Project 5

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Project Summary

The following report is based off a Star Wars survey that includes information about respondents favorite movies and characters, as well as additional information. By cleaning and wrangling the survey questions and responses, a machine learning model was created to predict if a respondent had a household income of over $50,000. Two statistics and two charts were created and compared to stats and charts from the original article to confirm that our data was wrangled properly.

Technical Details

Grand Question 1

Shorten the column names and clean them up for easier use with pandas.

respondentid
have_seen_any
fan_sw
seen__i__the_phantom_menace
seen__ii__attack_of_the_clones
seen__iii__revenge_of_the_sith
seen__iv__a_new_hope
seen__v_the_empire_strikes_back
seen__vi_return_of_the_jedi
rank__i__the_phantom_menace
rank__ii__attack_of_the_clones
rank__iii__revenge_of_the_sith
rank__iv__a_new_hope
rank__v_the_empire_strikes_back
rank__vi_return_of_the_jedi
viewhan_solo
viewluke_skywalker
viewprincess_leia_organa
viewanakin_skywalker
viewobi_wan_kenobi
viewemperor_palpatine
viewdarth_vader
viewlando_calrissian
viewboba_fett
viewc-3p0
viewr2_d2
viewjar_jar_binks
viewpadme_amidala
viewyoda
shotfirst
familiar_eu
fan_eu
fan_st
gender
age
household_income

| education |

| location_(census_region) |

Grand Question 2

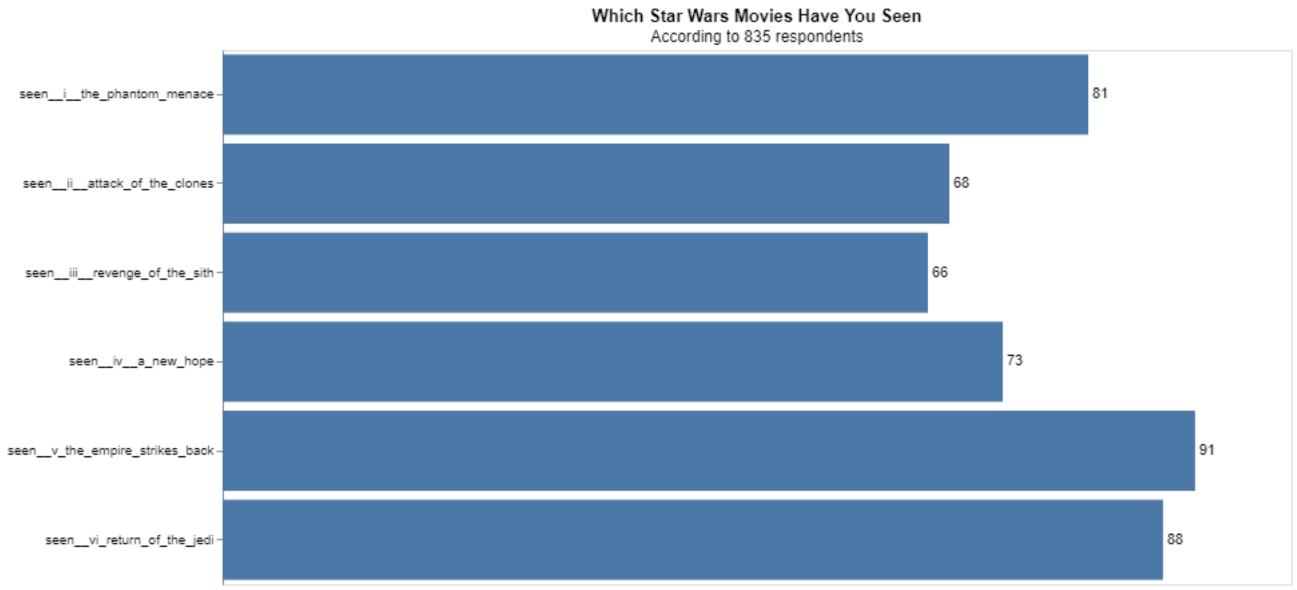
Please validate that the data provided on GitHub lines up with the article by recreating 2 of their visuals and calculating 2 summaries that they report in the article.

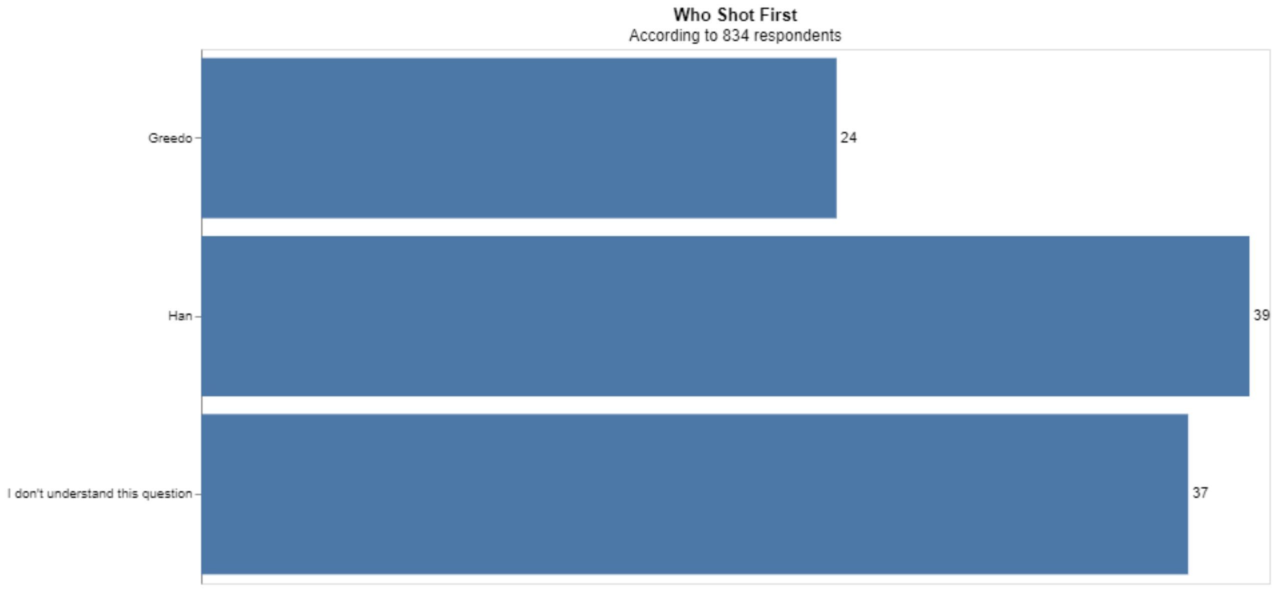
Summaries

	have_seen_any (Male)
Yes	0.851107

	have_seen_any (Female)
Yes	0.723133

Visuals





Grand Question 3

Clean and format the data so that it can be used in a machine learning model.

a. Filter the dataset to respondents that have seen at least one film.

	respondentid	have_seen_any	fan_sw	seen__i__the_phantom_menace	seen__ii__attack_of_the_clones	seen__iii__revenge_
0	3292879998	Yes	Yes	Star Wars: Episode I The Phantom Menace	Star Wars: Episode II Attack of the Clones	Star Wars: Episode III the Sith
2	3292765271	Yes	No	Star Wars: Episode I The Phantom Menace	Star Wars: Episode II Attack of the Clones	Star Wars: Episode III the Sith
3	3292763116	Yes	Yes	Star Wars: Episode I The Phantom Menace	Star Wars: Episode II Attack of the Clones	Star Wars: Episode III the Sith
4	3292731220	Yes	Yes	Star Wars: Episode I The Phantom Menace	Star Wars: Episode II Attack of the Clones	Star Wars: Episode III the Sith

b. Create a new column that converts the age ranges to a single number. Drop the age range categorical column.

	age_min
0	18
2	18
3	18
4	18
5	18

c. Create a new column that converts the school groupings to a single number. Drop the school categorical column.

	education
0	12
2	12
3	14
4	14
5	16

d. Create a new column that converts the income ranges to a single number. Drop the income range categorical column.

	income_min
0	nan
2	0
3	100000
4	100000
5	25000

e. Create your target (also known as "y" or "label") column based on the new income range column.

```
starwars_ml = pd.concat([ml_onehot,
                         q3.filter(['rank_i__the_phantom_menace', 'rank_ii__attack_of_the_clones',
                                    'rank_iii__revenge_of_the_sith', 'rank_iv__a_new_hope',
                                    'rank_v_the_empire_strikes_back', 'rank_vi_return_of_the_jedi']),
                         ml_age,
                         ml_school,
                         ml_income], axis=1)

features = starwars_ml.drop(['income_min'], axis=1)

target = (starwars_ml.income_min >= 50000) *1

target.value_counts()
```

f. One-hot encode all remaining categorical columns.

```
ml_onehot = pd.get_dummies(q3.filter(['fan_sw', 'seen__i__the_phantom_menace',
       'seen__ii__attack_of_the_clones', 'seen__iii__revenge_of_the_sith',
       'seen__iv__a_new_hope', 'seen__v_the_empire_strikes_back',
       'seen__vi_return_of_the_jedi', 'viewhan_solo', 'viewluke_skywalker',
       'viewprincess_leia_organa', 'viewanakin_skywalker',
       'viewobi_wan_kenobi', 'viewemperor_palpatine', 'viewdarth_vader',
       'viewlando_calrissian', 'viewboba_fett', 'viewc-3p0', 'viewr2_d2',
       'viewjar_jar_binks', 'viewpadme_amidala', 'viewyoda', 'shotfirst',
       'familiar_eu', 'fan_eu', 'fan_st', 'gender', 'age', 'household_income',
       'education', 'location_(census_region)']), drop_first=True)
```

Grand Question 4

Appendix A

```python
# %%
import pandas as pd
import altair as alt
import numpy as np

from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import GaussianNB
from sklearn import metrics
from sklearn.tree import DecisionTreeClassifier

from sklearn.ensemble import RandomForestClassifier

# %%
url = 'https://github.com/fivethirtyeight/data/raw/master/star-wars-survey/StarWars.csv'

sw_questions = pd.read_csv(url, encoding = 'ISO-8859-1', header=None, nrows=2)
sw_responses = pd.read_csv(url, encoding = 'ISO-8859-1', header=None, skiprows=2)

# %%
question_1 = (sw_questions.iloc[0,:]
.replace("Have you seen any of the 6 films in the Star Wars franchise?", "have_seen_any")
.replace("Do you consider yourself to be a fan of the Star Wars film franchise?","fan_sw")
.replace("Which of the following Star Wars films have you seen? Please select all that apply.","seen_")
.replace("Please rank the Star Wars films in order of preference with 1 being your favorite film in the franchise and 6 being your least favorite
.replace("Please state whether you view the following characters favorably, unfavorably, or are unfamiliar with him/her.","view")
.replace("Which character shot first?", "shotfirst")
.replace("Are you familiar with the Expanded Universe?","familiar_eu")
.replace("Do you consider yourself to be a fan of the Expanded Universe?Œæ","fan_eu")
.replace("Do you consider yourself to be a fan of the Star Trek franchise?", "fan_st")
.str.lower()
.str.replace(" ", "_")
.ffill()
)

question_2 = (sw_questions.iloc[1,:]
.replace("Response","")
.str.replace("Star Wars: Episode", "")
.str.lower()
.str.replace(" ","_")
.fillna("")
)


column_names = question_1 + question_2

print(column_names.to_markdown(index=False))

# %%
sw_responses.columns

# %%
hanshotfirst = sw_responses.shotfirst.value_counts(normalize=True).reset_index()
hanshotfirst["percent"] = round(hanshotfirst.shotfirst*100, 0)

hanshotfirst

# %% [markdown]
# # Question 2 : Validating data

# %%
# Percent men who have seen at least one film
print((sw_responses.query('gender == "Male"')
.have_seen_any
.value_counts(normalize=True)).to_markdown())

# %%
#Percent women
print((sw_responses.query('gender == "Female"')
.have_seen_any
.value_counts(normalize=True)).to_markdown())

# %%
watched = sw_responses.filter(regex="^seen_").dropna(how="all")
len(watched)
watched
```

```
# %%
watched_percent = round(watched.notnull().sum() / len(watched), 2).reset_index(name="percent")
watched_percent["percentfull"] = round(watched_percent.percent*100, 0)
watched_percent

# %% [markdown]
# ### Please validate that the data provided on GitHub lines up with the article by recreating 2 of their visuals and calculating 2 summaries tha
#

# %%

bars = alt.Chart(watched_percent).mark_bar().encode(
     x = alt.X('percent', axis = None),
     y = alt.Y('index', axis=alt.Axis(title = "")))


text = bars.mark_text(align='left', baseline='middle', dx=3
).encode(text = 'percentfull')


(bars + text).properties(
    height = 400,
    width = 800,
    title = {'text': "Which Star Wars Movies Have You Seen", 'subtitle': "According to 835 respondents"})

# %%


bars = alt.Chart(hanshotfirst).mark_bar().encode(
     x = alt.X('shotfirst', axis = None),
     y = alt.Y('index', axis=alt.Axis(title = "")))


text = bars.mark_text(align='left', baseline='middle', dx=3
).encode(text = 'percent')


(bars + text).properties(
    height = 400,
    width = 800,
    title = {'text': "Who Shot First", 'subtitle': "According to 834 respondents"})

# %% [markdown]
# ## Question 3

# %%
#Filter the dataset to respondents that have seen at least one film.

q3 = sw_responses.query('have_seen_any == "Yes"')
print(q3.to_markdown())

# %%
#Create a new column that converts the age ranges to a single number. Drop the age range categorical column.

ml_age = (q3.age
    .str.split("-", expand= True)
    .rename(columns = {0:'age_min', 1:'age_max'})
    .apply(lambda x: x.str.replace("> ", ""))
    .astype('float')
    .age_min
    )

print(ml_age.to_markdown())

# %%
#Create a new column that converts the school groupings to a single number. Drop the school categorical column.
ml_school = (q3.education.
        str.replace('Less than high school degree', '9').
        str.replace('High school degree', '12').
        str.replace('Some college or Associate degree', '14').
        str.replace('Bachelor degree', '16').
        str.replace('Graduate degree', '20').
        astype('float'))

print(ml_school.to_markdown())

# %%
```

```
#Create a new column that converts the income ranges to a single number. Drop the income range categorical column.
ml_income = (q3.household_income
    .str.replace("\$|,|\+", "")
    .str.split("-", expand=True)
    .rename(columns = {0:'income_min', 1:'income_max'})
    .astype('float')
    .income_min
)

print(ml_income.to_markdown())

# %%
#One-hot encode all remaining categorical columns.
ml_onehot = pd.get_dummies(q3.filter(['fan_sw', 'seen__i__the_phantom_menace',
       'seen__ii__attack_of_the_clones', 'seen__iii__revenge_of_the_sith',
       'seen__iv__a_new_hope', 'seen__v_the_empire_strikes_back',
       'seen__vi_return_of_the_jedi', 'viewhan_solo', 'viewluke_skywalker',
       'viewprincess_leia_organa', 'viewanakin_skywalker',
       'viewobi_wan_kenobi', 'viewemperor_palpatine', 'viewdarth_vader',
       'viewlando_calrissian', 'viewboba_fett', 'viewc-3p0', 'viewr2_d2',
       'viewjar_jar_binks', 'viewpadme_amidala', 'viewyoda', 'shotfirst',
       'familiar_eu', 'fan_eu', 'fan_st', 'gender', 'age', 'household_income',
       'education', 'location_(census_region)']), drop_first=True)



# %%
#Create your target (also known as "y" or "label") column based on the new income range column.
# combine all the new columns into a machine learning dataset
starwars_ml = pd.concat([ml_onehot,
                         q3.filter(['rank_i__the_phantom_menace', 'rank_ii__attack_of_the_clones',
                                    'rank_iii__revenge_of_the_sith', 'rank_iv__a_new_hope',
                                    'rank_v_the_empire_strikes_back', 'rank_vi_return_of_the_jedi']),
                         ml_age,
                         ml_school,
                         ml_income], axis=1)

# %%
features = starwars_ml.drop(['income_min'], axis=1)

target = (starwars_ml.income_min >= 50000) *1

target.value_counts()

features_train, features_test, targets_train, targets_test = train_test_split(
    features,
    target,
    test_size = .3,
    random_state = 24601)

# %%
classifierGNB = GaussianNB()

classifierGNB.fit(features_train, targets_train)

targets_predicted = classifierGNB.predict(features_test)

targets_test
targets_predicted
metrics.accuracy_score(targets_test, targets_predicted)

# %%
classifierDT = DecisionTreeClassifier(max_depth=10)

classifierDT.fit(features_train, targets_train)

targets_predicted = classifierDT.predict(features_test)

metrics.accuracy_score(targets_test, targets_predicted)
```