Practical 6 - JosiahTeh

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[1]:
```
import pandas as pd
import numpy as np
import scipy.stats  #I usually keep scipy as scipy because you will need to␣
↪access it libraries separately.
import seaborn as sns
import matplotlib.pyplot as plt
```

[2]:
```
#read in csv file into
nesarc = pd.read_csv('nesarc.csv', low_memory=False) #increase efficiency
pd.set_option('display.float_format', lambda x:'%f'%x)
```

[3]:
```
#setting variables you will be working with to numeric
nesarc['S2AQ5B'] = pd.to_numeric(nesarc['S2AQ5B'], errors='coerce') #convert␣
↪variable to numeric
nesarc['S2AQ5D'] = pd.to_numeric(nesarc['S2AQ5D'], errors='coerce') #convert␣
↪variable to numeric
nesarc['S2AQ5A'] = pd.to_numeric(nesarc['S2AQ5A'], errors='coerce') #convert␣
↪variable to numeric
nesarc['S2BQ1B1'] = pd.to_numeric(nesarc['S2BQ1B1'], errors='coerce') #convert␣
↪variable to numeric
nesarc['AGE'] = pd.to_numeric(nesarc['AGE'], errors='coerce') #convert variable␣
↪to numeric
```

[4]:
```
#subset data to adults age 26 to 50 who have consumed beer in the past 12 months
sub1=nesarc[(nesarc['AGE']>=26) & (nesarc['AGE']<=50) & (nesarc['S2AQ5A']==1)]
```

[5]:
```
sub2=sub1.copy()
```

[6]:
```
#SETTING MISSING DATA
sub2['S2AQ5D']=sub2['S2AQ5D'].replace(99, np.nan)

sub2['S2AQ5B']=sub2['S2AQ5B'].replace(8, np.nan)
sub2['S2AQ5B']=sub2['S2AQ5B'].replace(9, np.nan)
```

```
sub2['S2AQ5B']=sub2['S2AQ5B'].replace(10, np.nan)
sub2['S2AQ5B']=sub2['S2AQ5B'].replace(99, np.nan)

sub2['S2BQ1B1']=sub2['S2BQ1B1'].replace(9, np.nan)
```

[7]:
```
#recoding number of days consumed beer in the past month
recode2 = {1:30, 2:26, 3:14, 4:8, 5:4, 6:2.5, 7:1}
sub2['BEER_FEQMO']= sub2['S2AQ5B'].map(recode2)

recode3 = {2:0, 1:1}
sub2['S2BQ1B1']= sub2['S2BQ1B1'].map(recode3)
```

3 contingency table of observed counts - between beer dependence (S2BQ1B1) and beer drinking frequency (BEER_FEQMO)

4 Use sub2

[8]:
```
# hint lecture cell 8
ct1=pd.crosstab(sub2['S2BQ1B1'], sub2['BEER_FEQMO'])
print (ct1)
```

```
BEER_FEQMO  1.000000   2.500000   4.000000   8.000000   14.000000  26.000000  \
S2BQ1B1
0.000000         1172       1477       1390       1189        842        313
1.000000           40         80         82        114         78         51

BEER_FEQMO  30.000000
S2BQ1B1
0.000000          343
1.000000           65
```

5 contingency table of observed percentages - between beer dependence (S2BQ1B1) and beer drinking frequency (BEER_FEQMO)

6 Use ct1 calculated in the above cell

[9]:
```
# hint lecture cell 9
colsum=ct1.sum(axis=0)
colpct=ct1/colsum
print(colpct)
```

```
BEER_FEQMO  1.000000   2.500000   4.000000   8.000000   14.000000  26.000000  \
S2BQ1B1
0.000000     0.966997   0.948619   0.944293   0.912510   0.915217   0.859890
1.000000     0.033003   0.051381   0.055707   0.087490   0.084783   0.140110
```

```
BEER_FEQMO  30.000000
S2BQ1B1
0.000000     0.840686
1.000000     0.159314
```

7 chi-square analysis between beer dependence (S2BQ1B1) and beer drinking frequency (BEER_FEQMO)

8 Use ct1

[12]:
```
# hint lecture cell 10
print ('chi-square value, p value, expected counts')
cs1= scipy.stats.chi2_contingency(ct1)
print (cs1)
```

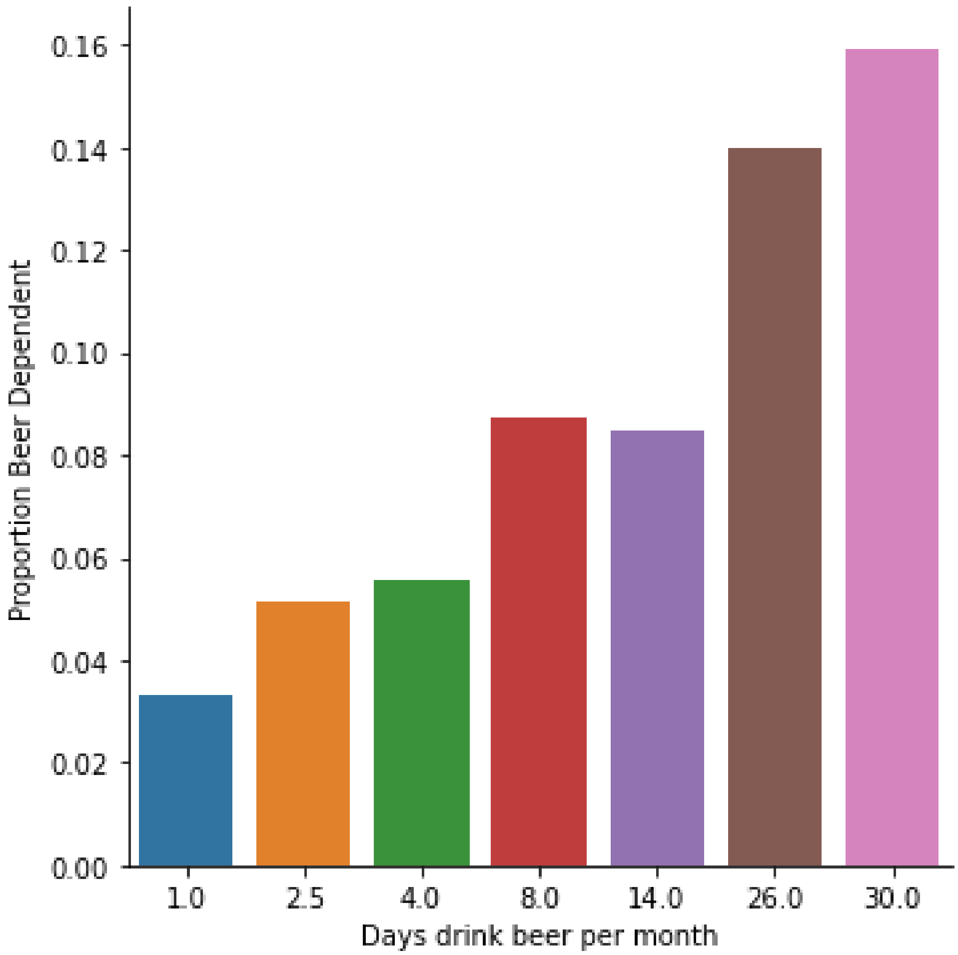
```
chi-square value, p value, expected counts
(124.26789738394885, 2.0662068579068e-24, 6, array([[1126.57711443,
1447.26119403, 1368.25207297, 1211.16334992,
         855.15754561,  338.34494196,  379.24378109],
       [  85.42288557,  109.73880597,  103.74792703,   91.83665008,
          64.84245439,   25.65505804,   28.75621891]]))
```

9 Bar plot to show relationship between beer dependence (S2BQ1B1) and beer drinking frequency (BEER_FEQMO)

[13]:
```
# hint lecture cell 11
%matplotlib inline
sns.factorplot(x='BEER_FEQMO', y='S2BQ1B1', data=sub2, kind='bar', ci=None)
plt.xlabel('Days drink beer per month')
plt.ylabel('Proportion Beer Dependent')
```

```
C:\Users\Admin\anaconda3\lib\site-packages\seaborn\categorical.py:3714:
UserWarning: The `factorplot` function has been renamed to `catplot`. The
original name will be removed in a future release. Please update your code. Note
that the default `kind` in `factorplot` (`'point'`) has changed `'strip'` in
`catplot`.
  warnings.warn(msg)
```

[13]:
```
Text(0.42499999999999716, 0.5, 'Proportion Beer Dependent')
```



10 Post-hoc analysis

11 Compare drinking beer once a month with drinking beer 2.5 days a mont

[14]:
```
# hint lecture cell 12
recode2 = {1: 1, 2.5: 2.5}
sub2['COMP1v2']= sub2['BEER_FEQMO'].map(recode2)
```

[15]:
```
# hint lecture cell 13
# contingency table of observed counts
ct2=pd.crosstab(sub2['S2BQ1B1'], sub2['COMP1v2'])
print (ct2)
```

```
COMP1v2   1.000000  2.500000
S2BQ1B1
```

```
0.000000      1172      1477
1.000000        40        80
```

[16]:
```
# hint lecture cell 14
# column percentages
colsum=ct2.sum(axis=0)
colpct=ct2/colsum
print(colpct)
```

```
COMP1v2   1.000000  2.500000
S2BQ1B1
0.000000  0.966997  0.948619
1.000000  0.033003  0.051381
```

[17]:
```
# hint lecture cell 15
print ('chi-square value, p value, expected counts')
cs2= scipy.stats.chi2_contingency(ct2)
print (cs2)
```

```
chi-square value, p value, expected counts
(5.117284954394778, 0.02368865151946301, 1, array([[1159.47562297,
1489.52437703],
       [  52.52437703,   67.47562297]]))
```

12 Post-hoc Analysis - Concise Code

[18]:
```
sub3=sub2.copy()
cat = [1,2.5,4,8,14,26,30]

for x in range(0,len(cat)-1):
    for y in range(x+1,len(cat)):
        recode = {cat[x]:cat[x], cat[y]:cat[y]}

        sub3['temp'] = sub3['BEER_FEQMO'].map(recode)
        cont=pd.crosstab(sub3['S2BQ1B1'], sub3['temp'])

        cs= scipy.stats.chi2_contingency(cont)
        print("\n", cat[x], " versus ", cat[y],
              "Chi value: ", cs[0], "\tp value: ", cs[1])
```

```

 1  versus  2.5 Chi value:  5.117284954394778    p value:  0.02368865151946301

 1  versus  4 Chi value:  7.38180981335711       p value:  0.0065886834719099405

 1  versus  8 Chi value:  31.48970835900156      p value:  2.005001332565289e-08

 1  versus  14 Chi value:  25.83816724108996     p value:  3.712737501612299e-07
```

```
 1  versus  26 Chi value:  57.071272116947235   p value:  4.2030056044577174e-14

 1  versus  30 Chi value:  78.27380780760498    p value:  8.97034162448021e-19

 2.5  versus  4 Chi value:  0.20075529654634663        p value:
0.654111881912749

 2.5  versus  8 Chi value:  14.062375089161176  p value:  0.0001768463156004476

 2.5  versus  14 Chi value:  10.251876070135845        p value:
0.0013654566479902833

 2.5  versus  26 Chi value:  35.170103284504975        p value:
3.0212634599168697e-09

 2.5  versus  30 Chi value:  53.53562719393847  p value:  2.5394550918301754e-13

 4  versus  8 Chi value:  10.158373116033038    p value:  0.0014364732738924846

 4  versus  14 Chi value:  7.209799927195343    p value:  0.007250657647040899

 4  versus  26 Chi value:  29.69766340423508    p value:  5.0495648994644e-08

 4  versus  30 Chi value:  46.149626073867154   p value:  1.0955792326874314e-11

 8  versus  14 Chi value:  0.021666481273132317        p value:
0.8829778034056507

 8  versus  26 Chi value:  8.253089606367094    p value:  0.004068269896531293

 8  versus  30 Chi value:  16.352774301920444   p value:  5.257913809814067e-05

 14  versus  26 Chi value:  8.232477852928524   p value:  0.004114731348779432

 14  versus  30 Chi value:  15.574090869472396  p value:  7.933428246084277e-05

 26  versus  30 Chi value:  0.41541298682085226        p value:
0.5192347944798172
```