```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='liveness', y='valence')
plt.show()
sns.relplot(data=df, x='liveness', y='valence', kind='hist',
            height=6, fill=True)
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='liveness', y='tempo')
plt.show()
sns.relplot(data=df, x='liveness', y='tempo', kind='hist',
            height=6, fill=True)
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
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```

```
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  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='liveness', y='loudness')
plt.show()
sns.relplot(data=df, x='liveness', y='loudness', kind='hist',
            height=6, fill=True)
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
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  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='liveness', y='duration_ms')
plt.show()
sns.relplot(data=df, x='liveness', y='duration_ms', kind='hist',
            height=6, fill=True)
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
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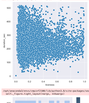

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
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```

[1]
```
sns.relplot(data=df, x='valence', y='duration_ms')
plt.show()
sns.relplot(data=df, x='valence', y='duration_ms', kind='hist',
            height=6, fill=True)
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
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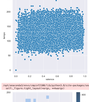
  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='tempo', y='duration_ms')
plt.show()
```



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  self._figure.tight_layout(kwargs, pad=1.0)
```

[1]
```
sns.relplot(data=df, x='release_date', y='duration_ms')
plt.show()
```

```
C:\Users\Lenovo\Desktop\Kaggle\Kaggle Competitions\Spotify Music Popularity Prediction\venv\Lib\site-packages\seaborn\relplot.py:125: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(kwargs, pad=1.0)
```

Bar-to-bar and manage comments, the only visualizations where there's a, will be removed to `binary_artist_name_popular`.

Categorical variables: `track_popularity` along with `binary_artist_name_popular`, `track_artist`, `release_date` along with `released_year`, `released_month`, and `release_day`, `artist_count`, `key`, and `mode`.

Continuous variables: `danceability`, `energy`, `loudness`, `speechiness`, `acousticness`, `instrumentalness`, `liveness`, `valence`, `tempo`, and `duration_ms` along with `duration_min`.

Visualizations of a categorical variable:

[1]
```
sns.catplot(data=df, x='released_month', hue='binary_artist_name_popular', y='track_popularity',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='released_month', hue='binary_artist_name_popular', y='artist_count',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='released_month', hue='binary_artist_name_popular', y='key',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='released_month', hue='binary_artist_name_popular', y='mode',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='danceability',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='energy',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='loudness',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='speechiness',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='acousticness',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='instrumentalness',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='liveness',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='valence',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='tempo',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='duration_ms',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

[1]
```
sns.catplot(data=df, x='release_year', hue='binary_artist_name_popular', y='duration_min',
            col_wrap=3, sharex=False, height=4, kind='bar', legend=True, legend_out=True)
plt.show()
```

```
sns.catplot(data=df_clean,x=y_test,y=best_history_activate_popular,
            hue_order=['Not Popular', 'Popular'],
            palette=['#ff7f0e', '#1f77b4'],
            kind='bar',
            height=4,aspect=1.2,legend=False,ci=None);
```

```
plt.show()
```

```
/usr/local/lib/python3.12/dist-packages/seaborn/categorical.py:3399: UserWarning: The figure layout has changed to tight
  self.draw_figure(fig=fig,pad_inches=padinch,kwargs=kwargs)
```

```
>>> sns.catplot(data = df_clean_copy, x='time_pure', y='popularity', kind='boxplot',palette=palette,
             hue='popularity', order=['Before Spotify', 'During Spotify'],
             hue_order=['Not Popular', 'Popular'], sharey=False,legend=False,legend_out=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

```
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=[2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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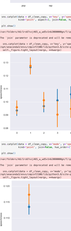
```




```
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=[0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23])
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```

```
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The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Mon','Tue','Wed','Thu','Fri','Sat','Sun'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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```

```
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
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plt.show()
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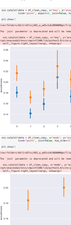
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Morning','Afternoon','Evening','Night'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```




```
>>> sns.catplot(data = df_clean_copy, x='time_pure', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
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             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Before Spotify', 'During Spotify'])
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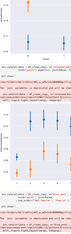
```




```
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
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             hue='popularity',legend=False,legend_out=False,sharey=False,order=[2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021])
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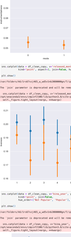


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```
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             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Before Spotify', 'During Spotify'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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```

```
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show()
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
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             hue='popularity',legend=False,legend_out=False,sharey=False,order=[2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021])
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```
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```



```
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plt.show
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Mon','Tue','Wed','Thu','Fri','Sat','Sun'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```



```
>>> sns.catplot(data = df_clean_copy, x='hours', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
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/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```



```
>>> sns.catplot(data = df_clean_copy, x='time_pure', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
The 'legend' parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with 'linewidth=0'.
>>> sns.catplot(data = df_clean_copy, x='time_pure', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Before Spotify', 'During Spotify'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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```



```
>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False)
plt.show
/usr/local/lib/python3.10/dist-packages/ipykernel/kernelbase.py:1202: UserWarning:
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>>> sns.catplot(data = df_clean_copy, x='release_year', y='popularity', kind='boxplot',palette=palette,
             hue='popularity',legend=False,legend_out=False,sharey=False,order=[2010,2011,2012,2013,2014,2015,2016,2017,2018,2019,2020,2021])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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```
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/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
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```
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```
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```
>>> sns.catplot(data = df_clean_copy, x='time_pure', y='popularity', kind='boxplot',palette=palette,
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```
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```
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```
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             hue='popularity',legend=False,legend_out=False,sharey=False,order=['Morning','Afternoon','Evening','Night'])
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:1296: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

```
>>> df_clean.groby('time_period', ax=ax[0,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[0,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('job', ax=ax[0,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[0,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('marital', ax=ax[1,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[1,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('education', ax=ax[1,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[1,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('day_of_week', ax=ax[2,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[2,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('poutcome', ax=ax[2,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[2,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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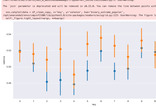
```




```
>>> df_clean.groby('time_period', ax=ax[3,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[3,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('contact', ax=ax[3,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[3,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('month', ax=ax[4,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[4,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('pdays', ax=ax[4,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[4,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
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```

```
>>> df_clean.groby('previous', ax=ax[5,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[5,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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```



```
>>> df_clean.groby('emp_var_rate', ax=ax[5,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[5,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
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```

```
>>> df_clean.groby('cons_price_idx', ax=ax[6,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[6,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
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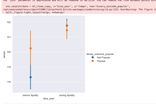
```



```
>>> df_clean.groby('cons_conf_idx', ax=ax[6,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[6,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
The `size` parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with `linewidth=0`
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```




```
>>> df_clean.groby('euribor3m', ax=ax[7,0], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[7,0].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
The `size` parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with `linewidth=0`
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('nr_employed', ax=ax[7,1], y='target', hue='history_outcome_popular',
    kind='point', dodge=True, hue_order=['Not Popular', 'Popular'])
ax[7,1].set(ylabel='Not Popular', 'Popular', xlabel='Campaign Success', 'Serving Spanish')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/categorical.py:3399:UserWarning: The `size` parameter has been renamed to `height`; please update your code.
  warnings.warn(msg, UserWarning)
The `size` parameter is deprecated and will be removed in v0.13.0. You can remove the line between points with `linewidth=0`
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

Visualizations of 2 continuous variables DISCARD IF Categorical variable

(The following scatterplots and 2D histograms fulfill requirements for use)

- If you are working on a CLASSIFICATION problem, you must:
  - Visualize relationships between continuous inputs DISCRIMINATED by the response (outcome) unique values.

```
>>> df_clean.groby('age', ax=ax[0,0], y='marital', 'education', 'job', 'day_of_week', 'poutcome', 'time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('marital', ax=ax[0,1], y='education', 'job', 'day_of_week', 'poutcome', 'time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('education', ax=ax[0,2], y='job', 'day_of_week', 'poutcome', 'time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('job', ax=ax[0,3], y='day_of_week', 'poutcome', 'time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

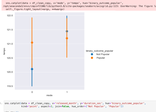
```
>>> df_clean.groby('day_of_week', ax=ax[0,4], y='poutcome', 'time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('poutcome', ax=ax[0,5], y='time_period', 'contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```




```
>>> df_clean.groby('time_period', ax=ax[0,6], y='contact', 'month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('contact', ax=ax[0,7], y='month', 'pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('month', ax=ax[0,8], y='pdays', 'previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('pdays', ax=ax[0,9], y='previous', 'emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```

```
>>> df_clean.groby('previous', ax=ax[0,10], y='emp_var_rate', 'cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1498:FutureWarning:is_categorical_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead
/usr/lib/python3/dist-packages/seaborn/_oldcore.py:1119:FutureWarning:use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN before operating instead.
/usr/lib/python3/dist-packages/seaborn/_base.py:949:FutureWarning:The figure layout has changed to tight
  warnings.warn(msg, FutureWarning, stacklevel=3)
```



```
>>> df_clean.groby('emp_var_rate', ax=ax[0,11], y='cons_price_idx', 'cons_conf_idx', 'euribor3m', 'nr_employed', 'history_outcome_popular', 'Not Popular', 'Popular')

ipts.py:1:
/usr/lib/python3/dist-packages/seabor
```

```
/usr/local/lib/python3.10/dist-packages/seaborn/categorical.py:3399: UserWarning: The figure layout has changed to tight
  self._figure.tight_layout(*args, **kwargs)
```

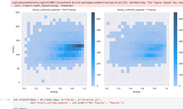
```
sns.boxplot(data=df,x='Genre',y='Gross(US)',hue='Genre')
sns.boxplot(data=df,x='Genre',y='Gross(US)',hue='Genre',palette='Set1')
plt.show()
sns.boxplot(data=df,x='Genre',y='Gross(US)',hue='Genre',palette='Set1',linewidth=2,
            fliersize=5, notch=True, dodge, gap=0.2,saturation=0.7,width=0.5)
plt.show()
```

```
In [15]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='energy', y='danceability', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='energy', y='danceability', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [16]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='energy', y='acousticness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='energy', y='acousticness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

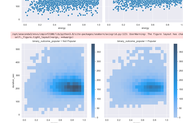



```
In [17]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='energy', y='instrumentalness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='energy', y='instrumentalness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [18]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='energy', y='liveness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='energy', y='liveness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```




```
In [19]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='energy', y='loudness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='energy', y='loudness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [20]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='danceability', y='acousticness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='danceability', y='acousticness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [21]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='danceability', y='instrumentalness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='danceability', y='instrumentalness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

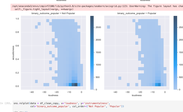
```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [22]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='danceability', y='liveness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='danceability', y='liveness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [23]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='danceability', y='loudness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='danceability', y='loudness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```




```
In [24]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='acousticness', y='instrumentalness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='acousticness', y='instrumentalness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [25]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='acousticness', y='liveness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='acousticness', y='liveness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [26]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='acousticness', y='loudness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='acousticness', y='loudness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [27]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='instrumentalness', y='liveness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='instrumentalness', y='liveness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [28]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='instrumentalness', y='loudness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='instrumentalness', y='loudness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
In [29]: fig, axes = plt.subplots(nrows=1, ncols=2)
         sns.lmplot(x='liveness', y='loudness', data=df, hue='popular', fit_reg=False)
         plt.show()
         sns.lmplot(x='liveness', y='loudness', data=df, hue='popular', col='history_activities_popular',
                    hue_order=[1, 0], sharex=True, sharey=True, col_order=['Not Popular', 'Popular'])
         plt.show()
```

```
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/numpy/core/fromnumeric.py:225: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
/usr/local/anaconda3/envs/py27/lib/python2.7/site-packages/matplotlib/backends/qt_compat.py:115: DeprecationWarning: The Tuple-3 Subset has changed in 1.14!
  self._figure.figure.canvas.draw_idle()
```

```
sns.lmplot(x='Year', y='Sales', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Year', y='Sales', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Year', y='Sales', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Year', y='Sales', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critic_Score', y='Sales', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critic_Score', y='Sales', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critic_Score', y='Sales', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critic_Score', y='Sales', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Score', y='Sales', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Score', y='Sales', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Score', y='Sales', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Score', y='Sales', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Sales', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Sales', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Sales', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Sales', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='Sales', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='Sales', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='Sales', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='Sales', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='User_Count', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='User_Count', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='User_Count', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='User_Count', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='User_Count', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='User_Count', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='User_Count', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Score', y='User_Count', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Critical_Score', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Critical_Score', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Critical_Score', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='Critical_Count', y='Critical_Score', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Count', y='Critical_Score', hue='Genre', col='Platform', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Count', y='Critical_Score', hue='Genre', col='Publisher', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Count', y='Critical_Score', hue='Genre', col='Rating', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
sns.lmplot(x='User_Count', y='Critical_Score', hue='Genre', col='Region', data=df_clean, ci=None, sharex=False, sharey=False, legend=False, scatter_kws={'alpha':0.1})
plt.show()
```

```
cont_features = df_clean_copy.select(['travel_insurance', 'age', 'net_fees_income_payment',
                                      'net_fees_income_loan', 'net_income', 'net_income_1', 'net_income_2', 'net_income_3', 'net_income_4', 'net_income_5', 'net_income_6', 'net_income_7', 'net_income_8', 'net_income_9', 'net_income_10', 'net_income_11', 'net_income_12', 'net_income_13', 'net_income_14', 'net_income_15', 'net_income_16', 'net_income_17', 'net_income_18', 'net_income_19', 'net_income_20', 'net_income_21', 'net_income_22', 'net_income_23', 'net_income_24', 'net_income_25', 'net_income_26', 'net_income_27', 'net_income_28', 'net_income_29', 'net_income_30', 'net_income_31', 'net_income_32', 'net_income_33', 'net_income_34', 'net_income_35', 'net_income_36', 'net_income_37', 'net_income_38', 'net_income_39', 'net_income_40',
```

```
churn[c(1,2,3,4,5)]%>%mutate(c_name=paste(c_name,c_id),c_id=NULL,dep_id=NULL)%>%print(.)%>%
```

```
dfTrain_num <- dfTrain[,sapply(dfTrain,is.numeric)]
dfTrain_num <- dfTrain_num[,-c(1)]
dfTrain_num$churn <- dfTrain$churn
dfTrain_num$churn <- factor(dfTrain_num$churn)
dim(dfTrain_num)
str(dfTrain_num)
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==1)]%>%colnames()
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==2)]%>%colnames()%>%table(.)
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==2)]%>%colnames()%>%table(churn,.)%>%t()
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==2)]%>%colnames()%>%table(churn,.)%>%t()%>%prop.table(margin=1)
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==2)]%>%colnames()%>%table(churn,.)%>%t()%>%prop.table(margin=1)%>%round(.,digits=2)
```

```
dfTrain_num[,sapply(dfTrain_num,function(x) length(unique(x))==2)]%>%colnames()%>%table(churn,.)%>%t()%>%prop.table(margin=1)%>%round(.,digits=2)%>%
```