

Introduction to common marketing metrics

ANALYZING MARKETING CAMPAIGNS WITH PANDAS



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Was the campaign successful?

Common metrics:

- Conversion rate
- Retention rate



Conversion rate

$$\text{Conversion rate} = \frac{\text{Number of people who convert}}{\text{Total number of people we marketed to}}$$

Calculating conversion rate using pandas

```
subscribers = marketing[marketing['converted'] == True]\
                    ['user_id'].nunique()

total = marketing['user_id'].nunique()
conv_rate = subscribers/total

print(round(conv_rate*100, 2), '%')
```

13.89 %

Retention rate

$$\text{Retention rate} = \frac{\text{Number of people who remain subscribed}}{\text{Total number of people who converted}}$$

Calculating retention rate

```
retained = marketing[marketing['is_retained'] == True]\
            ['user_id'].nunique()
subscribers = marketing[marketing['converted'] == True]\
            ['user_id'].nunique()
retention = retained/subscribers

print(round(retention*100, 2), '%')
```

84%

Let's practice!

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Customer segmentation

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Common ways to segment audiences



- Age
- Gender
- Location
- Past interaction(s) with the business
- Marketing channels users interacted with

Segmenting using pandas

```
# Subset to include only House Ads
house_ads = marketing\
    [marketing['subscribing_channel'] == 'House Ads']
retained = house_ads[house_ads['is_retained'] == True]\
    ['user_id'].nunique()
subscribers = house_ads[house_ads['converted'] == True]\
    ['user_id'].nunique()

retention_rate = retained/subscribers
print(round(retention_rate*100,2), '%')
```

58.05 %

There must be an easier way to segment!



Segmenting using pandas - groupby()

```
# Group by subscribing_channel and calculate retention
retained = marketing[marketing['is_retained'] == True]\
    .groupby(['subscribing_channel'])\
    ['user_id'].nunique()
print(retained)
```

```
subscribing_channel
Email            109
Facebook         152
House Ads        173
Instagram        158
Push             54
Name: user_id, dtype: int64
```

Segmenting using pandas - groupby()

```
# Group by subscribing_channel and calculate subscribers
subscribers = marketing[marketing['converted'] == True]\
    .groupby(['subscribing_channel'])\
    ['user_id'].nunique()
print(subscribers)
```

```
subscribing_channel
Email            125
Facebook         221
House Ads        298
Instagram        232
Push             77
Name: user_id, dtype: int64
```

Segmenting results

```
# Calculate the retention rate across the DataFrame
channel_retention_rate = (retained/subscribers)*100
print(channel_retention_rate)
```

```
subscribing_channel
Email      87.200000
Facebook   68.778281
House Ads  58.053691
Instagram  68.103448
Push       70.129870
Name: user_id, dtype: float64
```

Let's practice!

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Plotting campaign results (I)

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Comparing language conversion rates

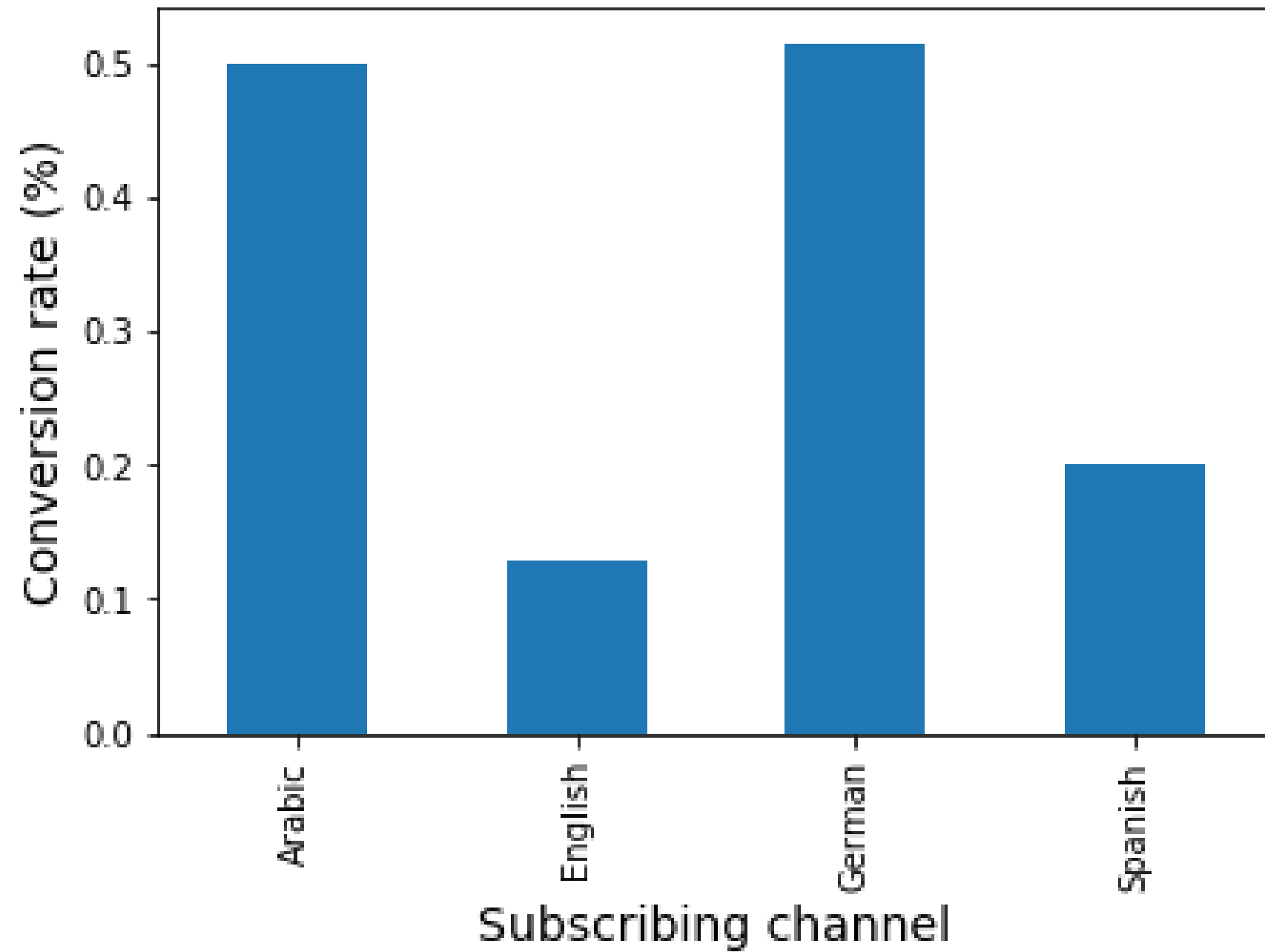
```
import matplotlib.pyplot as plt

# Create a bar chart using channel retention DataFrame
language_conversion_rate.plot(kind = 'bar')

# Add a title and x and y-axis labels
plt.title('Conversion rate by language\n', size = 16)
plt.xlabel('Language', size = 14)
plt.ylabel('Conversion rate (%)', size = 14)

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

Conversion by language



Calculating subscriber quality

```
# Group by language_displayed and count unique users
total = marketing.groupby(['date_subscribed'])['user_id']\
               .nunique()

# Group by language_displayed and sum conversions
retained = marketing[marketing['is_retained'] == True]\
               .groupby(['date_subscribed'])\
               ['user_id'].nunique()

# Calculate subscriber quality across dates
daily_retention_rate = retained/total
```

Preparing data to be plotted over time

```
# Reset index to turn the Series into a DataFrame
daily_retention_rate =
    pd.DataFrame(daily_retention_rate.reset_index())

# Rename columns
daily_retention_rate.columns = ['date_subscribed',
                                'retention_rate']
```

Visualizing data trended over time

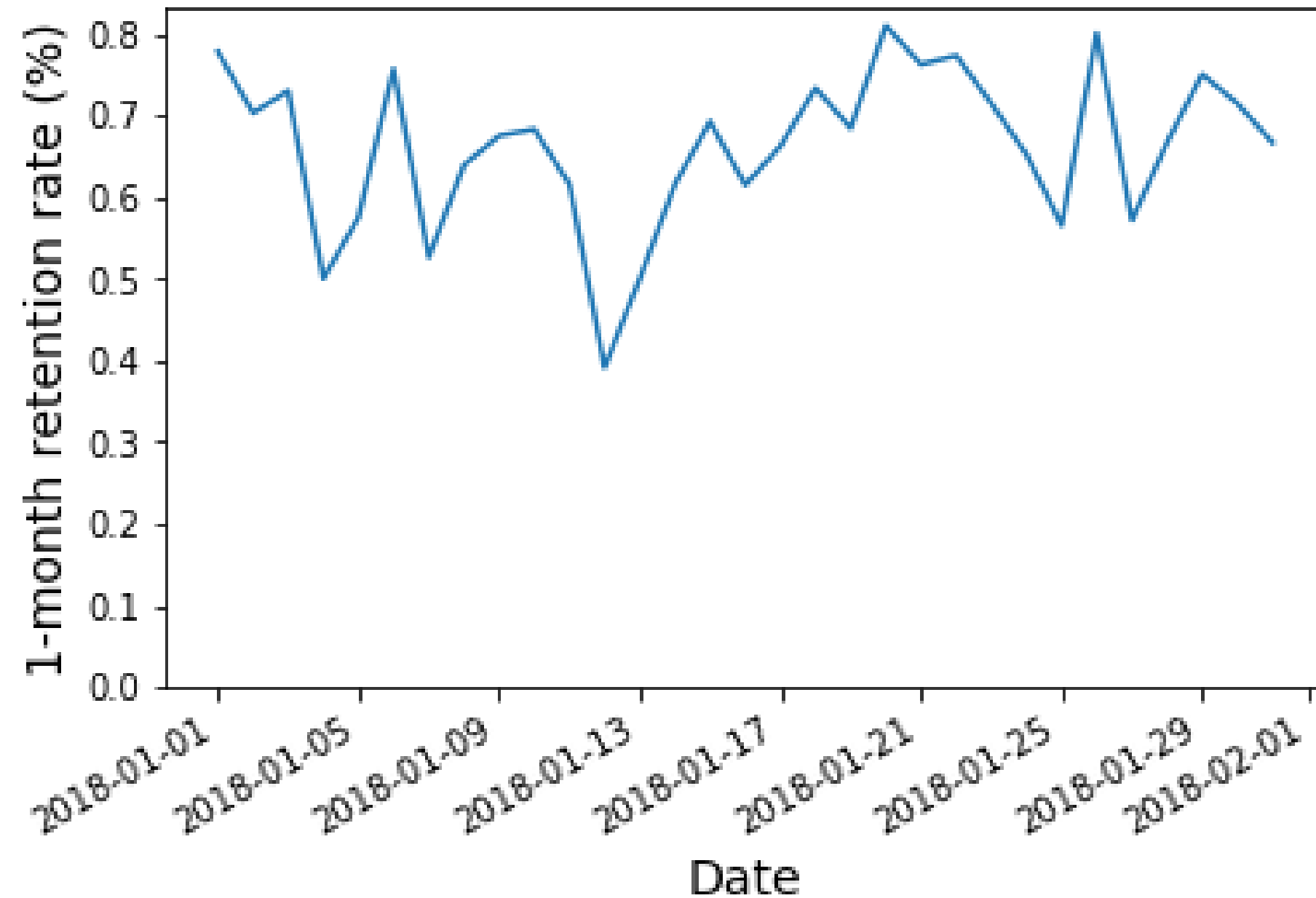
```
# Create a line chart using the daily_retention DataFrame
daily_retention_rate.plot('date_subscribed',
                           'retention_rate')

# Add a title and x and y-axis labels
plt.title('Daily subscriber quality\n', size = 16)
plt.ylabel('1-month retention rate (%)', size = 14)
plt.xlabel('Date', size = 14)

# Set the y-axis to begin at 0
plt.ylim(0)

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

Daily subscriber quality

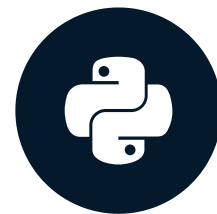


Let's practice!

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Plotting campaign results (II)

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Grouping by multiple columns

```
language = marketing.groupby(['date_served',  
                             'language_preferred'])\  
               ['user_id'].count()  
  
print(language.head())
```

```
date_served  preferred_language  
2018-01-01   Arabic             3  
             English          351  
             German            5  
             Spanish           11  
2018-01-02   Arabic             4  
Name: user_id, dtype: int64
```

Unstacking after groupby

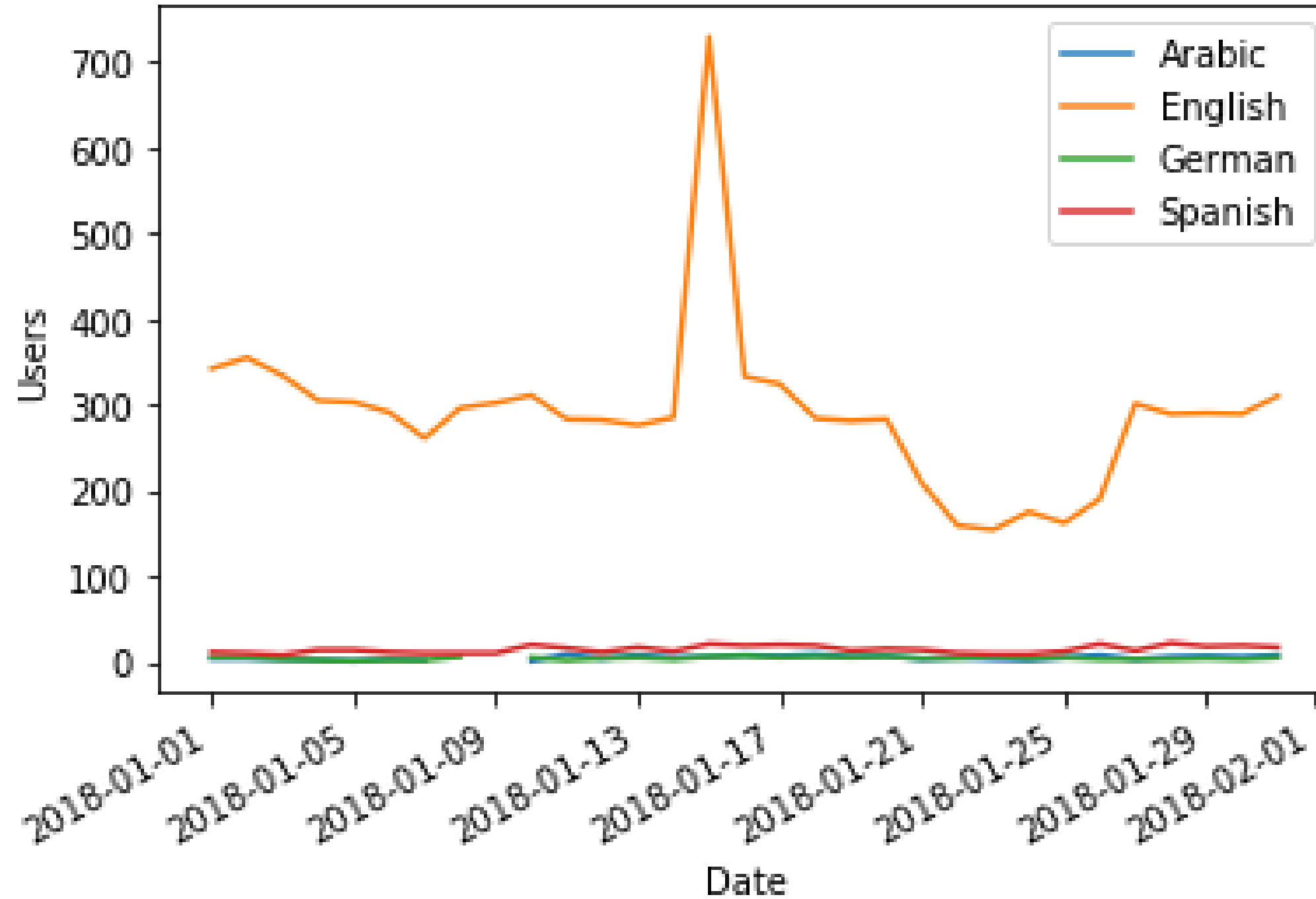
```
language = pd.DataFrame(language.unstack(level=1))  
  
print(language.head())
```

preferred_language	Arabic	English	German	Spanish
date_served				
2018-01-01	3.0	351.0	5.0	11.0
2018-01-02	4.0	369.0	6.0	10.0
2018-01-03	3.0	349.0	3.0	8.0
2018-01-04	2.0	313.0	2.0	14.0
2018-01-05	NaN	310.0	1.0	14.0

Plotting preferred language over time

```
language.plot()  
plt.title('Daily language preferences')  
plt.xlabel('Date')  
plt.ylabel('Users')  
plt.legend(loc = 'upper right',  
           labels = language.columns.values)  
plt.show()
```

Daily language preferences



Creating grouped bar charts

```
# Create DataFrame grouped by age and language preference
language_age = marketing.groupby(['language_preferred',
                                  'age_group'])\
                        ['user_id'].count()

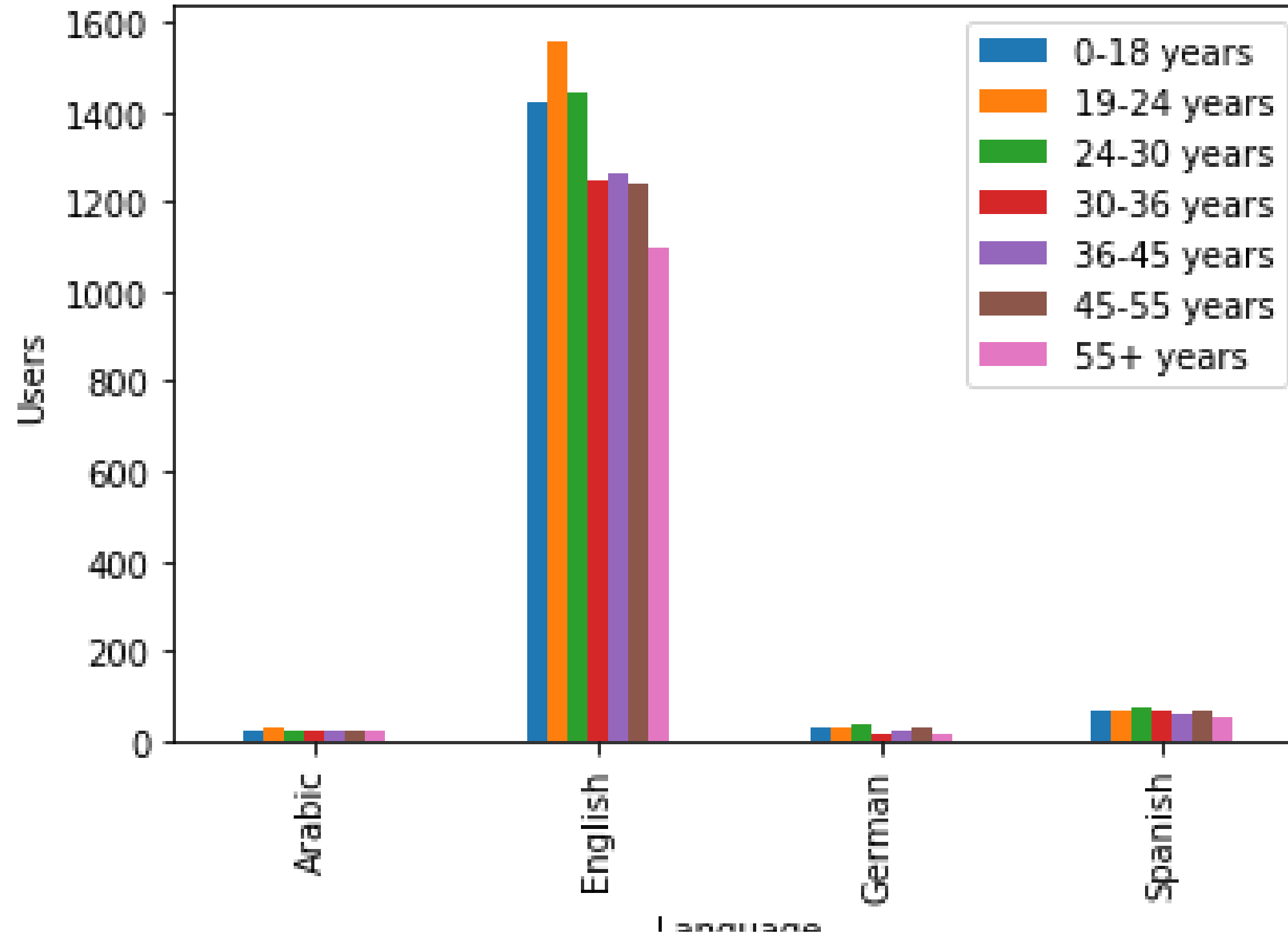
language_age = pd.DataFrame(language_age.unstack(level=1))
print(language_age.head())
```

preferred_language	Arabic	English	German	Spanish
age_group				
0-18 years	17	1409	20	66
19-24 years	25	1539	20	66
24-30 years	18	1424	18	71
30-36 years	19	1238	14	69
36-45 years	18	1251	17	55

Plotting language preferences by age group

```
language_age.plot(kind='bar')
plt.title('Language preferences by age group')
plt.xlabel('Language')
plt.ylabel('Users')
plt.legend(loc = 'upper right',
           labels = language_age.columns.values)
plt.show()
```

Language preferences by age group



Let's practice!

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