

User Growth Accounting of Company from Weekly Active Users(WAU) Data

Loading the Dataset and Printing data in it

```
In [43]: import pandas as pd
import matplotlib.pyplot as plt

# Loading the dataset
file_path = "./Active Users.xlsx" # Given Weekly Active Users Excel Sheet("Active Users.xlsx")
data = pd.read_excel(file_path)

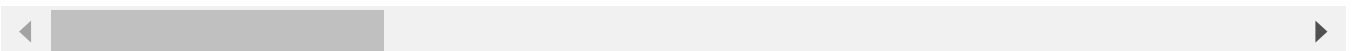
df = pd.DataFrame(data)

# The Data in the dataset
data
```

```
Out[43]:
```

	w1	w2	w3	w4	w5
0	fd7c28f9fd8045f2	fd7c28f9fd8045f2	fd7c28f9fd8045f2	fd7c28f9fd8045f2	fd7c28f9fd8045f2
1	54910d2b363221e1	520443b0b8128202	a4bce0d054266d68	a4bce0d054266d68	c0bb01dbe2b2de0f
2	520443b0b8128202	a4bce0d054266d68	7b042fcc54a45882	d98da6eaa4bb452f	7b042fcc54a45882
3	a4bce0d054266d68	d1afc6d7c4661d7e	aed9597fc6984d64	7b042fcc54a45882	c885df69f0e13074
4	3792a1c9395e3e2a	7b042fcc54a45882	407d67f50877e6f9	aed9597fc6984d64	aed9597fc6984d64
...
4009	NaN	NaN	NaN	NaN	NaN
4010	NaN	NaN	NaN	NaN	NaN
4011	NaN	NaN	NaN	NaN	NaN
4012	NaN	NaN	NaN	NaN	NaN
4013	NaN	NaN	NaN	NaN	NaN

4014 rows × 56 columns



Extracting unique users for each week

```
In [44]: # Extract unique users for each week
weekly_users = {f'w{i}': set(data[f'w{i}']) for i in range(1, 57)}

# weekly_users
```

Calculating and Printing Metrics - New, Retained, Resurrected and Churned Users

```
In [45]: # Initializing dictionaries to store new, retained, resurrected, and churned users
new_users = {}
retained_users = {}
resurrected_users = {}
churned_users = {}
retention_rate = {}

# Calculating metrics for each week
```

```

previous_week = None
all_previous_users = set({})
for week in range(1, 57):
    current_week = f'w{week}'
    if previous_week:
        current_users = weekly_users[current_week]
        previous_users = weekly_users[previous_week]

        # Calculating new, retained, resurrected, churned users and retention rate
        new_users[current_week] = len(current_users - previous_users - all_previous_users)
        retained_users[current_week] = len(current_users & previous_users)
        resurrected_users[current_week] = len((current_users & all_previous_users) - previous_users)
        churned_users[current_week] = len(previous_users - current_users)

        retention_rate[current_week] = retained_users[current_week] / len(previous_users) if previous_users else 0

        all_previous_users = all_previous_users | previous_users

    else:
        new_users[current_week] = len(weekly_users[current_week])
        retained_users[current_week] = 0
        resurrected_users[current_week] = 0
        churned_users[current_week] = 0

    previous_week = current_week

# Storing the results in DataFrame
results = pd.DataFrame({
    'Week': [f'w{i}' for i in range(1, 57)],
    'New Users': [new_users[f'w{i}'] for i in range(1, 57)],
    'Retained Users': [retained_users[f'w{i}'] for i in range(1, 57)],
    'Resurrected Users': [resurrected_users[f'w{i}'] for i in range(1, 57)],
    'Churned Users': [churned_users[f'w{i}'] for i in range(1, 57)],
    'Retention Rate': [0] + [retention_rate[f'w{i}'] for i in range(2, 57)] # Calculation of Retention Rate
})

# Calculating Quick Ratio
results['Quick Ratio'] = (results['New Users'] + results['Resurrected Users']) / results['Churned Users']

avg_retention_rate = sum([i for i in retention_rate.values()]) / len(retention_rate)

avg_quick_ratio = sum(results['Quick Ratio'].iloc[1:]) / results['Quick Ratio'].shape[0]
min_quick_ratio = min(results['Quick Ratio'].iloc[1:])
max_quick_ratio = max(results['Quick Ratio'].iloc[1:])

print(f"Average Retention Rate: {avg_retention_rate * 100} %\n")
print("Average Quick Ratio: ", avg_quick_ratio, "\nMinimum Quick Ratio:", min_quick_ratio, "\nMaximum Quick Ratio:", max_quick_ratio)

results

```

Average Retention Rate: 72.30139304257544 %

Average Quick Ratio: 1.044966793280212

Minimum Quick Ratio: 0.5547675334909378

Maximum Quick Ratio: 1.9642857142857142

Out[45]:

	Week	New Users	Retained Users	Resurrected Users	Churned Users	Retention Rate	Quick Ratio
0	w1	1760	0	0	0	0.000000	inf
1	w2	723	932	0	828	0.529545	0.873188
2	w3	645	1001	87	654	0.604834	1.119266
3	w4	722	1170	225	563	0.675130	1.682060
4	w5	674	1395	125	722	0.658951	1.106648
5	w6	489	1480	187	714	0.674567	0.946779
6	w7	860	1488	202	668	0.690167	1.589820
7	w8	1005	1678	193	872	0.658039	1.373853
8	w9	719	1840	237	1036	0.639777	0.922780
9	w10	621	1939	262	857	0.693491	1.030338
10	w11	578	1932	237	890	0.684621	0.915730
11	w12	634	1945	328	802	0.708045	1.199501
12	w13	774	2022	285	885	0.695562	1.196610
13	w14	669	2092	291	989	0.679000	0.970677
14	w15	527	2116	311	936	0.693316	0.895299
15	w16	537	2201	329	753	0.745091	1.150066
16	w17	526	2207	313	860	0.719596	0.975581
17	w18	515	2210	375	836	0.725542	1.064593
18	w19	466	2281	322	819	0.735806	0.962149
19	w20	542	2266	295	803	0.738351	1.042341
20	w21	508	2180	304	923	0.702546	0.879740
21	w22	490	2290	468	702	0.765374	1.364672
22	w23	437	2433	325	815	0.749076	0.934969
23	w24	386	2426	298	769	0.759311	0.889467
24	w25	405	2379	318	731	0.764952	0.989056
25	w26	439	2405	344	697	0.775306	1.123386
26	w27	457	2429	300	759	0.761920	0.997365
27	w28	370	2396	310	790	0.752040	0.860759
28	w29	245	2293	308	783	0.745449	0.706258
29	w30	175	2202	309	644	0.773717	0.751553
30	w31	175	2173	305	513	0.809010	0.935673
31	w32	181	2072	305	581	0.781003	0.836489
32	w33	279	1982	269	576	0.774824	0.951389
33	w34	366	2110	459	420	0.833992	1.964286
34	w35	434	2228	226	707	0.759114	0.933522

	Week	New Users	Retained Users	Resurrected Users	Churned Users	Retention Rate	Quick Ratio
35	w36	655	2252	275	636	0.779778	1.462264
36	w37	504	2331	265	851	0.732558	0.903643
37	w38	850	2307	245	793	0.744194	1.380832
38	w39	900	2462	376	940	0.723692	1.357447
39	w40	798	2642	307	1096	0.706795	1.008212
40	w41	1006	2665	343	1082	0.711236	1.246765
41	w42	371	2745	333	1269	0.683857	0.554768
42	w43	413	2446	291	1003	0.709191	0.701894
43	w44	475	2354	390	796	0.747302	1.086683
44	w45	422	2310	360	909	0.717614	0.860286
45	w46	592	2358	634	734	0.762613	1.670300
46	w47	593	2584	431	1000	0.720982	1.024000
47	w48	643	2655	525	953	0.735865	1.225603
48	w49	576	2826	462	997	0.739210	1.041123
49	w50	549	2783	423	1081	0.720238	0.899167
50	w51	519	2769	514	986	0.737417	1.047667
51	w52	550	2765	454	1037	0.727249	0.968177
52	w53	546	2716	480	1053	0.720616	0.974359
53	w54	609	2758	543	984	0.737039	1.170732
54	w55	484	2812	511	1098	0.719182	0.906193
55	w56	437	2787	473	1020	0.732072	0.892157

Generating and Visualising the User Growth Accounting Chart

```
In [46]: fig, ax1 = plt.subplots(figsize=(14, 8))

# Plotting the bar charts for new, resurrected, and churned users
bar_width = 0.4
weeks = results['Week']
index = range(len(weeks))

ax1.bar(index, results['New Users'], label='New', color='skyblue', bottom=results['Resurrected Users'])
ax1.bar(index, results['Resurrected Users'], label='Resurrected', color='salmon')
ax1.bar(index, -results['Churned Users'], label='Churned', color='lightgreen')

# Plotting the Quick Ratio and Rentention Ratio Line on the same graph with different X axis
ax2 = ax1.twinx()
ax2.plot(index, results['Quick Ratio'], label='Quick Ratio', color='purple', marker='o')
ax2.plot(index, results['Retention Rate'], label='Retention Rate', color='blue', marker='x')

# Setting X ticks values
ax1.set_xticks(index)
ax1.set_xticklabels(weeks, rotation=45)

# Adding labels and title
ax1.set_xlabel('Week')
```

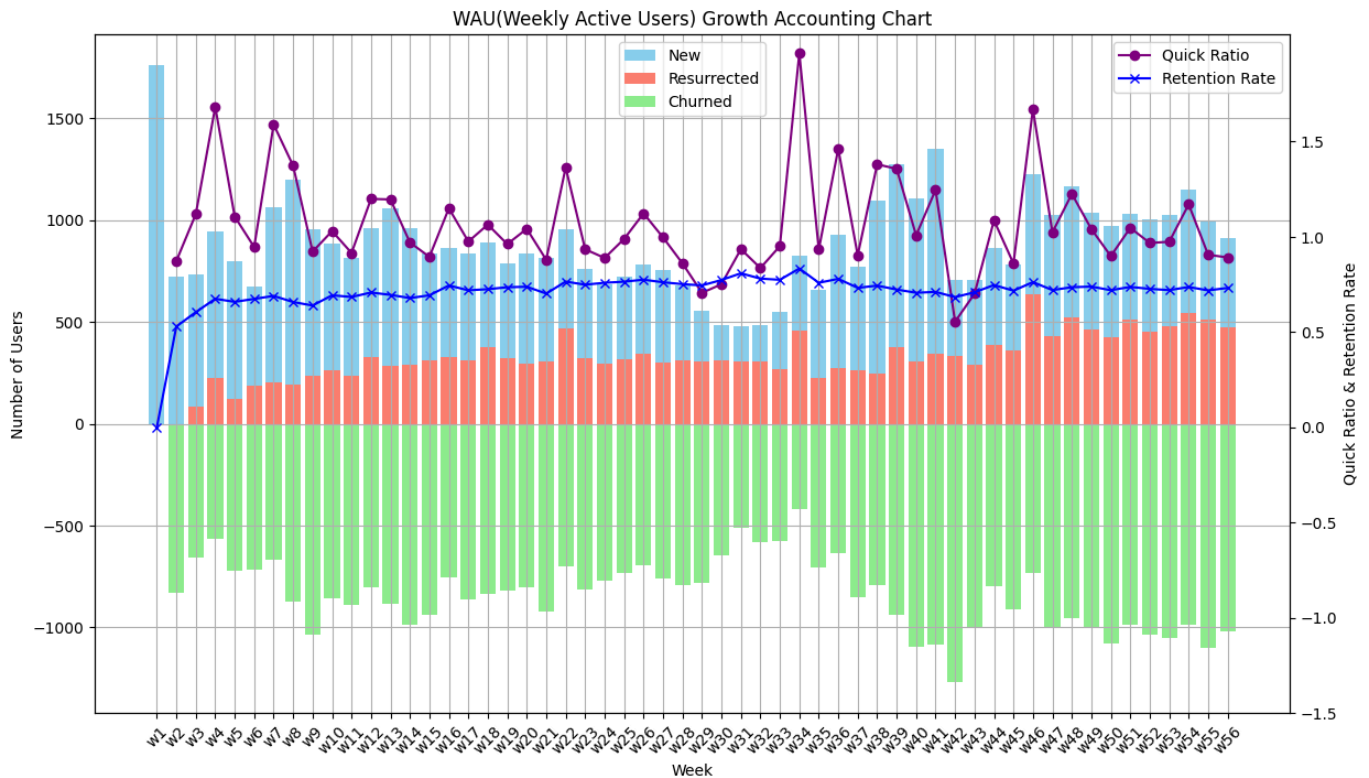
```

ax1.set_ylabel('Number of Users')
ax2.set_ylabel('Quick Ratio & Retention Rate')
ax2.set_yticks([-1.5, -1, -0.5, 0, 0.5, 1, 1.5])
ax1.set_title('WAU(Weekly Active Users) Growth Accounting Chart')

# Adding Legends
ax1.legend(loc='upper center')
ax2.legend(loc='upper right')

# Display the grid
ax1.grid(True)
plt.show()

```



Analysis:

The above generated Chart of Weekly Active Users(WAU) data represents "User Growth Accounting for a Company" similar to Monthly Active Users(MAU) as mentioned in article. It also gives the insights like the MAU Growth Accounting.

The insights we can observe from the above User Growth Accounting of WAU are:

1. **Retention and Churn Rate:** The average retention rate is "72%" and so average churn rate($100\% - 72\%$) is "28%". So, here more users are retained than the churned users. This gives the positive sign for growth of company.
2. **Quick Ratio:** Here, quick ratio is between 0.5 to 2(Approximatly). These means for every 2 new users the company is to loose 1 to 4 users as churns. We can say that the company is having drop and increase in users in a very fluctuated manner(with spikes).

Conclusion: Here according to comparison between (New users + Ressurcted users) and Churned users the company is not growing faster. and due to fluctuation of spikes in Quick Ratio can upgrades and degrades the growth of company based on some situations like campaigns. But, It's Retention Rate is much stable and better than chruned rate. So, majorly retention rate plays a main role to make the company to sustain and also to grow gradually. By this we can say that this company can sustain in future with a gradual growth in users.