Unicorn_EDA

July 28, 2023

1 Insights Into Unicorn Companies-EDA:Structuring Raw Data

1.1 Step 1: Imports

1.1.1 Import relevant libraries and modules

[1]:
```
# Import the relevant Python libraries and modules needed.
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
```

1.1.2 Load the dataset into a DataFrame

[22]:
```
companies = pd.read_csv("Unicorn_Companies.csv")
```

1.2 Step 2: Data exploration

1.2.1 Display the first rows of the data

[23]:
```
# Display the first rows of the data.
companies.head()
```

[23]:

	Company	Valuation	Date Joined	Industry	City	Country/Region	Continent	Year Founded	Funding
0	Bytedance	$180B	4/7/17	Artificial intelligence	Beijing	China	Asia	2012	$8B
1	SpaceX	$100B	12/1/12	Other	Hawthorne	United States	North America	2002	$7B
2	SHEIN	$100B	7/3/18	E-commerce & direct-to-consumer	Shenzhen	China	Asia	2008	$2B
3	Stripe	$95B	1/23/14	Fintech					
4	Klarna	$46B	12/12/11	Fintech					

```
3  San Francisco  United States  North America          2010     $2B
4       Stockholm         Sweden         Europe          2005     $4B

                                    Select Investors
0  Sequoia Capital China, SIG Asia Investments, S…
1  Founders Fund, Draper Fisher Jurvetson, Rothen…
2  Tiger Global Management, Sequoia Capital China…
3        Khosla Ventures, LowercaseCapital, capitalG
4  Institutional Venture Partners, Sequoia Capita…
```

1.2.2 Identify the number of rows and columns

[24]:
```
# Identify the number of rows and columns in the dataset.
companies.shape
```

[24]:
```
(1074, 10)
```

1.2.3 Handling duplicates and null values in the data

[25]:
```
# Check for duplicates in the dataset.
print(companies.drop_duplicates().shape)

# Check for null values in the dataset.
print(companies.isnull().sum())

# Drop 'city' and 'investors' columns containing null values without removing␣
 ↪companies from the list.
companies = companies.dropna(axis=1)
print(companies.shape)
```

```
(1074, 10)
Company              0
Valuation            0
Date Joined          0
Industry             0
City                16
Country/Region       0
Continent            0
Year Founded         0
Funding              0
Select Investors     1
dtype: int64
(1074, 8)
```

1.2.4 Display the data types of the columns

[6]:
```
# Display the metadata of the columns.
companies.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1074 entries, 0 to 1073
Data columns (total 8 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Company         1074 non-null   object
 1   Valuation       1074 non-null   object
 2   Date Joined     1074 non-null   object
 3   Industry        1074 non-null   object
 4   Country/Region  1074 non-null   object
 5   Continent       1074 non-null   object
 6   Year Founded    1074 non-null   int64
 7   Funding         1074 non-null   object
dtypes: int64(1), object(7)
memory usage: 67.2+ KB
```

1.2.5 Sort the data

[7]:
```
# Sort `companies` and display the first 10 rows of the resulting DataFrame.
companies.sort_values(by="Year Founded", ascending=False).head(10)
```

[7]:

	Company	Valuation	Date Joined	Industry	Country/Region	Continent	Year Founded	Funding
782	Phantom	$1B	1/31/22	Fintech	United States	North America	2021	$118M
714	Yidian Zixun	$1B	10/17/17	Mobile & telecommunications	China	Asia	2021	$151M
822	GlobalBees	$1B	12/28/21	E-commerce & direct-to-consumer	India	Asia	2021	$185M
554	ClickHouse	$2B	10/28/21	Data management & analytics	United States	North America	2021	$300M
952	LayerZero Labs	$1B	3/30/22	Internet software & services	United States	North America	2021	$143M
314	Flink Food	$3B	12/1/21	E-commerce & direct-to-consumer	Germany	Europe	2021	$1B
864	Aptos	$1B	3/15/22	Internet software & services	United States	North America	2021	$200M
238	Yuga Labs	$4B	3/22/22	Fintech				
775	Jokr	$1B	12/2/21	E-commerce & direct-to-consumer				
967	Mensa Brands	$1B	11/16/21	Other				

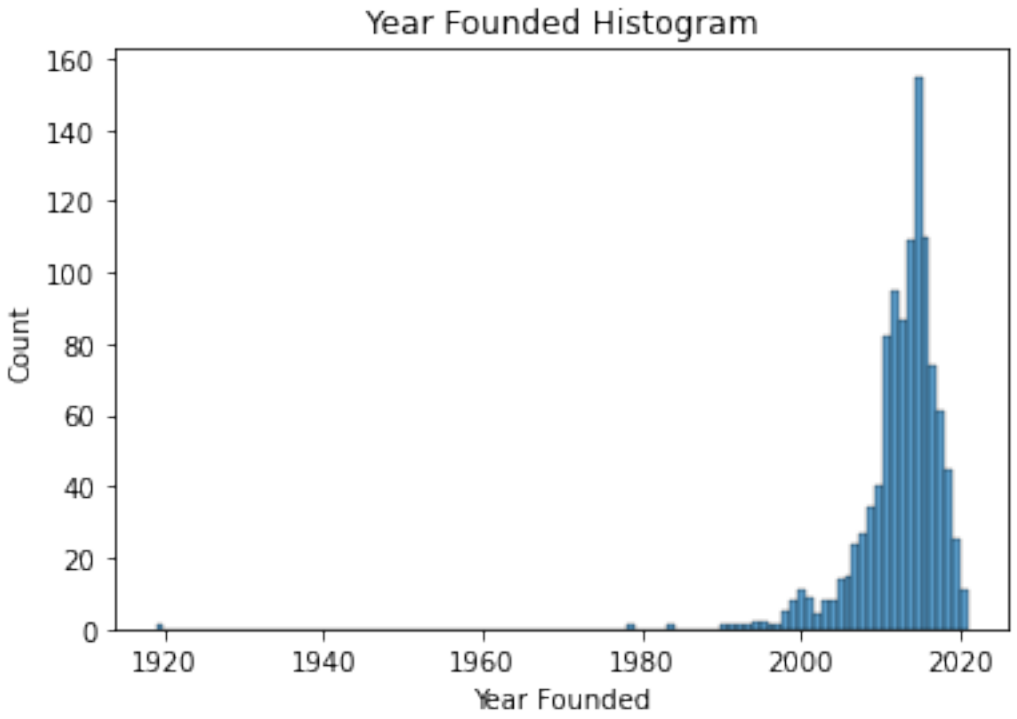
```
238  United States  North America          2021   $450M
775  United States  North America          2021   $430M
967          India           Asia          2021   $218M
```

1.2.6 Determine the number of companies founded each year

[8]:
```
# Display each unique year that occurs in the dataset
# along with the number of companies that were founded in each unique year.
companies["Year Founded"].value_counts().sort_values(ascending=False)
```

[8]:
```
2015    155
2016    110
2014    109
2012     95
2013     87
2011     82
2017     74
2018     61
2019     45
2010     40
2009     34
2008     27
2020     25
2007     24
2006     15
2005     14
2000     11
2021     11
2001      9
1999      8
2004      8
2003      8
1998      5
2002      4
1994      2
1995      2
1992      1
1993      1
1990      1
1984      1
1996      1
1979      1
1991      1
1919      1
1997      1
Name: Year Founded, dtype: int64
```

[9]:
```
# Plot a histogram of the Year Founded feature.
sns.histplot(x=companies["Year Founded"])
plt.title("Year Founded Histogram");
```



1.2.7 Convert the `Date Joined` column to datetime

[10]:
```
# Convert the `Date Joined` column to datetime.
# Update the column with the converted values.
companies["Date Joined"]=pd.to_datetime(companies["Date Joined"])
```

1.2.8 Create a `Month Joined` column

[11]:
```
# Obtain the names of the months when companies gained unicorn status.
# Use the result to create a `Month Joined` column.
companies["Month Joined"]=companies["Date Joined"].dt.month_name()

# Display the first few rows of `companies`
# to confirm that the new column did get added.
companies.head()
```

[11]:
```
      Company Valuation Date Joined                          Industry  \
0  Bytedance     $180B  2017-04-07          Artificial intelligence
1     SpaceX     $100B  2012-12-01                             Other
2      SHEIN     $100B  2018-07-03  E-commerce & direct-to-consumer
3     Stripe      $95B  2014-01-23                          Fintech
4     Klarna      $46B  2011-12-12                          Fintech

  Country/Region      Continent  Year Founded Funding Month Joined
0          China           Asia          2012     $8B        April
1  United States  North America          2002     $7B     December
2          China           Asia          2008     $2B         July
3  United States  North America          2010     $2B      January
4         Sweden         Europe          2005     $4B     December
```

1.2.9 Create a `Years To Join` column

[12]:
```
# Determine how many years it took for companies to reach unicorn status.
# Use the result to create a `Years To Join` column.
companies["Years to Join"]=companies["Date Joined"].dt.year-companies["Year␣
↪Founded"]

# Display the first few rows of `companies`
# to confirm that the new column did get added.
companies.head()
```

[12]:
```
      Company Valuation Date Joined                          Industry  \
0  Bytedance     $180B  2017-04-07          Artificial intelligence
1     SpaceX     $100B  2012-12-01                             Other
2      SHEIN     $100B  2018-07-03  E-commerce & direct-to-consumer
3     Stripe      $95B  2014-01-23                          Fintech
4     Klarna      $46B  2011-12-12                          Fintech

  Country/Region      Continent  Year Founded Funding Month Joined  \
0          China           Asia          2012     $8B        April
1  United States  North America          2002     $7B     December
2          China           Asia          2008     $2B         July
3  United States  North America          2010     $2B      January
4         Sweden         Europe          2005     $4B     December

   Years to Join
0              5
1             10
2             10
3              4
4              6
```

1.2.10 Gain more insight on a specific year

[13]:
```
# Filter dataset by 2021 since it is the most recent complete year for the␣
↪dataset
# Save the resulting subset in a new variable.
companies_2021=companies[companies["Date Joined"].dt.year==2021]

# Display the first few rows of the subset to confirm that it was created.
companies_2021
```

[13]:

	Company	Valuation	Date Joined	Industry	Country/Region	Continent	Year Founded	Funding	Month Joined	Years to Join
12	FTX	$32B	2021-07-20	Fintech	Bahamas	North America	2018	$2B	July	3
16	J&T Express	$20B	2021-04-07	Supply chain, logistics, & delivery	Indonesia	Asia	2015	$5B	April	6
24	Blockchain.com	$14B	2021-02-17	Fintech	United Kingdom	Europe	2011	$490M	February	10
27	OpenSea	$13B	2021-07-20	E-commerce & direct-to-consumer	United States	North America	2017	$427M	July	4
34	Getir	$12B	2021-03-26	E-commerce & direct-to-consumer	Turkey	Europe	2015	$2B	March	6
…	…	…	…	…	…	…	…	…	…	…
1065	XForcePlus	$1B	2021-06-01	Internet software & services	China	Asia	2015	$200M	June	6
1067	YipitData	$1B	2021-12-06	Internet software & services	United States	North America	2008	$492M	December	13
1068	Yunxuetang	$1B	2021-03-29	Edtech	China	Asia	2011	$389M	March	10
1071	Zihaiguo	$1B	2021-05-06	Consumer & retail	China	Asia	2018	$80M	May	3
1072	Zopa	$1B	2021-10-19	Fintech	United Kingdom	Europe				

```
1072          2005   $792M      October             16

[520 rows x 10 columns]
```

1.2.11 Observe trends over quarters

[14]:
```
# Create a quarter interval column for 2021 and group by the intervals to count␣
↪companies joined in each quarter.
companies_2021["Quarter Joined"] = companies_2021["Date Joined"].dt.
↪to_period("Q").dt.strftime('%Y-Q%q')
companies_2021_by_quarter = companies_2021.groupby("Quarter Joined")["Company"].
↪count().reset_index().rename(columns={"Company": "Number of Companies"})

# Display the first few rows of the new DataFrame.
companies_2021_by_quarter.head()
```

[14]:

	Quarter Joined	Number of Companies
0	2021-Q1	108
1	2021-Q2	144
2	2021-Q3	134
3	2021-Q4	134

1.2.12 Compare trends over time

[15]:
```
# Filter companies joined in the additional year of interest (2020).
companies_2020 = companies[companies["Date Joined"].dt.year == 2020]

# Concatenate the subset of 2020 with the previously defined subset for 2021.
companies_20_21 = pd.concat([companies_2020, companies_2021.
↪drop(columns="Quarter Joined")])

# Add a column for the time interval to the concatenated DataFrame.
companies_20_21["Quarter Joined"] = companies_20_21["Date Joined"].dt.
↪to_period("Q").dt.strftime("%Y-Q%q")

# Convert the 'Valuation' column to a numerical format.
companies_20_21["Valuation"] = companies_20_21["Valuation"].str.strip("$B").
↪astype(float)

# Group by the time interval and compute the average valuation and number of␣
↪companies per interval.
```

```
companies_by_quarter_20_21 = companies_20_21.groupby("Quarter Joined").
↪agg({"Valuation": "mean", "Company": "count"}).reset_index().
↪rename(columns={"Valuation": "Average Valuation", "Company": "Number of␣
↪Companies"})

# Display the resulting DataFrame.
companies_by_quarter_20_21
```

[15]:

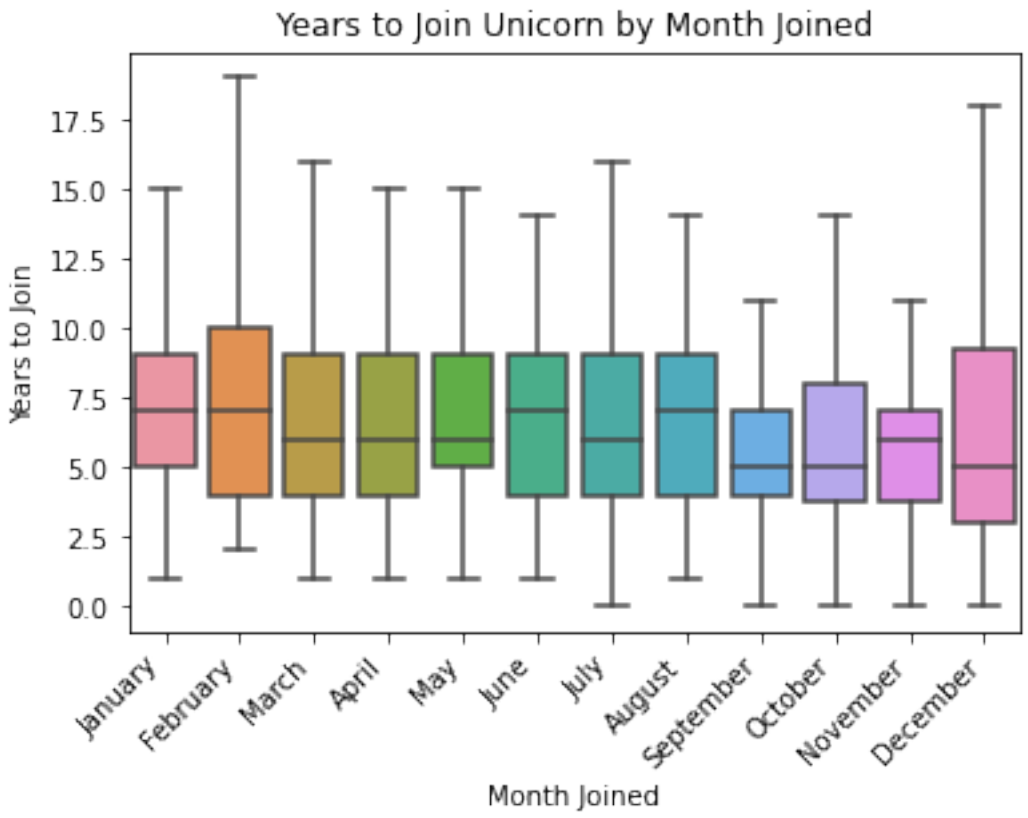
	Quarter Joined	Average Valuation	Number of Company
0	2020-Q1	3.444444	18
1	2020-Q2	3.777778	18
2	2020-Q3	3.896552	29
3	2020-Q4	3.697674	43
4	2021-Q1	2.750000	108
5	2021-Q2	2.340278	144
6	2021-Q3	2.291045	134
7	2021-Q4	1.850746	134

1.3 Step 3: Statistical tests

1.3.1 Visualize the time it took companies to become unicorns

[16]:
```
# Define a list that contains months in chronological order.
month_order = ["January", "February", "March", "April", "May", "June",
               "July", "August", "September", "October", "November",
               "December"]
```

[17]:
```
# Create the box plot to visualize the distribution of how long it took␣
↪companies to become unicorns, with respect to the month they joined.
# Plot the data from the `companies` DataFrame.
sns.boxplot(data=companies, x="Month Joined", y="Years to Join",␣
↪showfliers=False, order=month_order)

# Set the title of the plot.
plt.title("Years to Join Unicorn by Month Joined")

# Rotate labels on the x-axis as a way to avoid overlap in the positions of the␣
↪text.
plt.xticks(rotation=45, horizontalalignment='right')

# Display the plot.
plt.show()
```

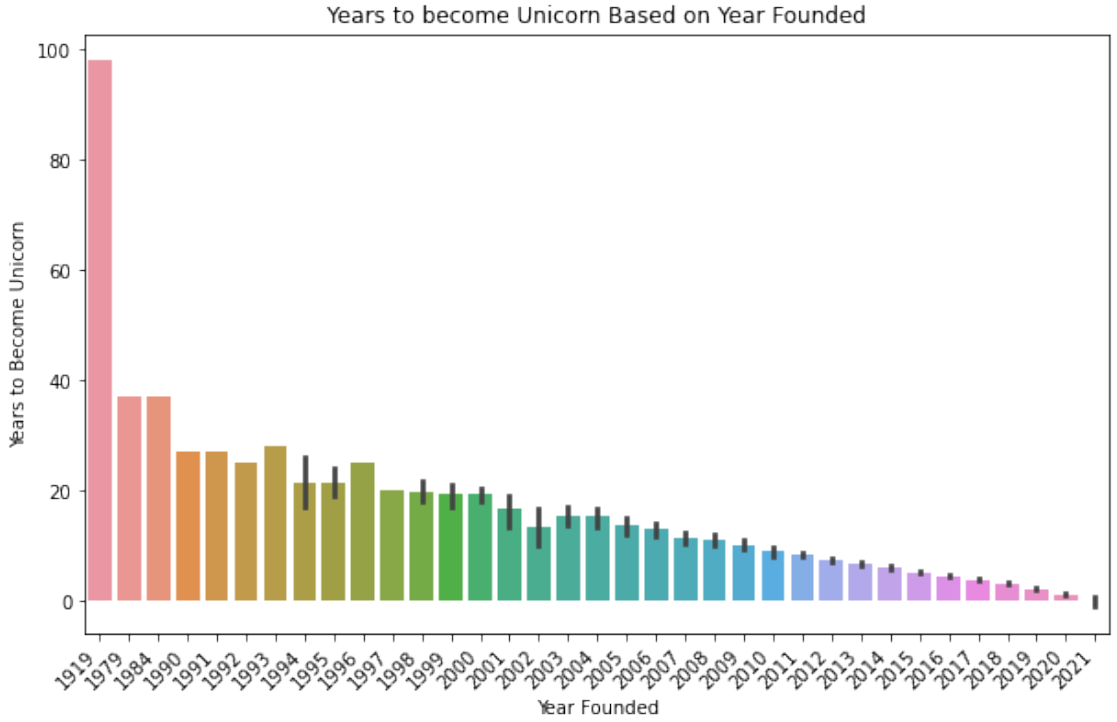


1.4 Step 4: Results and evaluation

1.4.1 Visualize the time it took companies to reach unicorn status

[18]:
```
# Set the size of the plot.
plt.figure(figsize=(10,6))

# Create bar plot to visualize the average number of years it took companies to␣
 ↪reach unicorn status
# with respect to when they were founded.
# Plot data from the `companies` DataFrame.
sns.barplot(x=companies["Year Founded"], y=companies["Years to Join"])

# Set title
plt.title("Years to become Unicorn Based on Year Founded")

# Set x-axis label
plt.xlabel("Year Founded")
```

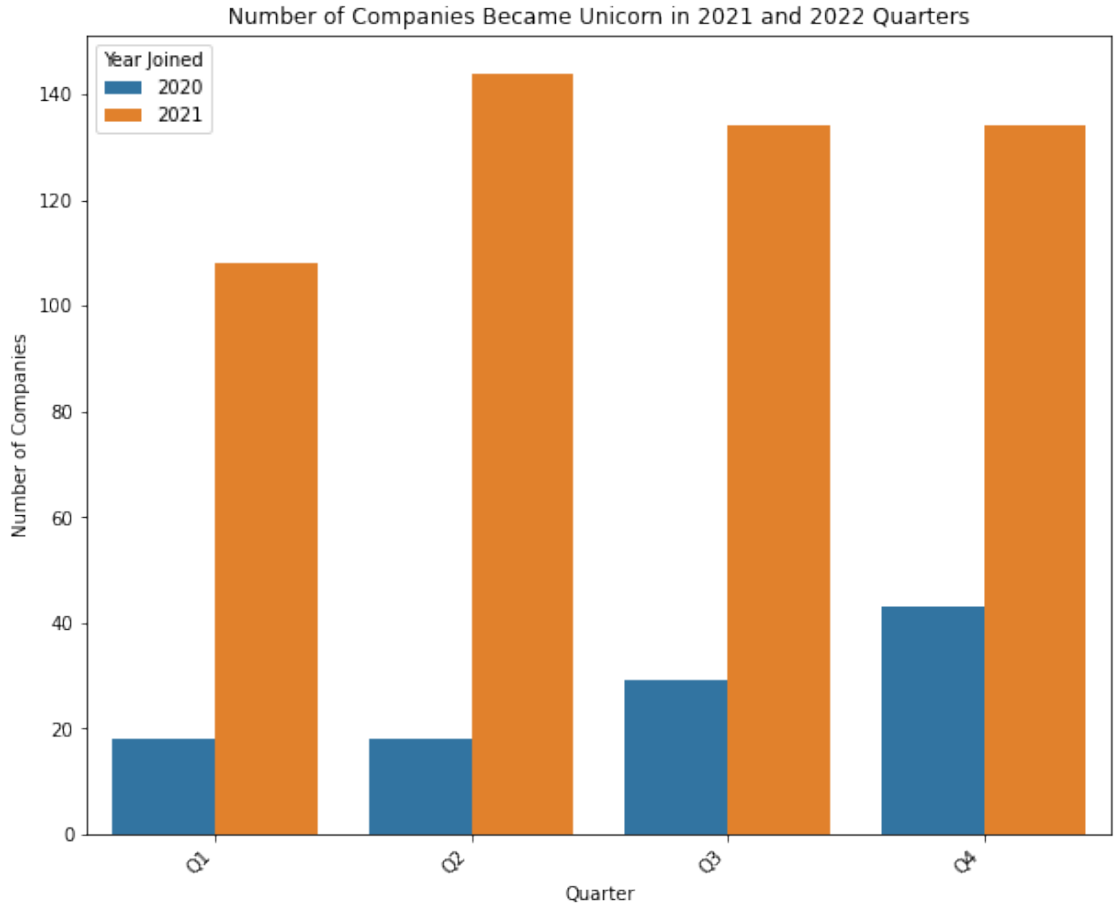
```
# Set y-axis label
plt.ylabel("Years to Become Unicorn")

# Rotate the labels on the x-axis as a way to avoid overlap in the positions of␣
 ↪the text.
plt.xticks(rotation=45, horizontalalignment='right')

# Display the plot.
plt.show()
```



1.4.2 Visualize the number of companies that joined per Quarter

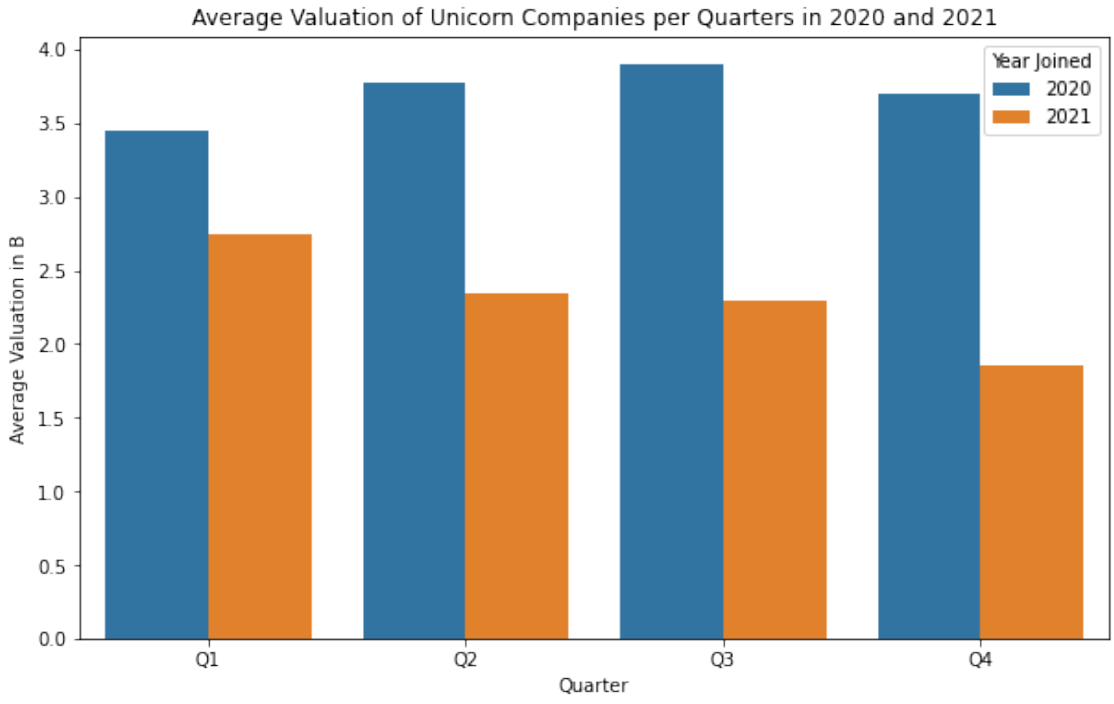
[19]:
```
# Set the size of the plot.
plt.figure(figsize=(10,8))

# Create bar plot to visualize number of companies that joined per interval for␣
 ↪the year of 2021 and 2022.
companies_by_quarter_20_21['Quarter Number'] =␣
 ↪companies_by_quarter_20_21['Quarter Joined'].str[-2:]
companies_by_quarter_20_21['Year Joined'] = companies_by_quarter_20_21['Quarter␣
 ↪Joined'].str[:4]
```

```
sns.barplot(x=companies_by_quarter_20_21["Quarter Number"],␣
 ↪y=companies_by_quarter_20_21["Number of Company"],␣
 ↪hue=companies_by_quarter_20_21["Year Joined"])

# Set the x-axis label.
plt.xlabel("Quarter")

# Set the y-axis label.
plt.ylabel("Number of Companies")

# Set the title.
plt.title("Number of Companies Became Unicorn in 2021 and 2022 Quarters")

# Rotate labels on the x-axis as a way to avoid overlap in the positions of the␣
 ↪text.
plt.xticks(rotation=45, horizontalalignment="right")

# Display the plot.
plt.show()
```



1.4.3 Visualize the average valuation over the quarters

[20]:
```
# Set the size of the plot.
plt.figure(figsize=(10,6))

# Create a grouped bar plot.
sns.barplot(data=companies_by_quarter_20_21, x="Quarter Number", y="Average␣
↪Valuation", hue="Year Joined")

# Set the x-axis label.
plt.xlabel("Quarter")

# Set the y-axis label.
plt.ylabel("Average Valuation in B")

# Set the title.
plt.title("Average Valuation of Unicorn Companies per Quarters in 2020 and␣
↪2021")

# Display the plot.
plt.show()
```



1.5 Conclusion

- In terms of company valuations and the number of new unicorns, there were interesting trends observed in 2020 and 2021. On average, the valuation of companies achieving unicorn status in 2020 was higher than those in 2021. However, the number of companies becoming unicorns in 2021 surpassed the count in 2020.
- Notably, the first quarter of 2021 saw the highest average valuation for companies achieving unicorn status, while the third quarter of 2020 had the highest average valuation for companies becoming unicorns. As we anticipate new entrants in the future, it is advisable to pay close attention to companies joining in the first and third quarters of the year due to their historically higher valuations.
- Our analysis revealed that the year 2015 witnessed the highest number of unicorn companies being founded, indicating a significant surge in unicorn formations during that period.
- Another insightful finding from the data analysis is that companies joining the unicorn club in the months of September and October tended to achieve this status in a shorter amount of time compared to companies joining in other months.

These key findings provide valuable insights for strategic decision-making, as they shed light on trends in unicorn company valuations, timing of entry into the unicorn status, and peak years for unicorn company formation.

References

Bhat, M.A. (2022, March). *Unicorn Companies*.