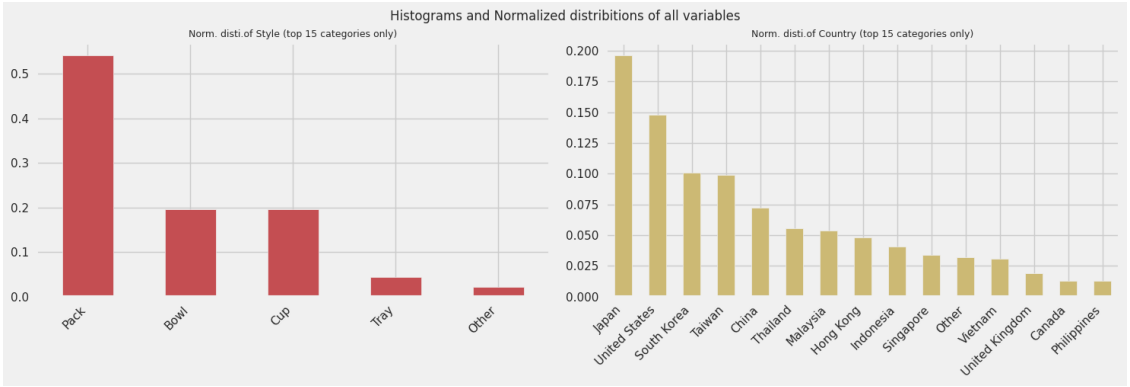
2.1 Exploratory data analysis with `autoviz`

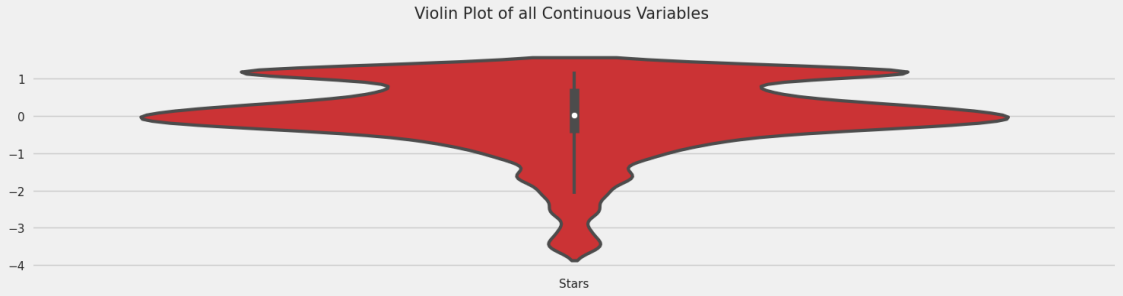
[ ]:
```
dft = AV.AutoViz("", dfte=data["Reviewed"])
```

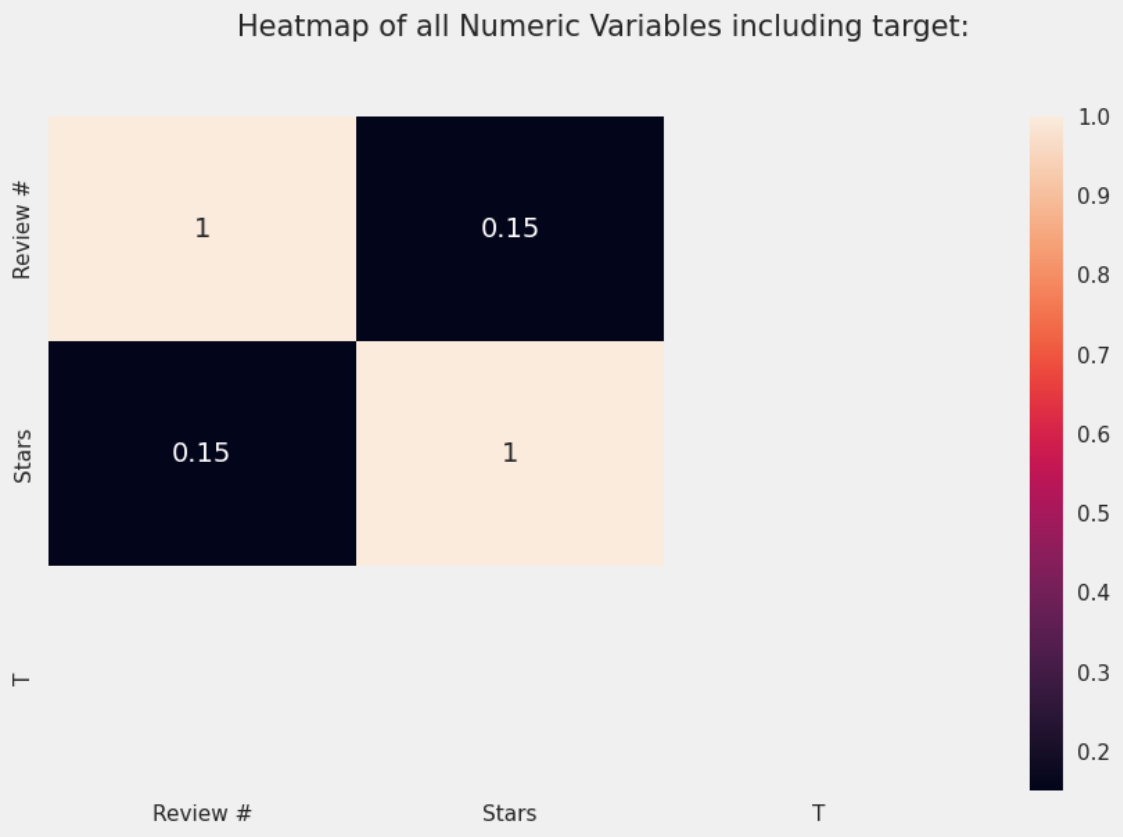
```
Shape of your Data Set loaded: (4292, 9)
################################################################################
#######
######################## C L A S S I F Y I N G  V A R I A B L E S
####################
################################################################################
#######
Classifying variables in data set…
    9 Predictors classified…
        4 variable(s) removed since they were ID or low-information variables
        List of variables removed: ['Review #', 'T', 'T_year', 'T_rank']
To fix data quality issues automatically, import FixDQ from autoviz…
```

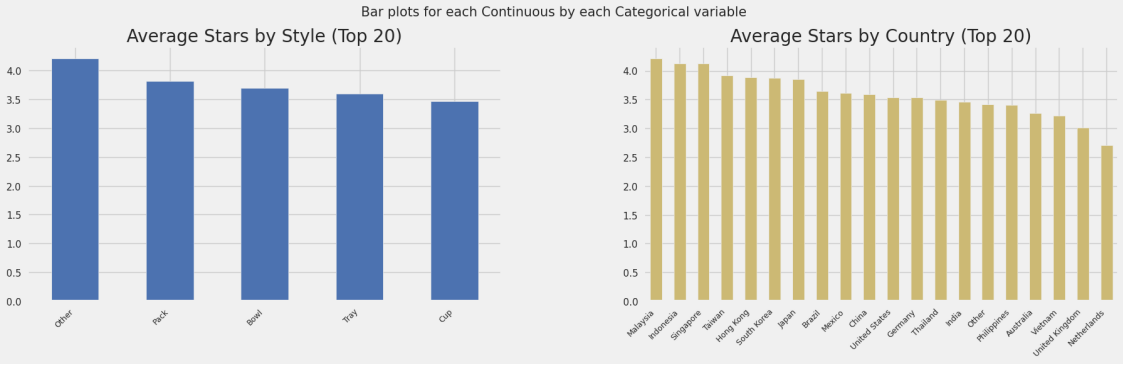
<pandas.io.formats.style.Styler at 0x7f245364f1d0>





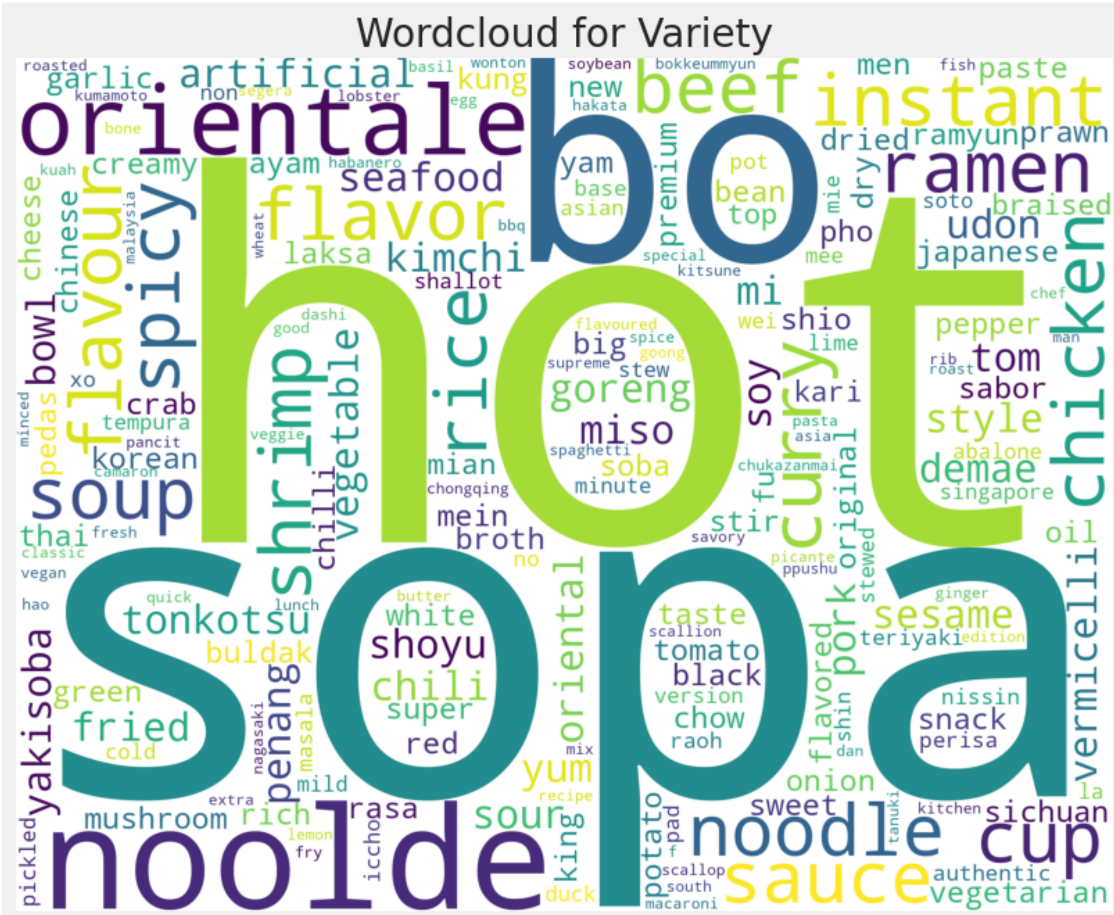

Violin Plot of all Continuous Variables
1
0
−1
−2
−3
−4
Stars


Heatmap of all Numeric Variables including target:
Review #
Stars
T
1
0.15
0.15
1
Review #
Stars
T
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2


Bar plots for each Continuous by each Categorical variable
Average Stars by Style (Top 20)
Other
Pack
Bowl
Tray
Cup
Average Stars by Country (Top 20)
Malaysia
Indonesia
Singapore
Taiwan
Hong Kong
South Korea
Japan
Brazil
Mexico
China
United States
Germany
Thailand
India
Other
Philippines
Australia
Vietnam
United Kingdom
Netherlands

```
[nltk_data] Downloading collection 'popular'
[nltk_data]    |
[nltk_data]    | Downloading package cmudict to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package cmudict is already up-to-date!
[nltk_data]    | Downloading package gazetteers to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package gazetteers is already up-to-date!
[nltk_data]    | Downloading package genesis to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package genesis is already up-to-date!
[nltk_data]    | Downloading package gutenberg to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package gutenberg is already up-to-date!
[nltk_data]    | Downloading package inaugural to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package inaugural is already up-to-date!
[nltk_data]    | Downloading package movie_reviews to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package movie_reviews is already up-to-date!
[nltk_data]    | Downloading package names to /home/alice/nltk_data…
[nltk_data]    |   Package names is already up-to-date!
[nltk_data]    | Downloading package shakespeare to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package shakespeare is already up-to-date!
[nltk_data]    | Downloading package stopwords to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package stopwords is already up-to-date!
[nltk_data]    | Downloading package treebank to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package treebank is already up-to-date!
[nltk_data]    | Downloading package twitter_samples to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package twitter_samples is already up-to-date!
[nltk_data]    | Downloading package omw to /home/alice/nltk_data…
[nltk_data]    |   Package omw is already up-to-date!
[nltk_data]    | Downloading package omw-1.4 to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package omw-1.4 is already up-to-date!
[nltk_data]    | Downloading package wordnet to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package wordnet is already up-to-date!
[nltk_data]    | Downloading package wordnet2021 to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package wordnet2021 is already up-to-date!
```

```
[nltk_data]    | Downloading package wordnet31 to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package wordnet31 is already up-to-date!
[nltk_data]    | Downloading package wordnet_ic to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package wordnet_ic is already up-to-date!
[nltk_data]    | Downloading package words to /home/alice/nltk_data…
[nltk_data]    |   Package words is already up-to-date!
[nltk_data]    | Downloading package maxent_ne_chunker to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package maxent_ne_chunker is already up-to-date!
[nltk_data]    | Downloading package punkt to /home/alice/nltk_data…
[nltk_data]    |   Package punkt is already up-to-date!
[nltk_data]    | Downloading package snowball_data to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package snowball_data is already up-to-date!
[nltk_data]    | Downloading package averaged_perceptron_tagger to
[nltk_data]    |     /home/alice/nltk_data…
[nltk_data]    |   Package averaged_perceptron_tagger is already up-
[nltk_data]    |       to-date!
[nltk_data]    |
[nltk_data]  Done downloading collection popular
```


Wordcloud for Variety
hot
sopa
bo
noolde
orientale
instant
beef
ramen
flavor
spicy
flavour
rice
shrimp
chicken
curry
soup
noodle cup
sauce
artificial
garlic
seafood
kimchi
goreng
miso
udon
japanese
vermicelli
tonkotsu
shoyu
chili
yakisoba
fried
mushroom
oriental
vegetable
vegetarian
sichuan


```
All Plots done
Time to run AutoViz = 16 seconds

 ###################### AUTO VISUALIZATION Completed ########################
```

2.2 Create a new `Flavor` column for common meat flavors based on the word cloud generated from the `Variety` column

```
[ ]: # Define a function to extract flavors from the variety column
def extract_flavor(value: str):
    output = []
    common_flavours = {
        "Pork": [
            "tonkotsu",
            "pork",
        ],
        "Beef": ["beef", " bo"],
        "Chicken": ["chicken", "ayam", "buldak"],
        "Seafood": [
```

```
            "seafood",
            "shrimp",
            "fish",
            "crab",
            "lobster",
            "abalone",
            "prawn",
            "pancit",
        ],
        "Duck": ["duck"],
    }
    val = value.lower()
    for k, labels in common_flavours.items():
        for v in labels:
            if v in val:
                output.append(k)
    output = list(set(output))
    if len(output) > 1:
        return "Mixed"
    elif len(output) == 1:
        return output[0]


data["Reviewed"]["Flavor"] = [extract_flavor(x) for x in␣
 ↪data["Reviewed"]["Variety"]]
```

2.3 Export Reviewed dataset as the working dataset

[ ]:
```
data["Reviewed"].to_csv("data/reviewed.csv", index=False)
```