

forage-1

November 6, 2024

Import the libraries

```
[13]: import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px
import plotly.graph_objects as go
```

0.1 Manually extracted the dataset from SEC's EDGAR database

- <https://www.sec.gov/edgar/browse/?CIK=789019&owner=exclude>
- <https://www.sec.gov/edgar/browse/?CIK=1318605&owner=exclude>
- <https://www.sec.gov/edgar/browse/?CIK=320193&owner=exclude>

```
[14]: df=pd.read_csv("forage_report.csv")
```

```
[17]: df
```

```
[17]:
```

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
4	2022	81462	12587	82338	36440	
5	2021	53823	5644	62131	30548	
6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company
0	87582	Microsoft
1	89035	Microsoft
2	76740	Microsoft
3	13256	Tesla
4	14724	Tesla
5	11497	Tesla
6	110543	Apple
7	122151	Apple

0.2 Year over year changes for Total Revenue and Net Income

```
[19]: df['Revenue Growth (%)']=df.groupby(['Company'])['Total Revenue'].
      ↪pct_change()*100
      df['Net Income Growth (%)']=df.groupby(['Company'])['Net Income'].
      ↪pct_change()*100
```

```
[21]: df
```

```
[21]:
```

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
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5	2021	53823	5644	62131	30548	
6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company	Revenue Growth (%)	\
0	87582	Microsoft	NaN	
1	89035	Microsoft	-6.438902	
2	76740	Microsoft	-15.222676	
3	13256	Tesla	NaN	
4	14724	Tesla	-15.821562	
5	11497	Tesla	-33.928703	
6	110543	Apple	NaN	
7	122151	Apple	2.881146	
8	104038	Apple	-7.230275	

	Net Income Growth (%)
0	NaN
1	0.520999
2	-15.764800
3	NaN
4	-15.940964
5	-55.160086
6	NaN
7	2.894995
8	-5.133112

0.3 Handling the missing values

```
[23]: df.fillna(0, inplace=True)
```

```
[25]: df
```

```
[25]:
```

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
4	2022	81462	12587	82338	36440	
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6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company	Revenue Growth (%)	\
0	87582	Microsoft	0.000000	
1	89035	Microsoft	-6.438902	
2	76740	Microsoft	-15.222676	
3	13256	Tesla	0.000000	
4	14724	Tesla	-15.821562	
5	11497	Tesla	-33.928703	
6	110543	Apple	0.000000	
7	122151	Apple	2.881146	
8	104038	Apple	-7.230275	

	Net Income Growth (%)
0	0.000000
1	0.520999
2	-15.764800
3	0.000000
4	-15.940964
5	-55.160086
6	0.000000
7	2.894995
8	-5.133112

0.4 Year by year changes for Total Assets, Total Liabilities and Cash Flow from Operational Activities

```
[27]: df['Assets Growth (%)'] = df.groupby('Company')['Total Assets'].pct_change()*100
df['Liabilities Growth (%)'] = df.groupby('Company')['Total Liabilities'].
    pct_change()*100
df['Cash Flow from Operations Growth (%)'] = df.groupby('Company')['Cash Flow_
    from Operating Activities'].pct_change()*100
```

[29]: df

```
[29]:   Year  Total Revenue  Net Income  Total Assets  Total Liabilities  \
0  2023         211915       72361      411976         205753
1  2022         198270       72738      364840         198298
2  2021         168088       61271      333779         191791
3  2023          96773       14974      106618          43009
4  2022          81462       12587       82338          36440
5  2021          53823        5644       62131          30548
6  2023         383285       96995      352583         290437
7  2022         394328       99803      352755         302083
8  2021         365817       94680      351002         287912

      Cash Flow from Operating Activities  Company  Revenue Growth (%)  \
0                                87582  Microsoft          0.000000
1                                89035  Microsoft          -6.438902
2                                76740  Microsoft         -15.222676
3                                13256    Tesla           0.000000
4                                14724    Tesla          -15.821562
5                                11497    Tesla          -33.928703
6                               110543    Apple           0.000000
7                               122151    Apple           2.881146
8                               104038    Apple          -7.230275

      Net Income Growth (%)  Assets Growth (%)  Liabilities Growth (%)  \
0                0.000000              NaN              NaN
1                0.520999          -11.441443          -3.623276
2               -15.764800           -8.513595          -3.281425
3                0.000000              NaN              NaN
4               -15.940964          -22.772890          -15.273547
5               -55.160086          -24.541524          -16.169045
6                0.000000              NaN              NaN
7                2.894995           0.048783           4.009820
8               -5.133112           -0.496945          -4.691095

      Cash Flow from Operations Growth (%)
0                NaN
1                1.659017
2               -13.809176
3                NaN
4                11.074231
5               -21.916599
6                NaN
7                10.500891
8               -14.828368
```

0.5 Handling the missing values

```
[31]: df.fillna(0,inplace=True)
```

```
[33]: df
```

```
[33]:
```

	Year	Total Revenue	Net Income	Total Assets	Total Liabilities	\
0	2023	211915	72361	411976	205753	
1	2022	198270	72738	364840	198298	
2	2021	168088	61271	333779	191791	
3	2023	96773	14974	106618	43009	
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6	2023	383285	96995	352583	290437	
7	2022	394328	99803	352755	302083	
8	2021	365817	94680	351002	287912	

	Cash Flow from Operating Activities	Company	Revenue Growth (%)	\
0	87582	Microsoft	0.000000	
1	89035	Microsoft	-6.438902	
2	76740	Microsoft	-15.222676	
3	13256	Tesla	0.000000	
4	14724	Tesla	-15.821562	
5	11497	Tesla	-33.928703	
6	110543	Apple	0.000000	
7	122151	Apple	2.881146	
8	104038	Apple	-7.230275	

	Net Income Growth (%)	Assets Growth (%)	Liabilities Growth (%)	\
0	0.000000	0.000000	0.000000	
1	0.520999	-11.441443	-3.623276	
2	-15.764800	-8.513595	-3.281425	
3	0.000000	0.000000	0.000000	
4	-15.940964	-22.772890	-15.273547	
5	-55.160086	-24.541524	-16.169045	
6	0.000000	0.000000	0.000000	
7	2.894995	0.048783	4.009820	
8	-5.133112	-0.496945	-4.691095	

	Cash Flow from Operations Growth (%)
0	0.000000
1	1.659017
2	-13.809176
3	0.000000
4	11.074231
5	-21.916599
6	0.000000

```
7          10.500891
8         -14.828368
```

```
[37]: df.to_csv('final_report.csv')
```

```
[39]: summary = df.groupby('Company').agg({
    'Revenue Growth (%)': 'mean',
    'Net Income Growth (%)': 'mean',
    'Assets Growth (%)' : 'mean',
    'Liabilities Growth (%)' : 'mean',
    'Cash Flow from Operations Growth (%)' : 'mean'
}).reset_index()
```

```
[41]: print("Overview of Year-By-Year Changes of Microsoft, Tesla and Apple from the_
    ↪fiscal years 2021-2023")
summary
```

Overview of Year-By-Year Changes of Microsoft, Tesla and Apple from the fiscal years 2021-2023

```
[41]:      Company  Revenue Growth (%)  Net Income Growth (%)  Assets Growth (%) \
0      Apple          -1.449710          -0.746039          -0.149388
1  Microsoft          -7.220526          -5.081267          -6.651679
2      Tesla          -16.583422          -23.700350          -15.771471

      Liabilities Growth (%)  Cash Flow from Operations Growth (%)
0              -0.227092              -1.442492
1              -2.301567              -4.050053
2             -10.480864              -3.614123
```

```
[43]: summary.to_csv('summary_report.csv')
```