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- Reg. No- 12020440
- Roll No- 69

In [2]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [3]:

```
salary = pd.read_csv('data_cleaned_2021.csv')
salary.head()
```

Out[3]:

	index	Job Title	Salary Estimate	Job Description	Rating	Company Name	Location	Headqu
0	0	Data Scientist	$53K-91K (Glassdoor est.)	Data Scientist\nLocation: Albuquerque, NM\nEdu...	3.8	Tecolote Research\n3.8	Albuquerque, NM	Gol
1	1	Healthcare Data Scientist	$63K-112K (Glassdoor est.)	What You Will Do:\n\nI. General Summary\n\nThe...	3.4	University of Maryland Medical System\n3.4	Linthicum, MD	Baltimo
2	2	Data Scientist	$80K-90K (Glassdoor est.)	KnowBe4, Inc. is a high growth information sec...	4.8	KnowBe4\n4.8	Clearwater, FL	Clea
3	3	Data Scientist	$56K-97K (Glassdoor est.)	*Organization and Job ID**\nJob ID: 310709\n\n...	3.8	PNNL\n3.8	Richland, WA	Richla
4	4	Data Scientist	$86K-143K (Glassdoor est.)	Data Scientist\nAffinity Solutions / Marketing...	2.9	Affinity Solutions\n2.9	New York, NY	New Y

5 rows × 42 columns

In [4]:

```
# replacing all -1 with np.nan (the documentation said this is where web scraping failed)
salary = salary.replace(-1, np.nan)

# replacing all 'na' text with np.nan
salary = salary.replace('na$', np.nan, regex = True)

# first 5 rows of the dataset
print(salary.head())
```

```
   index                  Job Title              Salary Estimate  \
0      0             Data Scientist   $53K-$91K (Glassdoor est.)
1      1  Healthcare Data Scientist  $63K-$112K (Glassdoor est.)
2      2             Data Scientist   $80K-$90K (Glassdoor est.)
3      3             Data Scientist   $56K-$97K (Glassdoor est.)
4      4             Data Scientist  $86K-$143K (Glassdoor est.)

                                     Job Description  Rating  \
0  Data Scientist\nLocation: Albuquerque, NM\nEdu...     3.8
1  What You Will Do:\n\nI. General Summary\n\nThe...     3.4
2  KnowBe4, Inc. is a high growth information sec...     4.8
3  *Organization and Job ID**\nJob ID: 310709\n\n...     3.8
4  Data Scientist\nAffinity Solutions / Marketing...     2.9

                                Company Name         Location  \
0                     Tecolote Research\n3.8  Albuquerque, NM
1  University of Maryland Medical System\n3.4    Linthicum, MD
2                                KnowBe4\n4.8   Clearwater, FL
3                                   PNNL\n3.8     Richland, WA
```

In [5]:

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 742 entries, 0 to 741
Data columns (total 42 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   index               742 non-null    int64  
 1   Job Title           742 non-null    object 
 2   Salary Estimate     742 non-null    object 
 3   Job Description     742 non-null    object 
 4   Rating              731 non-null    float64
 5   Company Name        742 non-null    object 
 6   Location            742 non-null    object 
 7   Headquarters        741 non-null    object 
 8   Size                742 non-null    object 
 9   Founded             692 non-null    float64
 10  Type of ownership   742 non-null    object 
 11  Industry            742 non-null    object 
 12  Sector              742 non-null    object 
 13  Revenue             742 non-null    object 
 14  Competitors         740 non-null    object 
 15  Hourly              742 non-null    int64  
 16  Employer provided   742 non-null    int64  
 17  Lower Salary        742 non-null    int64  
 18  Upper Salary        742 non-null    int64  
 19  Avg Salary(K)       742 non-null    float64
 20  company_txt         738 non-null    object 
 21  Job Location        742 non-null    object 
 22  Age                 692 non-null    float64
 23  Python              742 non-null    int64  
 24  spark               742 non-null    int64  
 25  aws                 742 non-null    int64  
 26  excel               742 non-null    int64  
 27  sql                 742 non-null    int64  
 28  sas                 742 non-null    int64  
 29  keras               742 non-null    int64  
 30  pytorch             742 non-null    int64  
 31  scikit              742 non-null    int64  
 32  tensor              742 non-null    int64  
 33  hadoop              742 non-null    int64  
 34  tableau             742 non-null    int64  
 35  bi                  742 non-null    int64  
 36  flink               742 non-null    int64  
 37  mongo               742 non-null    int64  
 38  google_an           742 non-null    int64  
 39  job_title_sim       732 non-null    object 
 40  seniority_by_title  223 non-null    object 
 41  Degree              359 non-null    object 
dtypes: float64(4), int64(21), object(17)
memory usage: 243.6+ KB
```

In [8]:

```
# names of all columns since they are truncated in the table above
salary.columns
salary.describe(include='all')
```

Out[8]:

	index	Job Title	Salary Estimate	Job Description	Rating	Company Name	Loca
count	742.000000	742	742	742	731.000000	742	
unique	NaN	264	416	463	NaN	343	
top	NaN	Data Scientist	$49K-113K (Glassdoor est.)	Description\nMedical Laboratory Scientist - Te...	NaN	MassMutual\n3.6	York
freq	NaN	131	6	4	NaN	14	
mean	469.129380	NaN	NaN	NaN	3.688372	NaN	
std	279.793117	NaN	NaN	NaN	0.570353	NaN	
min	0.000000	NaN	NaN	NaN	1.900000	NaN	
25%	221.500000	NaN	NaN	NaN	3.300000	NaN	
50%	472.500000	NaN	NaN	NaN	3.700000	NaN	
75%	707.750000	NaN	NaN	NaN	4.000000	NaN	
max	955.000000	NaN	NaN	NaN	5.000000	NaN	

11 rows × 42 columns

In [9]:

```
# dropping some unused columns (duplicates or mostly empty)
salary = salary.rename(columns={'index':'old_index'})
salary.drop(columns = ['old_index', 'Salary Estimate', 'Job Description', 'Employer provide
                       'Hourly', 'Job Title', 'Location'], inplace = True)
```

In [10]:

```
salary.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 742 entries, 0 to 741
Data columns (total 33 columns):
 #   Column              Non-Null Count  Dtype  
---  ------              --------------  -----  
 0   Rating              731 non-null    float64
 1   Headquarters        741 non-null    object 
 2   Size                742 non-null    object 
 3   Founded             692 non-null    float64
 4   Type of ownership   742 non-null    object 
 5   Industry            742 non-null    object 
 6   Sector              742 non-null    object 
 7   Revenue             742 non-null    object 
 8   Lower Salary        742 non-null    int64  
 9   Upper Salary        742 non-null    int64  
 10  Avg Salary(K)       742 non-null    float64
 11  company_txt         738 non-null    object 
 12  Job Location        742 non-null    object 
 13  Age                 692 non-null    float64
 14  Python              742 non-null    int64  
 15  spark               742 non-null    int64  
 16  aws                 742 non-null    int64  
 17  excel               742 non-null    int64  
 18  sql                 742 non-null    int64  
 19  sas                 742 non-null    int64  
 20  keras               742 non-null    int64  
 21  pytorch             742 non-null    int64  
 22  scikit              742 non-null    int64  
 23  tensor              742 non-null    int64  
 24  hadoop              742 non-null    int64  
 25  tableau             742 non-null    int64  
 26  bi                  742 non-null    int64  
 27  flink               742 non-null    int64  
 28  mongo               742 non-null    int64  
 29  google_an           742 non-null    int64  
 30  job_title_sim       732 non-null    object 
 31  seniority_by_title  223 non-null    object 
 32  Degree              359 non-null    object 
dtypes: float64(4), int64(18), object(11)
memory usage: 191.4+ KB
```

In [11]:

```
salary.shape
```

Out[11]:

```
(742, 33)
```

In [12]:

```
# what type of data is in each column
salary.dtypes
```

Out[12]:

```
Rating                float64
Headquarters           object
Size                   object
Founded               float64
Type of ownership      object
Industry               object
Sector                 object
Revenue                object
Lower Salary            int64
Upper Salary            int64
Avg Salary(K)         float64
company_txt            object
Job Location           object
Age                   float64
Python                  int64
spark                   int64
aws                     int64
excel                   int64
sql                     int64
sas                     int64
keras                   int64
pytorch                 int64
scikit                  int64
tensor                  int64
hadoop                  int64
tableau                 int64
bi                      int64
flink                   int64
mongo                   int64
google_an               int64
job_title_sim          object
seniority_by_title     object
Degree                 object
dtype: object
```

In [13]:

```
#shows which columns have any null values
salary.isnull().any()
```

Out[13]:

```
Rating                 True
Headquarters           True
Size                  False
Founded                True
Type of ownership     False
Industry              False
Sector                False
Revenue               False
Lower Salary          False
Upper Salary          False
Avg Salary(K)         False
company_txt            True
Job Location          False
Age                    True
Python                False
spark                 False
aws                   False
excel                 False
sql                   False
sas                   False
keras                 False
pytorch               False
scikit                False
tensor                False
hadoop                False
tableau               False
bi                    False
flink                 False
mongo                 False
google_an             False
job_title_sim          True
seniority_by_title     True
Degree                 True
dtype: bool
```

In [14]:

```
# what proportion of data is missing from each column
salary.isna().sum()/len(salary)
```

Out[14]:

```
Rating                0.014825
Headquarters          0.001348
Size                  0.000000
Founded               0.067385
Type of ownership     0.000000
Industry              0.000000
Sector                0.000000
Revenue               0.000000
Lower Salary          0.000000
Upper Salary          0.000000
Avg Salary(K)         0.000000
company_txt           0.005391
Job Location          0.000000
Age                   0.067385
Python                0.000000
spark                 0.000000
aws                   0.000000
excel                 0.000000
sql                   0.000000
sas                   0.000000
keras                 0.000000
pytorch               0.000000
scikit                0.000000
tensor                0.000000
hadoop                0.000000
tableau               0.000000
bi                    0.000000
flink                 0.000000
mongo                 0.000000
google_an             0.000000
job_title_sim         0.013477
seniority_by_title    0.699461
Degree                0.516173
dtype: float64
```

In [15]:

```
#anothe way of finding Null record count along with their percentages
total = salary.isnull().sum().sort_values(ascending = False)
percent =(salary.isnull().sum()/len(salary)).sort_values(ascending=False)
missing_data = pd.concat([total, percent], axis =1, keys=['Total', 'Percent'])
missing_data.head(10)
```

Out[15]:

	Total	Percent
seniority_by_title	519	0.699461
Degree	383	0.516173
Age	50	0.067385
Founded	50	0.067385
Rating	11	0.014825
job_title_sim	10	0.013477
company_txt	4	0.005391
Headquarters	1	0.001348
Industry	0	0.000000
keras	0	0.000000

In [16]:

```
# show unique values in particular column and Count of unique values
salary['Job Location'].nunique()
salary['Job Location'].unique()
```

Out[16]:

```
array(['NM', 'MD', 'FL', 'WA', 'NY', 'TX', 'CA', 'VA', 'MA', 'NJ', 'CO',
       'IL', 'KY', 'OR', 'CT', 'MI', 'DC', 'OH', 'AL', 'MO', 'PA', 'GA',
       'IN', 'LA', 'WI', 'NC', 'AZ', 'NE', 'MN', 'UT', 'TN', 'DE', 'ID',
       'RI', 'IA', 'SC', 'KS'], dtype=object)
```

In [17]:

```
# show descriptive statistics for quantitative columns
salary.describe(include = np.number)
```

Out[17]:

	Rating	Founded	Lower Salary	Upper Salary	Avg Salary(K)	Age	Python	
count	731.000000	692.000000	742.000000	742.000000	742.000000	692.000000	742.000000	7
mean	3.688372	1969.969653	74.754717	128.214286	101.484501	51.030347	0.528302	
std	0.570353	54.089762	30.945892	45.128650	37.482449	54.089762	0.499535	
min	1.900000	1744.000000	15.000000	16.000000	15.500000	2.000000	0.000000	
25%	3.300000	1958.000000	52.000000	96.000000	73.500000	14.000000	0.000000	
50%	3.700000	1992.000000	69.500000	124.000000	97.500000	29.000000	1.000000	
75%	4.000000	2007.000000	91.000000	155.000000	122.500000	63.000000	1.000000	
max	5.000000	2019.000000	202.000000	306.000000	254.000000	277.000000	1.000000	

8 rows × 22 columns

In [18]:

```
#show descriptive statistics for qualitiative columns
salary.describe(include = object)
```

Out[18]:

	Headquarters	Size	Type of ownership	Industry	Sector	Revenue	company_txt	L
count	741	742	742	742	742	742	738	
unique	197	8	9	60	25	13	342	
top	New York, NY	1001 - 5000	Company - Private	Biotech & Pharmaceuticals	Information Technology	Unknown / Non-Applicable	MassMutual	
freq	52	150	410	112	180	204	14	

In [19]:

```
# find number of values for each unique entry in each qualitative column
for i in salary.select_dtypes(include = object):
    print(salary[i].value_counts())
```

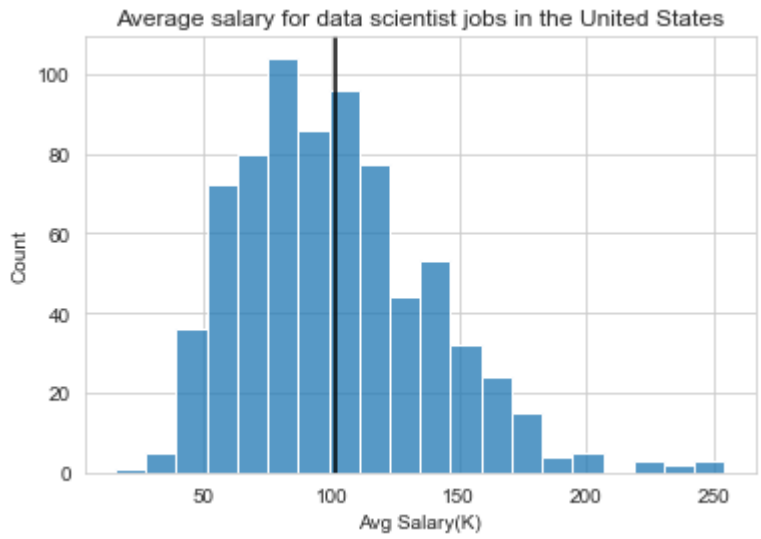
```
New York, NY            52
San Francisco, CA       42
Chicago, IL             30
Cambridge, MA           20
Springfield, MA         14
                        ..
West Hills, CA           1
Fort Worth, TX           1
Kansas City, MO          1
Santa Fe Springs, CA     1
Centennial, CO           1
Name: Headquarters, Length: 197, dtype: int64
1001 - 5000      150
501 - 1000       134
10000+           130
201 - 500        117
51 - 200          94
5001 - 10000      76
1 - 50            31
```

In [20]:

```
# example of a histplot to visualize quantitative data
sns.set_style("whitegrid")
sns.histplot(data = salary, x = 'Avg Salary(K)', bins = 20)
plt.title('Average salary for data scientist jobs in the United States')
# draw vertical line at average
plt.axvline(x = salary['Avg Salary(K)'].mean(), color = 'black')
```

Out[20]:

```
<matplotlib.lines.Line2D at 0x22fdea94c10>
```

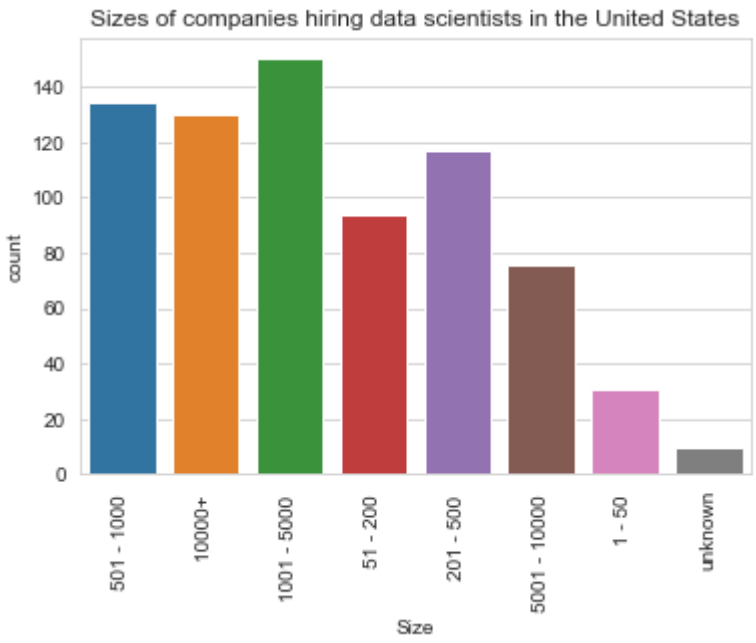


In [21]:

```
# example of a count plot to visualize qualitative data
sns.countplot(x = 'Size', data = salary)
plt.title('Sizes of companies hiring data scientists in the United States')
plt.xticks(rotation = 'vertical')
```

Out[21]:

```
(array([0, 1, 2, 3, 4, 5, 6, 7]),
 [Text(0, 0, '501 - 1000 '),
  Text(1, 0, '10000+ '),
  Text(2, 0, '1001 - 5000 '),
  Text(3, 0, '51 - 200 '),
  Text(4, 0, '201 - 500 '),
  Text(5, 0, '5001 - 10000 '),
  Text(6, 0, '1 - 50 '),
  Text(7, 0, 'unknown')])
```

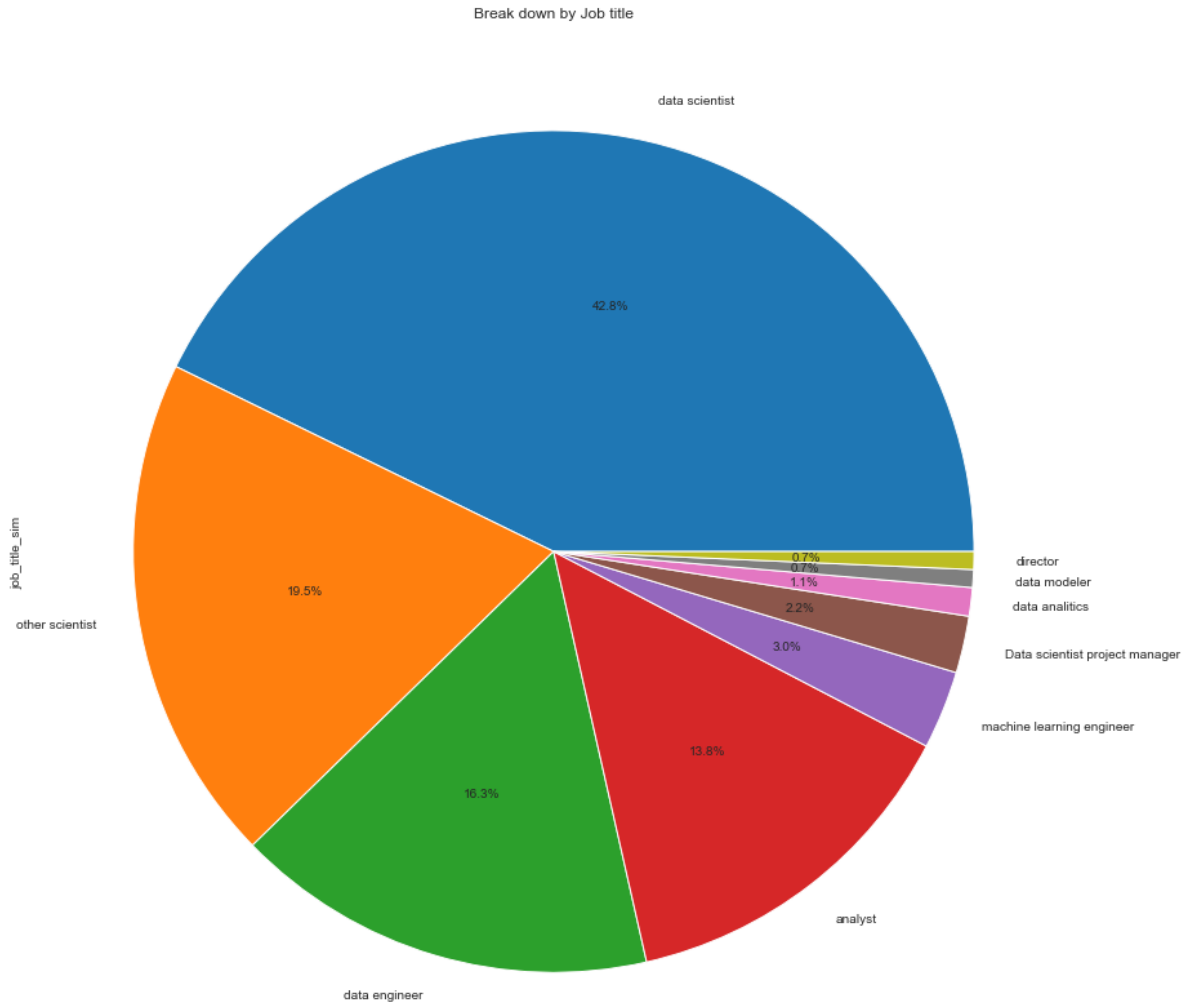


In [22]:

```
salary['job_title_sim'].value_counts(normalize=True).plot.pie(y ='Job title', title = 'Brea
```

Out[22]:

```
<AxesSubplot:title={'center':'Break down by Job title'}, ylabel='job_title_s
im'>
```



In [23]:

```
salary.head(1)
```

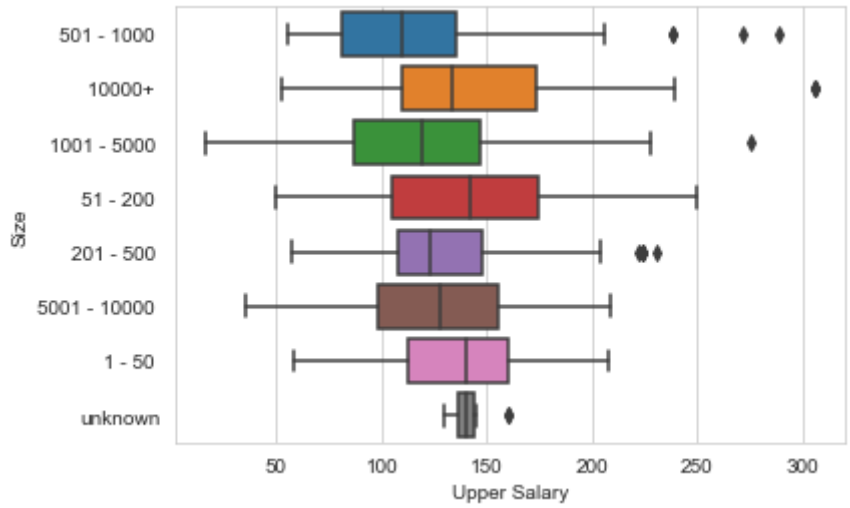
Out[23]:

	Rating	Headquarters	Size	Founded	Type of ownership	Industry	Sector	Revenue	Lower Salary	U S
0	3.8	Goleta, CA	501 - 1000	1973.0	Company - Private	Aerospace & Defense	Aerospace & Defense	50to100 million (USD)	53	

1 rows × 33 columns

In [24]:

```
# salary['job_title_sim'].value_counts(normalize=True).plot.pie(y ='Job title', title = 'Br
sns.boxplot(x='Upper Salary',y='Size',data=salary)
plt.show()
```



In [ ]:

In [ ]:

In [ ]:

In [ ]:

In [ ]:

```
```