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COURSE TITLE : DATA AND VISUAL ANALYTICS LAB

LAB04. Pandas Grouping and Aggregation

```
In [1]: import pandas as pd
```

```
In [2]: data=pd.read_csv("thanksgiving-2015-poll-data.csv",encoding="latin-1")
```

```
In [3]: data.head()
```

Out[3]:

	RespondentID	Do you celebrate Thanksgiving?	What is typically the main dish at your Thanksgiving dinner?	What is typically the main dish at your Thanksgiving dinner? - Other (please specify)	How is the main dish typically cooked?	How is the main dish typically cooked? - Other (please specify)	What kind of stuffing/dressing do you typically have?	What kind of stuffing/dressing do you typically have? - Other (please specify)	What type of cranberry saucedo you typically have?	What type of cranberry saucedo you typically have? - Other (please specify)	...	Have you ever tried to meet up with hometown friends on Thanksgiving night?	Have you ever attended a "Friendsgiving?"
0	4337954960	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	None	NaN	...	Yes	No
1	4337951949	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	Other (please specify)	Homemade cranberry gelatin ring	...	No	No
2	4337935621	Yes	Turkey	NaN	Roasted	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	Yes
3	4337933040	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	Homemade	NaN	...	Yes	No
4	4337931983	Yes	Tofurkey	NaN	Baked	NaN	Bread-based	NaN	Canned	NaN	...	Yes	No

5 rows × 65 columns

```
In [4]: data.shape
```

```
Out[4]: (1058, 65)
```

```
In [5]: data["Do you celebrate Thanksgiving?"].unique()
```

```
Out[5]: array(['Yes', 'No'], dtype=object)
```

```
In [6]: data.columns[:5]
```

```
Out[6]: Index(['RespondentID', 'Do you celebrate Thanksgiving?',
               'What is typically the main dish at your Thanksgiving dinner?',
               'What is typically the main dish at your Thanksgiving dinner? - Other (please specify)',
               'How is the main dish typically cooked?'],
              dtype='object')
```

Apply function to Series

```
In [7]: data["What is your gender?"].value_counts(dropna=False)
```

```
Out[7]: Female    544
        Male      481
        NaN        33
        Name: What is your gender?, dtype: int64
```

In [8]:

```
import math
def gender_code(gender_string):
    if isinstance(gender_string, float) and math.isnan(gender_string):
        return gender_string
    return int(gender_string == "Female")
```

Apply gender_code() to What is your gender? column

In [9]:

```
data["gender"]=data["What is your gender?"].apply(gender_code)
```

In [10]:

```
data["gender"].value_counts(dropna=False)
```

Out[10]:

```
1.0    544
0.0    481
NaN     33
Name: gender, dtype: int64
```

Applying functions to DataFrames

In [11]:

```
data.apply(lambda x:x.dtype).head(5)
```

Out[11]:

```
RespondentID                                                                         int64
Do you celebrate Thanksgiving?                                                      object
What is typically the main dish at your Thanksgiving dinner?                        object
What is typically the main dish at your Thanksgiving dinner? - Other (please specify)    object
How is the main dish typically cooked?                                              object
dtype: object
```

Data Cleaning

In [12]:

```
data["How much total combined money did all members of your HOUSEHOLD earn last year?"]
```

Out[12]:

```
0         $75,000 to $99,999
1         $50,000 to $74,999
2               $0 to $9,999
3            $200,000 and up
4       $100,000 to $124,999
                ...         
1053    $100,000 to $124,999
1054      $50,000 to $74,999
1055    $100,000 to $124,999
1056                     NaN
1057                     NaN
Name: How much total combined money did all members of your HOUSEHOLD earn last year?, Length: 1058, dtype: object
```

In [13]:

```
import numpy as np
def clean_income(value):
    if value == "$200,000 and up":
        return 200000
    elif value == "Prefer not to answer":
        return np.nan
    elif isinstance(value, float) and math.isnan(value):
        return np.nan
    value = value.replace("$", "").replace(",","")
    income_high, income_low = value.split(" to ")
    return(int(income_high) + int(income_low)) / 2
```

In [14]:

```
data["income"]=data["How much total combined money did all members of your HOUSEHOLD earn last year?"].apply(clean_income)
data["income"].head()
```

Out[14]:

```
0     87499.5
1     62499.5
2      4999.5
3    200000.0
4    112499.5
Name: income, dtype: float64
```

Grouping Data with pandas

In [15]:

```
data["What type of cranberry saucedo you typically have?"].value_counts()
```

Out[15]:

```
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
Name: What type of cranberry saucedo you typically have?, dtype: int64
```

Create a dataframe by filtering values"Housemade"

In [16]:
```
homemade_df=data[data["What type of cranberry saucedo you typically have?"]=="Homemade"]
```

In [17]:
```
canned_df=data[data["What type of cranberry saucedo you typically have?"]=="Canned_df"]
```

In [18]:
```
homemade_df.head()
```

Out[18]:

	RespondentID	Do you celebrate Thanksgiving?	What is typically the main dish at your Thanksgiving dinner?	What is typically the main dish at your Thanksgiving dinner? - Other (please specify)	How is the main dish typically cooked?	How is the main dish typically cooked? - Other (please specify)	What kind of stuffing/dressing do you typically have?	What kind of stuffing/dressing do you typically have? - Other (please specify)	What type of cranberry saucedo you typically have?	What type of cranberry saucedo you typically have? - Other (please specify)	...	Will you shop any Black Friday sales on Thanksgiving Day?	Do you work in retail?	Will you employer make you work on Black Friday?
2	4337935621	Yes	Turkey	NaN	Roasted	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	No	NaN
3	4337933040	Yes	Turkey	NaN	Baked	NaN	Bread-based	NaN	Homemade	NaN	...	No	No	NaN
5	4337929779	Yes	Turkey	NaN	Roasted	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	No	NaN
7	4337916002	Yes	Turkey	NaN	Baked	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	Yes	Yes
13	4337878450	Yes	Turkey	NaN	Baked	NaN	Rice-based	NaN	Homemade	NaN	...	Yes	No	NaN

5 rows × 67 columns

In [19]:
```
canned_df
```

Out[19]:

RespondentID	Do you celebrate Thanksgiving?	What is typically the main dish at your Thanksgiving dinner?	What is typically the main dish at your Thanksgiving dinner? - Other (please specify)	How is the main dish typically cooked?	How is the main dish typically cooked? - Other (please specify)	What kind of stuffing/dressing do you typically have?	What kind of stuffing/dressing do you typically have? - Other (please specify)	What type of cranberry saucedo you typically have?	What type of cranberry saucedo you typically have? - Other (please specify)	...	Will you shop any Black Friday sales on Thanksgiving Day?	Do you work in retail?	Will you employer make you work on Black Friday?	de

0 rows × 67 columns

In [20]:
```
homemade_df["income"].mean
```

Out[20]:
```
<bound method NDFrame._add_numeric_operations.<locals>.mean of 2         4999.5
3       200000.0
5         4999.5
7            NaN
13        4999.5
          ...
1034         NaN
1048     87499.5
1049         NaN
1053    112499.5
1056         NaN
Name: income, Length: 301, dtype: float64>
```

In [21]:
```
canned_df["income"].mean
```

Out[21]:
```
<bound method NDFrame._add_numeric_operations.<locals>.mean of Series([], Name: income, dtype: float64)>
```

Use groupby() and aggregate() to find out "Who earn more income?"

In [22]:
```
grouped = data.groupby("What type of cranberry saucedo you typically have?")
grouped
```

Out[22]:
```
<pandas.core.groupby.generic.DataFrameGroupBy object at 0x0000021576C902B0>
```

List out all groups that are created bygroupby()

In [23]:
```
grouped.groups
```

Out[23]:
```
{'Canned': [4, 6, 8, 11, 12, 15, 18, 19, 26, 27, 38, 43, 48, 53, 58, 59, 60, 68, 69, 71, 74, 76, 79, 80, 86, 87, 89, 90, 91, 97, 103, 106, 10
7, 109, 115, 116, 118, 119, 123, 127, 129, 130, 132, 135, 136, 137, 140, 141, 143, 144, 145, 150, 153, 155, 156, 157, 158, 159, 161, 162, 163,
166, 167, 168, 169, 173, 179, 180, 181, 182, 184, 186, 190, 192, 193, 195, 198, 199, 200, 204, 205, 207, 209, 210, 211, 212, 213, 215, 217, 21
8, 220, 222, 224, 226, 229, 230, 231, 239, 243, 245, ...], 'Homemade': [2, 3, 5, 7, 13, 14, 16, 20, 21, 23, 25, 28, 30, 32, 33, 37, 39, 42, 4
4, 46, 52, 54, 56, 57, 62, 64, 66, 70, 82, 83, 85, 88, 93, 94, 96, 98, 101, 102, 108, 110, 111, 112, 114, 120, 122, 128, 134, 138, 139, 152, 1
65, 171, 172, 174, 175, 176, 177, 178, 183, 188, 189, 194, 201, 202, 203, 208, 219, 223, 225, 232, 234, 235, 236, 238, 241, 242, 244, 246, 24
8, 254, 255, 256, 259, 261, 262, 263, 264, 268, 281, 285, 286, 287, 290, 291, 292, 295, 298, 300, 302, 303, ...], 'None': [0, 17, 24, 29, 34,
36, 40, 47, 49, 51, 55, 61, 67, 72, 73, 77, 78, 81, 92, 99, 100, 104, 105, 117, 121, 124, 126, 131, 133, 142, 146, 148, 149, 160, 164, 185, 18
7, 191, 197, 227, 228, 237, 240, 274, 275, 319, 321, 329, 337, 362, 370, 377, 391, 395, 406, 409, 414, 417, 421, 437, 439, 466, 480, 491, 492,
495, 505, 514, 526, 529, 532, 537, 540, 553, 560, 564, 571, 573, 580, 584, 591, 594, 598, 602, 605, 606, 609, 610, 618, 626, 631, 639, 647, 65
8, 672, 673, 684, 700, 701, 716, ...], 'Other (please specify)': [1, 9, 154, 216, 221, 233, 249, 265, 301, 336, 380, 435, 444, 447, 513, 550,
749, 750, 784, 807, 860, 872, 905, 1000, 1007]}
```

In [24]:
```
grouped.size()
```

Out[24]:
```
What type of cranberry saucedo you typically have?
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
dtype: int64
```

In [25]:
```
for name, group in grouped:
    print(name)
    print(group.shape)
    print(type(group))
```

```
Canned
(502, 67)
<class 'pandas.core.frame.DataFrame'>
Homemade
(301, 67)
<class 'pandas.core.frame.DataFrame'>
None
(146, 67)
<class 'pandas.core.frame.DataFrame'>
Other (please specify)
(25, 67)
<class 'pandas.core.frame.DataFrame'>
```

In [26]:
```
grouped["income"]
```

Out[26]:
```
<pandas.core.groupby.generic.SeriesGroupBy object at 0x0000021576C9F730>
```

In [27]:
```
grouped["income"].size()
```

Out[27]:
```
What type of cranberry saucedo you typically have?
Canned                    502
Homemade                  301
None                      146
Other (please specify)     25
Name: income, dtype: int64
```

Aggregating values in groups

Find out Avg Income

In [28]:
```
import numpy as num
```

In [29]:
```
grouped['income'].agg(num.mean)
```

Out[29]:
```
What type of cranberry saucedo you typically have?
Canned                    83823.403409
Homemade                  94878.107287
None                      78886.084034
Other (please specify)    86629.978261
Name: income, dtype: float64
```

In [ ]:

In [30]:
```python
grouped.agg(num.mean)
```

Out[30]:

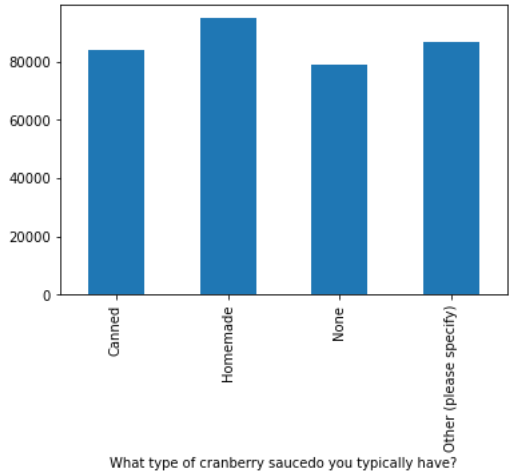
	RespondentID	gender	income
What type of cranberry saucedo you typically have?			
Canned	4.336699e+09	0.552846	83823.403409
Homemade	4.336792e+09	0.533101	94878.107287
None	4.336765e+09	0.517483	78886.084034
Other (please specify)	4.336763e+09	0.640000	86629.978261

Plotting the results of aggregation

What is the average income of each category?

In [31]:
```python
sauce = grouped.agg(num.mean)
sauce['income'].plot(kind='bar')
```

Out[31]:
```
<AxesSubplot:xlabel='What type of cranberry saucedo you typically have?'>
```



In [32]:
```python
grouped = data.groupby(['What type of cranberry saucedo you typically have?','What type of cranberry saucedo you typically have?'])
grouped.agg(num.mean)
```

Out[32]:

		RespondentID	gender	income
What type of cranberry saucedo you typically have?	**What type of cranberry saucedo you typically have?**			
Canned	**Canned**	4.336699e+09	0.552846	83823.403409
Homemade	**Homemade**	4.336792e+09	0.533101	94878.107287
None	**None**	4.336765e+09	0.517483	78886.084034
Other (please specify)	**Other (please specify)**	4.336763e+09	0.640000	86629.978261

In [33]:
```python
grouped = data.groupby('How would you describe where you live?')['What is typically the main dish at your Thanksgiving dinner?']
grouped.apply(lambda x:x.value_counts())
```

Out[33]:
```
How would you describe where you live?
Rural                                    Turkey                    189
                                         Other (please specify)      9
                                         Ham/Pork                    7
                                         Tofurkey                    3
                                         I don't know                3
                                         Turducken                   2
                                         Chicken                     2
                                         Roast beef                  1
Suburban                                 Turkey                    449
                                         Ham/Pork                   17
                                         Other (please specify)     13
                                         Tofurkey                    9
                                         Chicken                     3
                                         Roast beef                  3
                                         Turducken                   1
                                         I don't know                1
Urban                                    Turkey                    198
                                         Other (please specify)     13
                                         Tofurkey                    8
                                         Chicken                     7
                                         Roast beef                  6
                                         Ham/Pork                    4
Name: What is typically the main dish at your Thanksgiving dinner?, dtype: int64
```