Introduction to pandas for marketing

ANALYZING MARKETING CAMPAIGNS WITH PANDAS

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datacamp

What does a data scientist on a marketing team do?

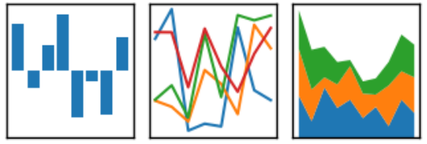
- Analyzing marketing campaign performance
- Attributing credit for conversions to marketing channels
- A/B testing

What is pandas, again?

- Provides table-like data structures that are easy to use in analysis

pandas

$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$



- Allows for easy importing and exporting of a variety of common formats (i.e., CSV, TSV, Stata)
- Enables manipulation such as joining other datasets, grouping by and aggregating columns, and taking subsets of dataset columns and rows.

Importing data using pandas

```
import pandas as pd


marketing = pd.read_csv('marketing.csv')
```

Inspecting data

```
print(marketing.head())
```

```
      user_id date_served    channel          variant  conv  \
0  a100000029  2018-01-01  House Ads  personalization  True
1  a100000030  2018-01-01  House Ads  personalization  True
2  a100000031  2018-01-01  House Ads  personalization  True
3  a100000032  2018-01-01  House Ads  personalization  True
4  a100000033  2018-01-01  House Ads  personalization  True

  language_displayed preferred_language    age_group
0            English             English   0-18 years
1            English             English  19-24 years
2            English             English  24-30 years
3            English             English  30-36 years
4            English             English  36-45 years
```

Summary statistics

```
print(marketing.describe())
```

```
           user_id date_served    channel  variant   conv    \
count         9882        9881       9882     9882   9882
unique        7253          31          5        2      2
top     a100000882  2018-01-15  House Ads  control  False
freq             6         782       4682     4986   8883

          language_displayed preferred_language     age_group
count                   9882                9882          9882
unique                     4                   4             7
top                  English             English   19-24 years
freq                    9695                9177          1650
```

Missing values & data types

```
print(marketing.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 9996 entries, 0 to 9995
Data columns (total 12 columns):
user_id                 9996 non-null object
date_served             9980 non-null object
...
date_subscribed         1815 non-null object
date_canceled           568 non-null object
subscribing_channel     1815 non-null object
is_retained             1815 non-null object
dtypes: object(12)
memory usage: 937.2+ KB
```

Let's Practice!

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Data types and data merging

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Common data types

- Strings (objects)
- Numbers (floats, integers)
- Boolean values (True, False)
- Dates

Data type of a column

```
# Print a data type of a single column
print(marketing['converted'].dtype)
```

```
dtype('object')
```

Changing the data type of a column

```
# Change the data type of a column
marketing['converted'] = marketing['converted']\
                            .astype('bool')
print(marketing['converted'].dtype)
```

```
dtype('bool')
```

Creating new boolean columns

```
marketing['is_house_ads'] = np.where(
    marketing['marketing_channel'] == 'House Ads',
    True, False
)

print(marketing.is_house_ads.head(3))
```

```
0     True
1    False
2     True
Name: is_house_ads, dtype: bool
```

Mapping values to existing columns

```
channel_dict = {"House Ads": 1, "Instagram": 2,
                "Facebook": 3, "Email": 4, "Push": 5}
marketing['channel_code'] = marketing['marketing_channel']\
                                .map(channel_dict)

print(marketing['channel_code'].head(3))
```

```
0    1
1    1
2    1
Name: channel_code, dtype: int64
```

Date columns

```
# Read date columns using parse_dates
marketing = pd.read_csv('marketing.csv',
                        parse_dates=['date_served',
                                     'date_subscribed',
                                     'date_canceled'])


# Or
# Convert already existing column to datetime column
marketing['date_served'] = pd.to_datetime(
    marketing['date_served']
)
```

Date columns

```
# Or convert each column individually
# Convert already existing column to datetime column
marketing['date_served'] = pd.to_datetime(
    marketing['date_served']
)
```

Date columns

```
marketing['day_served'] = marketing['date_served']\
                          .dt.dayofweek
```

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Initial exploratory analysis

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How many users see marketing assets?

```
# Aggregate unique users that see ads by date
daily_users = marketing.groupby(['date_served'])\
                                    ['user_id'].nunique()
print(daily_users)
```

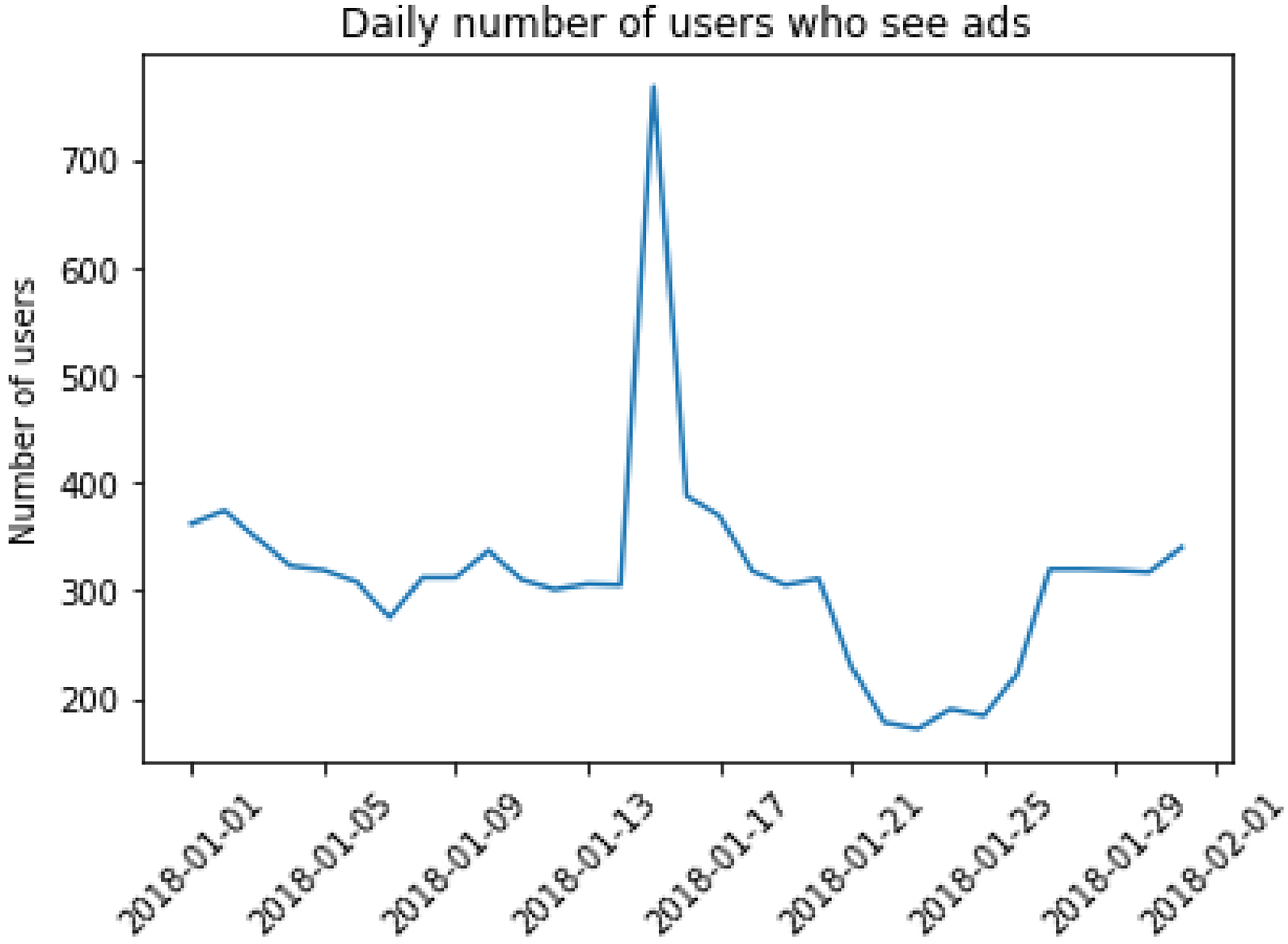
```
date_served
2018-01-01    362
2018-01-02    374
2018-01-03    348
...
Name: user_id, dtype: int64
```

Visualizing results

```
import matplotlib.pyplot as plt


# Plot
daily_users.plot()


# Annotate
plt.title('Daily number of users who see ads')
plt.xlabel('Date')
plt.ylabel('Number of users')
plt.xticks(rotation = 45)
plt.show()
```


Daily number of users who see ads
Number of users
700
600
500
400
300
200
2018-01-01
2018-01-05
2018-01-09
2018-01-13
2018-01-17
2018-01-21
2018-01-25
2018-01-29
2018-02-01

Let's practice!

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