CMPINF 2100 Week 08

Exploratory Data Analysis - Graded Assignment

by Ethan Sanchez

Import Modules

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
```

2. Predictive Modeling Discussion

1. Pick one variable in CHURNDATA to predict (the response variable).

I am working on CLASSIFICATION problem.

2. Select variables to forecast?

The teams are the assigned variables: tag, state , track_album_release_date, through track_popularity , a categorical variable with two values, 'Before 2021' for records released before 2021 and 'Big Spotify' for songs released during or after 2021, and artist_popularity , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity. The variables are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

3. Pick two predictors?

The two predictors are track_popularity and artist_popularity through tracks_album_popular , a categorical variable with two values, 'Popular' and 'Not Popular' for records in CHURNDATA, and 'Big Spotify' for songs released during or after 2021 and artist_popularity , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity. The variables are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

4. Pick one interaction?

The interaction is between the variable track_popularity through tracks_album_popular , a categorical variable with two values, 'Popular' and 'Not Popular' for records in CHURNDATA, and artist_popularity , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity. The variables are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

5. Transform variables?

The transformed variables are: tag, state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers. The transformed variables are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

6. Transform interaction?

The transformed interaction is between the variable track_popularity through tracks_album_popular , a categorical variable with two values, 'Popular' and 'Not Popular' for records in CHURNDATA, and artist_popularity , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity. The variables are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

7. Transform predictors?

The transformed predictors are: tag, state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers. The transformed predictors are: danceability, energy, loudness, speechiness, acousticness, instrumentalness, liveness, valence, tempo, and duration_ms, through duration_ms, the numerical variables can be accurate forecast of consumers.

8. Transform response?

The transformed response: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

9. Transform interaction?

The transformed interaction: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

10. Transform predictors?

The transformed predictors: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

Spotify Songs data

```
df_songs.shape
```

```
(18454, 22)
```

```
df_songs.info()
```

```
<class_pandas.core.frame.DataFrame>
RangeIndex: 18454 entries, 0 to 18453
Data columns (total 22):
 #   Unnamed: 0_x  18454 non-null  int64
 #   track_name    18454 non-null  object
 #   track_id      18454 non-null  object
 #   track_popularity  18454 non-null  int64
 #   track_album_release_date  18454 non-null  object
 #   artist_popularity  18454 non-null  int64
 #   danceability  18454 non-null  float64
 #   energy        18454 non-null  float64
 #   loudness      18454 non-null  float64
 #   speechiness   18454 non-null  float64
 #   acousticness  18454 non-null  float64
 #   instrumentalness  18454 non-null  float64
 #   liveness      18454 non-null  float64
 #   valence       18454 non-null  float64
 #   tempo         18454 non-null  float64
 #   duration_ms   18454 non-null  int64
 #   Unnamed: 0_y  18454 non-null  int64
 #   tag           18454 non-null  object
 #   state         18454 non-null  object
 #   through_pop   18454 non-null  object
 #   artist_popular  18454 non-null  object
 #   tracks_album_popular  18454 non-null  object
dtypes: int64 (6), float64 (11), object (5)
memory usage: 3.1 MB
```

```
df_songs.head(5)
```

	Unnamed: 0_x	track_name	track_id	track_popularity	track_album_release_date	artist_popularity	danceability	energy	loudness	speechiness	acousticness	instrumentalness	liveness	valence	tempo	duration_ms	Unnamed: 0_y	tag	state	through_pop	artist_popular	tracks_album_popular
0	0	Ghost - Acoustic	6rqhB6b4O8Ayr3DWKMC6iB	84	2014-10-31	51	0.429	0.294	-10.828	0.0392	0.765	0.000011	0.123	0.414	160.083	176465	0	Big Spotify	Before 2021	Popular	Medium Popularity	Popular
1	1	Lost In Japan	7EjXA8ZzqcPW7ZJ0ZZ0Ed0	55	2018-08-03	76	0.762	0.713	-5.423	0.0363	0.207	0.000012	0.0966	0.732	82.033	211160	1	Big Spotify	Before 2021	Popular	High Popularity	Popular
2	2	Ya Ya (feat. Lil Durk)	1Ovr0Weq7ea18qMveArgJZ	69	2021-01-29	80	0.741	0.626	-7.679	0.0251	0.116	0.000000	0.351	0.466	139.931	239018	2	Big Spotify	Big Spotify	Popular	High Popularity	Popular
3	3	Toothless	5Qb7MX9ZbqTPI1Qnqf8UUR	44	2017-06-23	51	0.501	0.703	-11.771	0.0462	0.483	0.038000	0.122	0.655	99.572	189483	3	Big Spotify	Before 2021	Popular	Medium Popularity	Popular
4	4	Feelings (feat. Lauv)	5Pb8bK7WqRCG1JLzzqXTr7	69	2021-05-14	76	0.781	0.753	-5.884	0.0477	0.0465	0.000000	0.0916	0.732	124.992	214240	4	Big Spotify	Big Spotify	Popular	High Popularity	Popular

```
df_songs.dtypes
```

```
Unnamed: 0_x                int64
track_name                 object
track_id                   object
track_popularity           int64
track_album_release_date   object
artist_popularity          int64
danceability               float64
energy                     float64
loudness                   float64
speechiness                float64
acousticness               float64
instrumentalness           float64
liveness                   float64
valence                    float64
tempo                      float64
duration_ms                int64
Unnamed: 0_y                int64
tag                        object
state                      object
through_pop                object
artist_popular             object
tracks_album_popular       object
dtype: object
```

```
df_songs.describe()
```

	Unnamed: 0_x	track_popularity	track_album_release_date	artist_popularity	danceability	energy	loudness	speechiness	acousticness	instrumentalness	liveness	valence	tempo	duration_ms	Unnamed: 0_y
count	18454.000000	18454.000000	NaN	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000	18454.000000
mean	9.500000	42.167747	2018-10-23	50.000000	0.651000	0.699000	-6.746437	0.107082	0.307693	0.080652	0.190564	0.529646	122.078193	224809	9.500000
std	5.766663	24.643550	NaN	28.867513	0.143354	0.152893	2.070465	0.096146	0.290480	0.271807	0.154334	0.245591	29.780431	39696.822416	5.766663
min	0.000000	0.000000	1957-03-04	0.000000	0.000510	0.000020	-46.448000	0.023100	0.000003	0.000000	0.012100	0.035900	47.859000	30000.000000	0.000000
25%	4.750000	24.000000	2020-08-07	25.000000	0.553000	0.585000	-7.723750	0.038500	0.037600	0.000000	0.098300	0.343000	97.959250	187800.000000	4.750000
50%	9.500000	46.000000	2021-06-25	50.000000	0.663000	0.718000	-5.557000	0.052900	0.207000	0.000034	0.136000	0.537000	122.035000	216000.000000	9.500000
75%	14.250000	64.000000	2021-12-31	75.000000	0.757000	0.821000	-4.344000	0.098425	0.545000	0.000244	0.243000	0.726000	143.923000	252000.000000	14.250000
max	19.000000	100.000000	2022-12-31	100.000000	0.975000	0.997000	0.582000	0.964000	0.996000	0.996000	0.996000	0.983000	220.276000	1561080.000000	19.000000

```
df_songs.tracks_album_popular.value_counts
```

```
Popular    9227
Not Popular    9227
Name: tracks_album_popular, dtype: int64
```

```
df_songs.artist_popular.value_counts
```

```
Medium Popularity    9227
High Popularity      4614
Low Popularity       4614
Name: artist_popular, dtype: int64
```

```
df_songs.through_pop.value_counts
```

```
Before 2021    9227
Big Spotify    9227
Name: through_pop, dtype: int64
```

```
df_songs.state.value_counts
```

```
Popular    9227
Not Popular    9227
Name: state, dtype: int64
```

```
df_songs.tag.value_counts
```

```
Big Spotify    9227
Before 2021    9227
Name: tag, dtype: int64
```

Unfortunately, the dataset is balanced, so I will not need to use stratified sampling.

Unfortunately, some "categorical" strings (track_popularity) where more than or equal to 100 were frequently released in January, also dedicated to the production of Spotify songs in January, and it will not work. So I drop strings when classifying the data and only use the pure data.

Three binary variables: through_pop and tag , that are similar, but have some slight differences with regards to categorical inputs, through dummies can still be made.

3. Exploratory Data Analysis

1. Level of the data associated with your project?

Row level.

2. Pick two numerical variables?

The numerical variables: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

3. Pick one categorical variable?

The categorical variable: through_pop , a categorical variable with two values, 'Before 2021' and 'Big Spotify' for songs released during or after 2021.

4. Pick one ordinal variable?

The ordinal variable: artist_popular , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity.

5. Pick two numerical variables?

The numerical variables: tracks_album_popular , a categorical variable with two values, 'Popular' and 'Not Popular' for records in CHURNDATA, and artist_popular , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity.

6. Pick one interaction?

The interaction is between the variable through_pop , a categorical variable with two values, 'Before 2021' and 'Big Spotify' for songs released during or after 2021, and artist_popular , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity.

7. Transform variables?

The transformed variables: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

8. Transform interaction?

The transformed interaction: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

9. Transform predictors?

The transformed predictors: tag , state , track_album_release_date , artist_popularity , and duration_ms , through duration_ms, the numerical variables can be accurate forecast of consumers.

4. Exploratory Data Analysis

1. Pick one variable to predict?

I am working on CLASSIFICATION problem.

2. Pick two predictors?

The two predictors are track_popularity and artist_popularity through tracks_album_popular , a categorical variable with two values, 'Popular' and 'Not Popular' for records in CHURNDATA, and artist_popularity , a categorical variable with three values, 'Low Popularity' for artists with low popularity, 'Medium Popularity' for artists with medium popularity, and 'High Popularity' for artists with high popularity.

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7. Exploratory Data Analysis

```
df_songs.shape
```

```
(18454, 22)
```

```
df_songs.dtypes
```

```
Unnamed: 0_x                int64
track_name                 object
track_id                   object
track_popularity           int64
track_album_release_date   object
artist_popularity          int64
danceability               float64
energy                     float64
loudness                   float64
speechiness                float64
acousticness               float64
instrumentalness           float64
liveness                   float64
valence                    float64
tempo                      float64
duration_ms                int64
Unnamed: 0_y                int64
tag                        object
state                      object
through_pop                object
artist_popular             object
tracks_album_popular       object
dtype: object
```

```
df_songs.value_counts()
```

```
Unnamed: 0_x  track_name  track_id  track_popularity  track_album_release_date  artist_popularity  danceability  energy  loudness  speechiness  acousticness  instrumentalness  liveness  valence  tempo  duration_ms  Unnamed: 0_y  tag  state  through_pop  artist_popular  tracks_album_popular
0             Ghost - Acoustic  6rqhB6b4O8Ayr3DWKMC6iB  84  2014-10-31  51  0.429  0.294  -10.828  0.0392  0.765  0.000011  0.123  0.414  160.083  176465  0  Big Spotify  Before 2021  Popular  Medium Popularity  Popular  1
1             Lost In Japan  7EjXA8ZzqcPW7ZJ0ZZ0Ed0  55  2018-08-03  76  0.762  0.713  -5.423  0.0363  0.207  0.000012  0.0966  0.732  82.033  211160  1  Big Spotify  Before 2021  Popular  High Popularity  Popular  1
2             Ya Ya (feat. Lil Durk)  1Ovr0Weq7ea18qMveArgJZ  69  2021-01-29  80  0.741  0.626  -7.679  0.0251  0.116  0.000000  0.351  0.466  139.931  239018  2  Big Spotify  Big Spotify  Popular  High Popularity  Popular  1
3             Toothless  5Qb7MX9ZbqTPI1Qnqf8UUR  44  2017-06-23  51  0.501  0.703  -11.771  0.0462  0.483  0.038000  0.122  0.655  99.572  189483  3  Big Spotify  Before 2021  Popular  Medium Popularity  Popular  1
4             Feelings (feat. Lauv)  5Pb8bK7WqRCG1JLzzqXTr7  69  2021-05-14  76  0.781  0.753  -5.884  0.0477  0.0465  0.000000  0.0916  0.732  124.992  214240  4  Big Spotify  Big Spotify  Popular  High Popularity  Popular  1
                                                
```

```
<class'> 
RangeIndex: 1000000 entries
```

```
df_clean.loc[df_clean.playlist_genre.isna()]
```

```
Series([], Name: playlist_genre, dtype: int64)
```

```
df_clean.playlist_genre.value_counts()
```

```
edm       200000
latin     200000
pop       200000
r&b       200000
rock      200000
metal     200000
indie     200000
hip hop   200000
Name: playlist_genre, dtype: int64
```

```
df_clean.loc[df_clean.track_artist.isna()]
```

```
Series([], Name: track_artist, dtype: int64)
```

```
df_clean.loc[df_clean.track_artist.isna()].to_csv('df_clean_track_playlists.csv', header=True)
```

```
df_clean.loc[df_clean.track_album_release_date.isna()]
```

```
Series([], Name: track_album_release_date, dtype: int64)
```

```
df_clean.loc[df_clean.track_album_release_date.isna()].to_csv('df_clean_track_album_release_date.csv', header=True)
```

```
df_clean.loc[df_clean.track_album_release_date.isna()]
```

	track_id	track_album_release_date	track_album_release_date_dbn	released_year	released_month
0	6Ovx1vsuvo8RcMsgLUqtAW	2019-06-14	2019-06-14	2019	6
1	6TJX7Y1Kq0Tf7Q6BaPGCP	2019-05-31	2019-05-31	2019	5
2	6Vc5wAMmXdKIAM7WUoEb7N	2020-07-24	2020-07-24	2020	7
3	6Wq6KuqkxGqGqCqpcfbfqV	2019-02-15	2019-02-15	2019	2
4	6aPKOYLhAoOuRuYkqmqdu	2019-03-05	2019-03-05	2019	3
5	6CUSuQqqBbKDGJ5QdD	2019-07-11	2019-07-11	2019	7

```
df_clean.loc[df_clean.track_album_release_date.isna].to_csv('df_clean_track_album_release_date.csv', header=True)
```

```
df_clean.loc[df_clean.track_album_release_date.isna()].sort_values('released_month')
```

	track_id	track_album_release_date	track_album_release_date_dbn	released_year	released_month
0	6Ovx1vsuvo8RcMsgLUqtAW	2019-06-14	2019-06-14	2019	6
1	6TJX7Y1Kq0Tf7Q6BaPGCP	2019-05-31	2019-05-31	2019	5
5	6CUSuQqqBbKDGJ5QdD	2019-07-11	2019-07-11	2019	7
4	6aPKOYLhAoOuRuYkqmqdu	2019-03-05	2019-03-05	2019	3
3	6Wq6KuqkxGqGqCqpcfbfqV	2019-02-15	2019-02-15	2019	2
2	6Vc5wAMmXdKIAM7WUoEb7N	2020-07-24	2020-07-24	2020	7

```
df_clean.loc[df_clean.released_year.isna()]
```

```
Series([], Name: released_year, dtype: int64)
```

```
df_clean.loc[df_clean.released_month.isna()]
```

```
Series([], Name: released_month, dtype: int64)
```

```
df_clean.loc[df_clean.released_year.isna()].sort_values('released_month')
```

```
Series([], Name: released_year, dtype: int64)
```

```
df_clean.loc[df_clean.released_month.isna()].sort_values('released_year')
```

The visualization of wanted distributions for `track_id`, `track_name`, `track_artist`, `track_album_id`, `track_album_name`, `playlist_name`, and `playlist_id` reveals the data and storage processing. Lastly, we will summarize the statistics of these identifiers.

```
>> df_clean.track_id.describe()

count      6872
unique     6872
top        6TNFCdXaaUeu3Ry7Ms
freq          1
Name: track_id, dtype: object

>> df_clean.track_name.describe()

count                 6872
unique                5475
top        Sweet Nothing - 
freq                    12
Name: track_name, dtype: object

>> df_clean.track_artist.describe()

count    6872
unique   1986
top       ...
freq      ...
Name: track_artist, dtype: object

>> df_clean.track_album_id.describe()

count    6872
unique   2000
top      5Ro0Ln4mnOOSSSSSSSSSSS
freq       ...
Name: track_album_id, dtype: object

>> df_clean.track_album_name.describe()

count                 6872
unique                1911
top        Sweet Nothing - 
freq                    12
Name: track_album_name, dtype: object

>> df_clean.playlist_id.describe()

count    6872
unique   2000
top      37i9dQZF1DXcBWIGoYBM5M
freq       ...
Name: playlist_id, dtype: object

>> df_clean.playlist_name.describe()

count                 6872
unique                2000
top        Chill Hits - 
freq                    ...
Name: playlist_name, dtype: object
```

"Is `loudness` or `duration_ms` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='duration_ms', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='loudness', hue='popularity', height=5, aspect=1.5 )
```


"Is `playlist_genre` or `key` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='playlist_genre', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='key', hue='popularity', height=5, aspect=1.5 )
```


"Is `mode` or `time_signature` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='mode', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='time_signature', hue='popularity', height=5, aspect=1.5 )
```


"Is `danceability` or `energy` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='danceability', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='energy', hue='popularity', height=5, aspect=1.5 )
```


"Is `speechiness` or `liveness` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='speechiness', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='liveness', hue='popularity', height=5, aspect=1.5 )
```


"Is `acousticness` or `instrumentalness` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='acousticness', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='instrumentalness', hue='popularity', height=5, aspect=1.5 )
```


"Is `valence` or `tempo` correlated with `popularity`?"

```
>> sns.lmplot(data = df_clean, x='valence', hue='popularity', height=5, aspect=1.5 )
```



```
>> sns.lmplot(data = df_clean, x='tempo', hue='popularity', height=5, aspect=1.5 )
```


**"Is `duration_ms` or `loudness

```
sns.heatmap(df.crosstab[df.crosstab[df.crosstab.T.sum() >
                                    df.crosstab.T.sum().sort_values(ascending=False)[:20].index],
            annot=True, cmap="Blues", annot_kwargs={"size": 10}, fmt="d")
plt.show()
```

(b) Categorize bivariate relationships:

(The two (3) combined EDA plots fulfill requirements for 1 part.)

1 if plot is starting with CLUSTERED/STACKED plot

2. Visually considered distribution of the continuous target variable (Hint: Consider the response continuous unique values.

```
sns.displot(data=df.df_clean,kind="kde",hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="liveness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="loudness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="speechiness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="acousticness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="instrumentalness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="liveness",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="valence",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="tempo",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.displot(data=df.df_clean,kind="kde",hue="duration_ms",  hue="music_listening_activity",
            common_grid=False, fill=True, palette=["Red","Green","Yellow"])
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/distributions.py:2619: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

(The remaining bivariate and mixed EDA plots (with the rest of the 5) requirements.)

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="danceability",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="energy",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="loudness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="speechiness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="acousticness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="instrumentalness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="liveness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="valence",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="released_month",y="tempo",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="duration_ms",y="released_month",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="danceability",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="energy",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="loudness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="speechiness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="acousticness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="instrumentalness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="liveness",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="valence",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="tempo",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="violin",x="music_listening_activity",y="duration_ms",  hue="music_listening_activity",
            sharey=False,height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="danceability",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="energy",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="loudness",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="speechiness",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="acousticness",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="instrumentalness",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="liveness",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="valence",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="tempo",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```



```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="duration_ms",sharey=False)
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

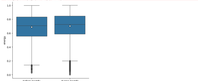


```
sns.catplot(data=df.df_clean,kind="boxplot",x="music_listening_activity",y="duration_ms",sharey=False,
            height=4,aspect=2,palette="Set2")
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:640: FutureWarning: The figure-level kde has changed to tight
  warnings.warn(msg, FutureWarning)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='duration(min)', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```




```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='danceability', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='energy', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='loudness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='speechiness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='acousticness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='instrumentalness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='liveness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='valence', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='tempo', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug_year', y='duration_sec', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

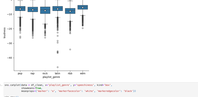
```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='duration(min)', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

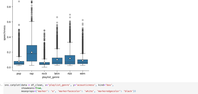
```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='danceability', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



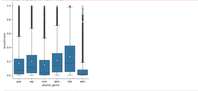

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='energy', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



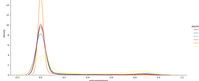

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='loudness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



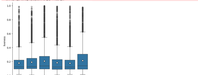

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='speechiness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```




```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='acousticness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```




```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='instrumentalness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='liveness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='valence', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='tempo', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='physical_genre', y='duration_sec', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='duration(min)', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='danceability', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='energy', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='loudness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='speechiness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='acousticness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='instrumentalness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='liveness', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='valence', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



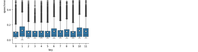
```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='tempo', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```



```
sns_colors_3 = ['#ffa_blue', '#ff_orange', '#ff_red']
sns.boxplot(data=df_clean, x='drug', y='duration_sec', hue='has', palette=sns_colors_3, linewidth=1.5, fliersize=3, dodge=True, width=0.7, saturation=0.9, linecolor='black')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:515: SettingWarning: The figure layout has changed to tight
  self._figure.tight_layout(pad=.2, w_pad=.8, h_pad=.8)
```

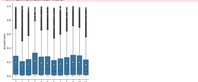


```
>>> sns.catplot(data = df_clean, x="day", y="precipitation", kind="bar",
             palette="Paired", ci=None)
             sns.set(font_scale=1.5)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="precipitation", kind="bar",
             palette="Paired", ci=None, hue="month", aspect=3, height=6)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```



```
>>> sns.catplot(data = df_clean, x="month", y="precipitation", kind="bar",
             palette="Paired", ci=None, hue="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="precipitation", kind="box",
             palette="Paired", "hue"="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="precipitation", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="temp", kind="box",
             palette="Paired", "hue"="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="temp", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

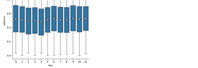
```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="humidity", kind="box",
             palette="Paired", "hue"="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="humidity", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```



```
>>> sns.catplot(data = df_clean, x="day", y="duration_min", kind="box",
             palette="Paired", "hue"="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="duration_min", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="coordinates", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="coordinates", kind="box",
             palette="Paired", "hue"="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="duration_min", kind="bar",
             palette="Paired", ci=None)
             sns.set(font_scale=1.5)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="duration_min", kind="bar",
             palette="Paired", ci=None, hue="day", aspect=3, height=6)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="duration_min", kind="bar",
             palette="Paired", ci=None, hue="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="coordinates", kind="bar",
             palette="Paired", ci=None, hue="day", aspect=3, height=6)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="day", y="coordinates", kind="bar",
             palette="Paired", ci=None, hue="month")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.kde(data = df_clean, x="coordinates", hue="month", palette="Paired", aspect=3, height=6)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/distributions.py:2619: DeprecationWarning: The figure layout has changed to tight
  self.fig.tight_layout(kwargs, pad=dpi_ratio)
```

```
>>> sns.catplot(data = df_clean, x="month", y="temp", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="temp", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="duration_min", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="coordinates", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.kde(data = df_clean, x="coordinates", hue="month", palette="Paired", aspect=3, height=6)
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/distributions.py:2619: DeprecationWarning: The figure layout has changed to tight
  self.fig.tight_layout(kwargs, pad=dpi_ratio)
```

```
>>> sns.catplot(data = df_clean, x="month", y="humidity", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

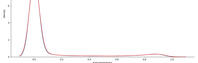
```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="humidity", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```

```
>>> sns.catplot(data = df_clean, x="month", y="duration_min", kind="box",
             palette="Paired", "hue"="day")
             plt.show()
```

```
/opt/conda/envs/rapids/lib/python3.7/site-packages/seaborn/categorical.py:3755: DeprecationWarning: The figure layout has changed to tight
  self.figure.tight_layout(kwargs, pad=dpi_ratio, rotation=rot)
```



```
>>> sns.catplot(data = df_clean, x="month", y="coordinates", kind="box",
             palette="Paired", "hue"="day
```

```
sns.scatterplot(x = df_clean, y='barrels08', y='barrelsHwy')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='barrelsHwy', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
sns.scatterplot(x = df_clean, y='barrels08', y='combinedMpg')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='combinedMpg', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
sns.scatterplot(x = df_clean, y='barrels08', y='cylinders')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='cylinders', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
sns.scatterplot(x = df_clean, y='barrels08', y='displ')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='displ', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
sns.scatterplot(x = df_clean, y='barrels08', y='fuelType')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='fuelType', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='barrels08', y='gasoline')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='gasoline', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='barrels08', y='highway08')
plt.show()
sns.scatterplot(x = df_clean, y='barrels08', y='highway08', kind='hist',
                hue=df_clean.fuelType)
plt.show
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='highway08', y='city08')
plt.show()
sns.scatterplot(x = df_clean, y='highway08', y='city08', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='highway08', y='cylinders')
plt.show()
sns.scatterplot(x = df_clean, y='highway08', y='cylinders', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='highway08', y='displ')
plt.show()
sns.scatterplot(x = df_clean, y='highway08', y='displ', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='highway08', y='fuelType')
plt.show()
sns.scatterplot(x = df_clean, y='highway08', y='fuelType', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
sns.scatterplot(x = df_clean, y='highway08', y='gasoline')
plt.show()
sns.scatterplot(x = df_clean, y='highway08', y='gasoline', kind='hist',
                hue=df_clean.fuelType)
plt.show()
```

```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```



```
/opt/conda/envelopes/anaconda2020.11/lib/python3.8/site-packages/seaborn/scatterplot.py:123: DeprecWarning: The figure layout has changed to tight
with_legend=legend, legend=legend, ax=ax, **kwargs)
```

```
In [14]: sns.scatterplot( df_clean, x="energy", y="tempo")
plt.show()
sns.scatterplot( df_clean, x="energy", y="tempo", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [15]: sns.scatterplot( df_clean,x="energy", y="danceability")
plt.show()
sns.scatterplot( df_clean,x="energy", y="danceability", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [16]: sns.scatterplot( df_clean,x="energy", y="danceability")
plt.show()
sns.scatterplot( df_clean,x="energy", y="danceability", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [17]: sns.scatterplot( df_clean, x="speechiness")
plt.show()
sns.scatterplot( df_clean, x="speechiness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [18]: sns.scatterplot( df_clean, x="speechiness", y="danceability")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="danceability", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [19]: sns.scatterplot( df_clean, x="loudness", y="acousticness")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="acousticness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [20]: sns.scatterplot( df_clean, x="loudness", y="instrumentalness")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="instrumentalness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [21]: sns.scatterplot( df_clean, x="loudness", y="liveness")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="liveness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [22]: sns.scatterplot( df_clean, x="loudness", y="valence")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="valence", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [23]: sns.scatterplot( df_clean, x="loudness", y="tempo")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="tempo", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [24]: sns.scatterplot( df_clean, x="loudness", y="duration_ms")
plt.show()
sns.scatterplot( df_clean, x="loudness", y="duration_ms", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [25]: sns.scatterplot( df_clean, x="speechiness", y="acousticness")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="acousticness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [26]: sns.scatterplot( df_clean, x="speechiness", y="instrumentalness")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="instrumentalness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [27]: sns.scatterplot( df_clean, x="speechiness", y="liveness")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="liveness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [28]: sns.scatterplot( df_clean, x="speechiness", y="valence")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="valence", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [29]: sns.scatterplot( df_clean, x="speechiness", y="tempo")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="tempo", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [30]: sns.scatterplot( df_clean, x="speechiness", y="duration_ms")
plt.show()
sns.scatterplot( df_clean, x="speechiness", y="duration_ms", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [31]: sns.scatterplot( df_clean, x="acousticness", y="instrumentalness")
plt.show()
sns.scatterplot( df_clean, x="acousticness", y="instrumentalness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [32]: sns.scatterplot( df_clean, x="acousticness", y="liveness")
plt.show()
sns.scatterplot( df_clean, x="acousticness", y="liveness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [33]: sns.scatterplot( df_clean, x="acousticness", y="valence")
plt.show()
sns.scatterplot( df_clean, x="acousticness", y="valence", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [34]: sns.scatterplot( df_clean, x="acousticness", y="tempo")
plt.show()
sns.scatterplot( df_clean, x="acousticness", y="tempo", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [35]: sns.scatterplot( df_clean, x="acousticness", y="duration_ms")
plt.show()
sns.scatterplot( df_clean, x="acousticness", y="duration_ms", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [36]: sns.scatterplot( df_clean, x="instrumentalness", y="liveness")
plt.show()
sns.scatterplot( df_clean, x="instrumentalness", y="liveness", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

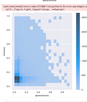
```
In [37]: sns.scatterplot( df_clean, x="instrumentalness", y="valence")
plt.show()
sns.scatterplot( df_clean, x="instrumentalness", y="valence", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
In [38]: sns.scatterplot( df_clean, x="instrumentalness", y="tempo")
plt.show()
sns.scatterplot( df_clean, x="instrumentalness", y="tempo", s=5,alpha=0.5)
plt.show()
plt.clear()
```

```
/opt/homebrew/Cellar/jupyterlab/4.0.9_1/libexec/lib/python3.11/site-packages/notebook/nbextension.py:125: DeprecationWarning: The traitlets.kwarg has changed to traitlets.utils.sysdata.kwargs, kwargs.keys, kwargs.values
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

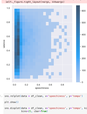


```
sns.scatterplot(x = df_clean, y='openbrewery', z='latitude')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='latitude', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='openbrewery', z='image')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='image', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```



```
sns.scatterplot(x = df_clean, y='openbrewery', z='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

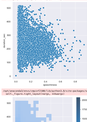
```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='openbrewery', z='overallscore')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='overallscore', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='openbrewery', z='taste')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='taste', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```



```
sns.scatterplot(x = df_clean, y='openbrewery', z='time')
plt.show()
sns.scatterplot(x = df_clean, y='openbrewery', z='time', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='overallscore')
plt.show()
sns.scatterplot(x = df_clean, y='overallscore', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='taste')
plt.show()
sns.scatterplot(x = df_clean, y='taste', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```

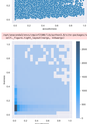

```
sns.scatterplot(x = df_clean, y='time')
plt.show()
sns.scatterplot(x = df_clean, y='time', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='location_id', z='overallscore')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='overallscore', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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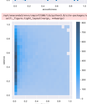

```
sns.scatterplot(x = df_clean, y='location_id', z='taste')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='taste', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```

```
sns.scatterplot(x = df_clean, y='location_id', z='time')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='time', hue='foul',
                data=df_clean, ax=ax)
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```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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sns.scatterplot(x = df_clean, y='overallscore', z='taste')
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plt.show()
sns.scatterplot(x = df_clean, y='overallscore', z='time', hue='foul',
                data=df_clean, ax=ax)
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```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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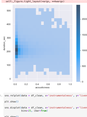
```



```
sns.scatterplot(x = df_clean, y='taste', z='time')
plt.show()
sns.scatterplot(x = df_clean, y='taste', z='time', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```
sns.scatterplot(x = df_clean, y='overallscore', z='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='overallscore', z='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```
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                data=df_clean, ax=ax)
plt.show()
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```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```

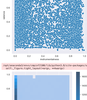

```
sns.scatterplot(x = df_clean, y='overallscore', z='time')
plt.show()
sns.scatterplot(x = df_clean, y='overallscore', z='time', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```

```
sns.scatterplot(x = df_clean, y='taste', z='time')
plt.show()
sns.scatterplot(x = df_clean, y='taste', z='time', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```

```
sns.scatterplot(x = df_clean, y='location_id', z='overallscore', p='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='overallscore', p='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```

```
sns.scatterplot(x = df_clean, y='location_id', z='taste', p='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='taste', p='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
  self._figure.figure_layout_haschanged.emit()
```



```
sns.scatterplot(x = df_clean, y='location_id', z='time', p='location_id')
plt.show()
sns.scatterplot(x = df_clean, y='location_id', z='time', p='location_id', hue='foul',
                data=df_clean, ax=ax)
plt.show()
```

```
/usr/local/lib/python3.7/dist-packages/matplotlib/colorbar/_ax_to_mappable.py:225: DeprecationWarning: The figure layout has changed to tight
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```