Double-click (or enter) to edit

Importing Libraries

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

Loading the dataset

```
df = pd.read_csv('/content/hotel_bookings 2.csv')
```

Exploratory Data Analysis and Data Cleaning

```
df.head()
```

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_number	ar
0	Resort Hotel	0	342	2015	July	27	
1	Resort Hotel	0	737	2015	July	27	
2	Resort Hotel	0	7	2015	July	27	
3	Resort Hotel	0	13	2015	July	27	
4	Resort Hotel	0	14	2015	July	27	

5 rows × 32 columns

```
df.tail()
```

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_numbe
119385	City Hotel	0	23	2017	August	3
119386	City Hotel	0	102	2017	August	3
119387	City Hotel	0	34	2017	August	3
119388	City Hotel	0	109	2017	August	3
119389	City Hotel	0	205	2017	August	3

5 rows × 32 columns

df.shape

```
(119390, 32)
```

df.columns

```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type', 'agent',
       'company', 'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date'],
      dtype='object')
```

df.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119390 entries, 0 to 119389
Data columns (total 32 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   hotel                           119390 non-null  object
 1   is_canceled                     119390 non-null  int64
 2   lead_time                       119390 non-null  int64
 3   arrival_date_year               119390 non-null  int64
 4   arrival_date_month              119390 non-null  object
 5   arrival_date_week_number        119390 non-null  int64
 6   arrival_date_day_of_month       119390 non-null  int64
 7   stays_in_weekend_nights         119390 non-null  int64
 8   stays_in_week_nights            119390 non-null  int64
 9   adults                          119390 non-null  int64
 10  children                        119386 non-null  float64
 11  babies                          119390 non-null  int64
 12  meal                            119390 non-null  object
 13  country                         118902 non-null  object
 14  market_segment                  119390 non-null  object
 15  distribution_channel            119390 non-null  object
 16  is_repeated_guest               119390 non-null  int64
 17  previous_cancellations          119390 non-null  int64
 18  previous_bookings_not_canceled  119390 non-null  int64
 19  reserved_room_type              119390 non-null  object
 20  assigned_room_type              119390 non-null  object
 21  booking_changes                 119390 non-null  int64
```

```
 22  deposit_type                    119390 non-null  object
 23  agent                           103050 non-null  float64
 24  company                         6797 non-null    float64
 25  days_in_waiting_list            119390 non-null  int64
 26  customer_type                   119390 non-null  object
 27  adr                             119390 non-null  float64
 28  required_car_parking_spaces     119390 non-null  int64
 29  total_of_special_requests       119390 non-null  int64
 30  reservation_status              119390 non-null  object
 31  reservation_status_date         119390 non-null  object
dtypes: float64(4), int64(16), object(12)
memory usage: 29.1+ MB
```

```
df['reservation_status_date'] = pd.to_datetime(df['reservation_status_
```

```
df.describe(include='object')
```

	hotel	arrival_date_month	meal	country	market_segment	distribution_channel	reserved_r
count	119390	119390	119390	118902	119390	119390	
unique	2	12	5	177	8	5	
top	City Hotel	August	BB	PRT	Online TA	TA/TO	
freq	79330	13877	92310	48590	56477	97870	

```
for col in  df.describe(include='object').columns:
  print(col)
  print(df[col].unique())
  print('-'*50)
```

```
hotel
['Resort Hotel' 'City Hotel']
--------------------------------------------------
arrival_date_month
['July' 'August' 'September' 'October' 'November' 'December' 'January'
 'February' 'March' 'April' 'May' 'June']
--------------------------------------------------
meal
['BB' 'FB' 'HB' 'SC' 'Undefined']
--------------------------------------------------
country
['PRT' 'GBR' 'USA' 'ESP' 'IRL' 'FRA' nan 'ROU' 'NOR' 'OMN' 'ARG' 'POL'
 'DEU' 'BEL' 'CHE' 'CN' 'GRC' 'ITA' 'NLD' 'DNK' 'RUS' 'SWE' 'AUS' 'EST'
 'CZE' 'BRA' 'FIN' 'MOZ' 'BWA' 'LUX' 'SVN' 'ALB' 'IND' 'CHN' 'MEX' 'MAR'
 'UKR' 'SMR' 'LVA' 'PRI' 'SRB' 'CHL' 'AUT' 'BLR' 'LTU' 'TUR' 'ZAF' 'AGO'
 'ISR' 'CYM' 'ZMB' 'CPV' 'ZWE' 'DZA' 'KOR' 'CRI' 'HUN' 'ARE' 'TUN' 'JAM'
 'HRV' 'HKG' 'IRN' 'GEO' 'AND' 'GIB' 'URY' 'JEY' 'CAF' 'CYP' 'COL' 'GGY'
 'KWT' 'NGA' 'MDV' 'VEN' 'SVK' 'FJI' 'KAZ' 'PAK' 'IDN' 'LBN' 'PHL' 'SEN'
 'SYC' 'AZE' 'BHR' 'NZL' 'THA' 'DOM' 'MKD' 'MYS' 'ARM' 'JPN' 'LKA' 'CUB'
 'CMR' 'BIH' 'MUS' 'COM' 'SUR' 'UGA' 'BGR' 'CIV' 'JOR' 'SYR' 'SGP' 'BDI'
 'SAU' 'VNM' 'PLW' 'QAT' 'EGY' 'PER' 'MLT' 'MWI' 'ECU' 'MDG' 'ISL' 'UZB'
 'NPL' 'BHS' 'MAC' 'TGO' 'TWN' 'DJI' 'STP' 'KNA' 'ETH' 'IRQ' 'HND' 'RWA'
 'KHM' 'MCO' 'BGD' 'IMN' 'TJK' 'NIC' 'BEN' 'VGB' 'TZA' 'GAB' 'GHA' 'TMP'
 'GLP' 'KEN' 'LIE' 'GNB' 'MNE' 'UMI' 'MYT' 'FRO' 'MMR' 'PAN' 'BFA' 'LBY'
 'MLI' 'NAM' 'BOL' 'PRY' 'BRB' 'ABW' 'AIA' 'SLV' 'DMA' 'PYF' 'GUY' 'LCA'
 'ATA' 'GTM' 'ASM' 'MRT' 'NCL' 'KIR' 'SDN' 'ATF' 'SLE' 'LAO']
--------------------------------------------------
market_segment
['Direct' 'Corporate' 'Online TA' 'Offline TA/TO' 'Complementary' 'Groups'
```

```
 'Undefined' 'Aviation']
--------------------------------------------------
distribution_channel
['Direct' 'Corporate' 'TA/TO' 'Undefined' 'GDS']
--------------------------------------------------
reserved_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'H' 'L' 'P' 'B']
--------------------------------------------------
assigned_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'I' 'B' 'H' 'P' 'L' 'K']
--------------------------------------------------
deposit_type
['No Deposit' 'Refundable' 'Non Refund']
--------------------------------------------------
customer_type
['Transient' 'Contract' 'Transient-Party' 'Group']
--------------------------------------------------
reservation_status
['Check-Out' 'Canceled' 'No-Show']
--------------------------------------------------
```

```
df.isnull().sum()
```

	0
hotel	0
is_canceled	0
lead_time	0
arrival_date_year	0
arrival_date_month	0
arrival_date_week_number	0
arrival_date_day_of_month	0
stays_in_weekend_nights	0
stays_in_week_nights	0
adults	0
children	4
babies	0
meal	0
country	488
market_segment	0
distribution_channel	0
is_repeated_guest	0
previous_cancellations	0
previous_bookings_not_canceled	0
reserved_room_type	0
assigned_room_type	0
booking_changes	0
deposit_type	0
agent	16340
company	112593
days_in_waiting_list	0
customer_type	0
adr	0
required_car_parking_spaces	0
total_of_special_requests	0
reservation_status	0
reservation_status_date	0

dtype: int64

```
df.drop(['company','agent'], axis=1,inplace=True)
df.dropna(inplace=True)
```

```
df.isnull().sum()
```

	0
hotel	0
is_canceled	0
lead_time	0
arrival_date_year	0
arrival_date_month	0
arrival_date_week_number	0
arrival_date_day_of_month	0
stays_in_weekend_nights	0
stays_in_week_nights	0
adults	0
children	0
babies	0
meal	0
country	0
market_segment	0
distribution_channel	0
is_repeated_guest	0
previous_cancellations	0
previous_bookings_not_canceled	0
reserved_room_type	0
assigned_room_type	0
booking_changes	0
deposit_type	0
days_in_waiting_list	0
customer_type	0
adr	0
required_car_parking_spaces	0
total_of_special_requests	0
reservation_status	0
reservation_status_date	0

dtype: int64

```
df.describe()
```

	is_canceled	lead_time	arrival_date_year	arrival_date_week_number	arrival_date_day_of_
count	118898.000000	118898.000000	118898.000000	118898.000000	118898.0
mean	0.371352	104.311435	2016.157656	27.166555	15.8
min	0.000000	0.000000	2015.000000	1.000000	1.0
25%	0.000000	18.000000	2016.000000	16.000000	8.0
50%	0.000000	69.000000	2016.000000	28.000000	16.0
75%	1.000000	161.000000	2017.000000	38.000000	23.0
max	1.000000	737.000000	2017.000000	53.000000	31.0
std	0.483168	106.903309	0.707459	13.589971	8.7

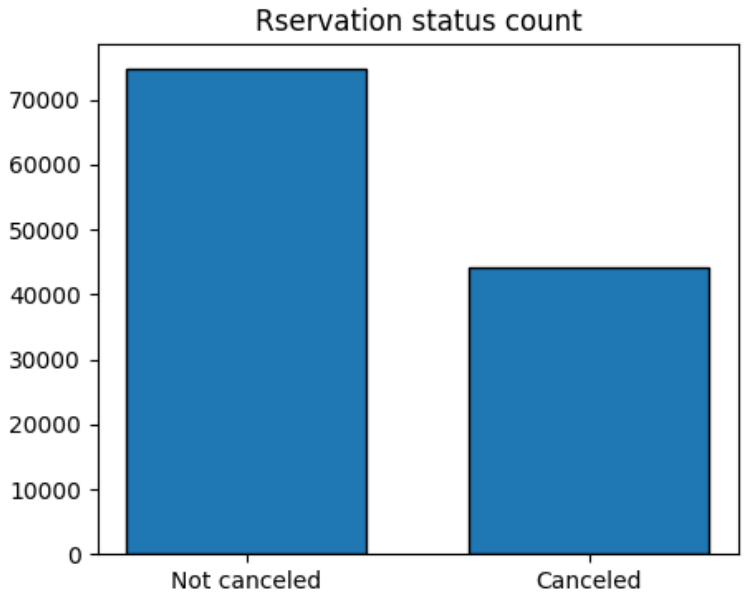
```
df=df[df['adr']<5000]
```

Data Analysis and visualization

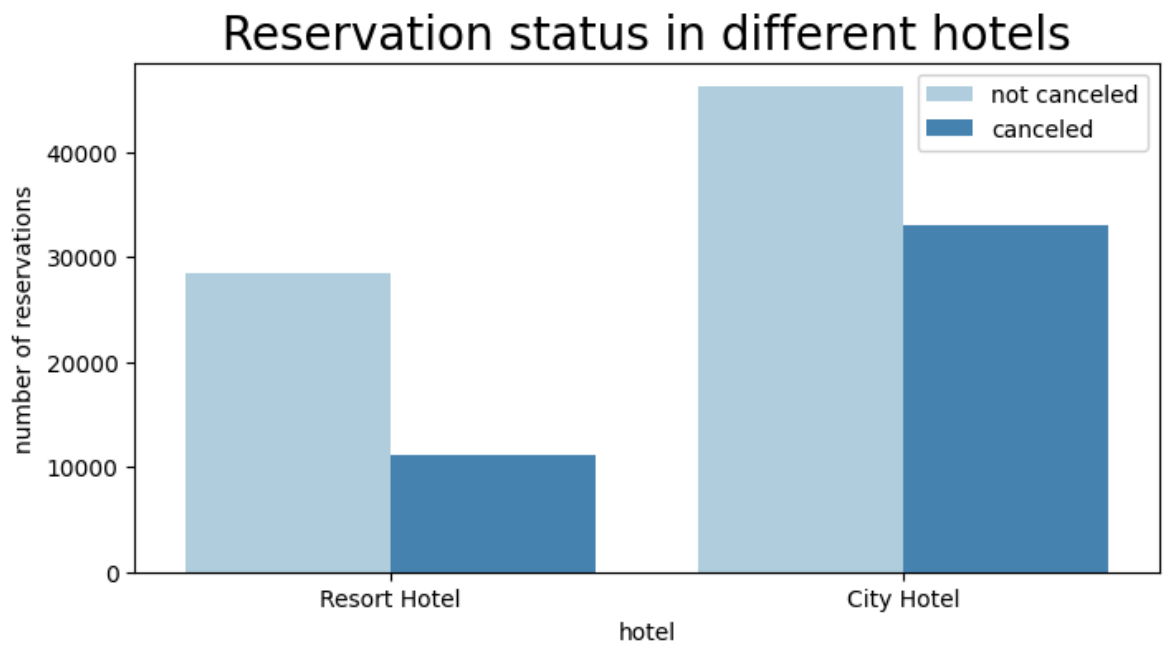
Data Analysis and Visualisalions

```
cancelled_perc = df['is_canceled'].value_counts(normalize=True)
print(cancelled_perc)



plt.figure(figsize=(5,4))
plt.title('Rservation status count')
plt.bar(['Not canceled','Canceled'], df['is_canceled'].value_counts(),
```

```
is_canceled
0    0.628653
1    0.371347
Name: proportion, dtype: float64
<BarContainer object of 2 artists>
```



```
plt.figure(figsize = (8,4))
ax1= sns.countplot(x = 'hotel', hue = 'is_canceled', data = df, palett
legend_labels,_ = ax1. get_legend_handles_labels()
ax1.legend(bbox_to_anchor=(1,1))
plt.title('Reservation status in different hotels', size = 20)
plt.xlabel('hotel')
plt.ylabel('number of reservations')
plt.legend(['not canceled', 'canceled'])
plt.show()
```




```
resort_hotel = df[df['hotel']=='Resort Hotel']
resort_hotel['is_canceled'].value_counts(normalize=True)
```

is_canceled	proportion
0	0.72025
1	0.27975

dtype: float64

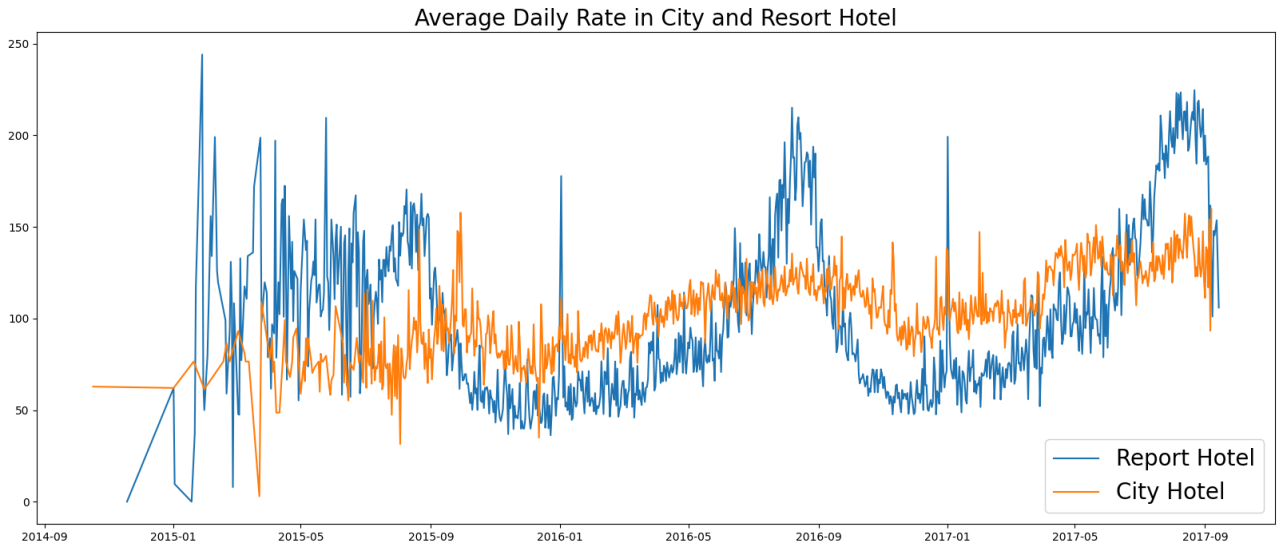
```
city_hotel=df[df['hotel']=='City Hotel']
city_hotel['is_canceled'].value_counts(normalize=True)
```

is_canceled	proportion
0	0.582918
1	0.417082

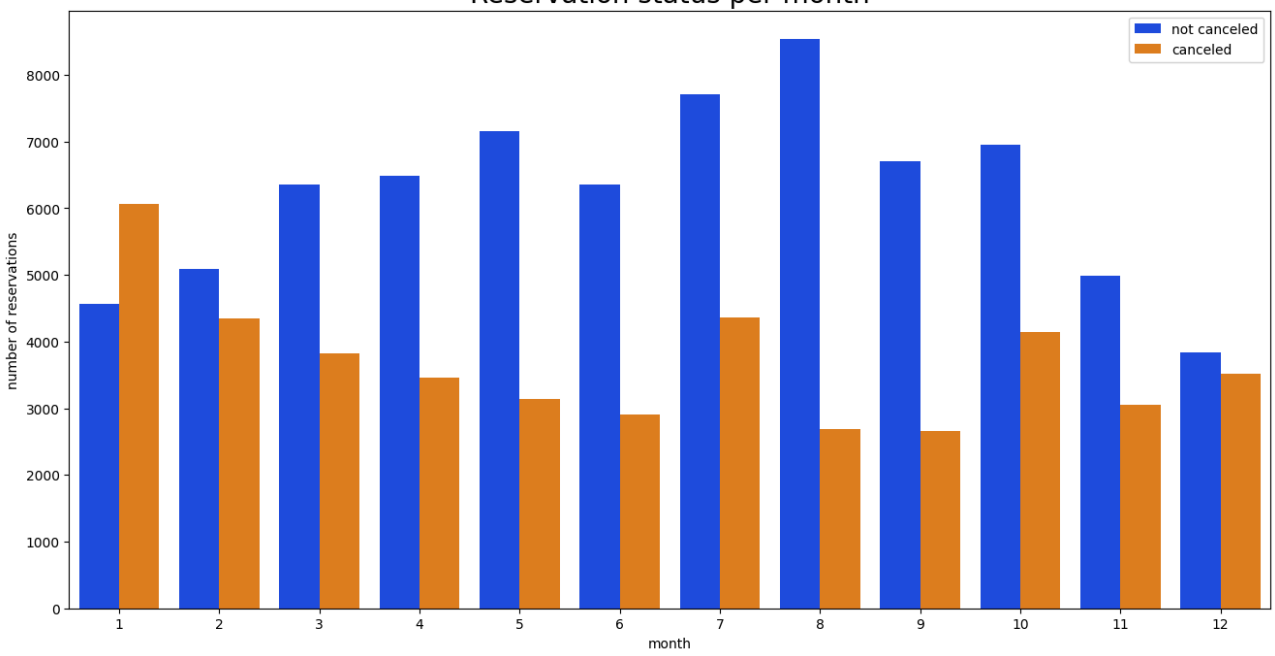
dtype: float64

```
resort_hotel =resort_hotel.groupby('reservation_status_date')[['adr']]
city_hotel = city_hotel.groupby('reservation_status_date')[['adr']].me
```

```
plt.figure(figsize=(20,8))
plt.title('Average Daily Rate in City and Resort Hotel',fontsize = 20)
plt.plot(resort_hotel.index, resort_hotel['adr'], label = 'Report Hote
plt.plot(city_hotel.index, city_hotel['adr'], label='City Hotel')
plt.legend(fontsize =20)
plt.show()
```

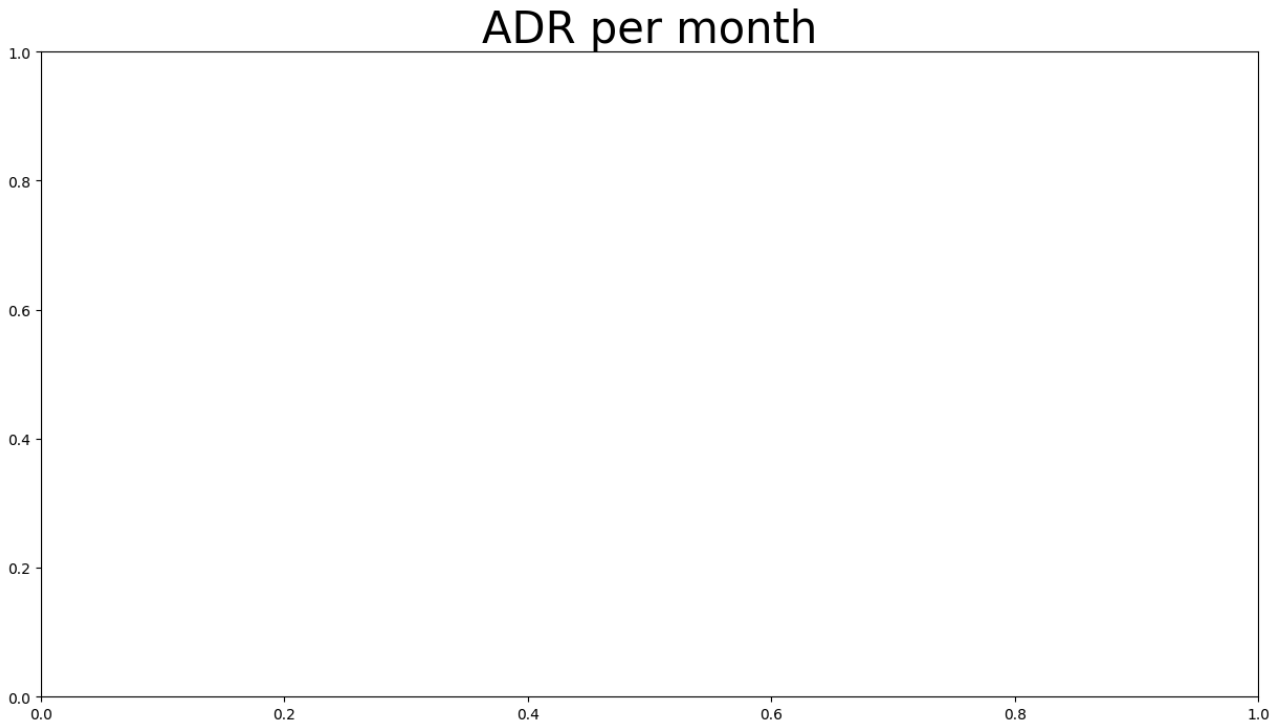



```
df['month'] = df['reservation_status_date'].dt.month
plt.figure(figsize = (16,8))
ax1 = sns.countplot(x = 'month', hue = 'is_canceled', data = df, palet
legend_labels,_ = ax1. get_legend_handles_labels()
ax1.legend(bbox_to_anchor=(1,1))
plt.title('Reservation status per month', size = 20)
plt.xlabel('month')
plt.ylabel('number of reservations')
plt.legend(['not canceled', 'canceled'])
plt.show()
```



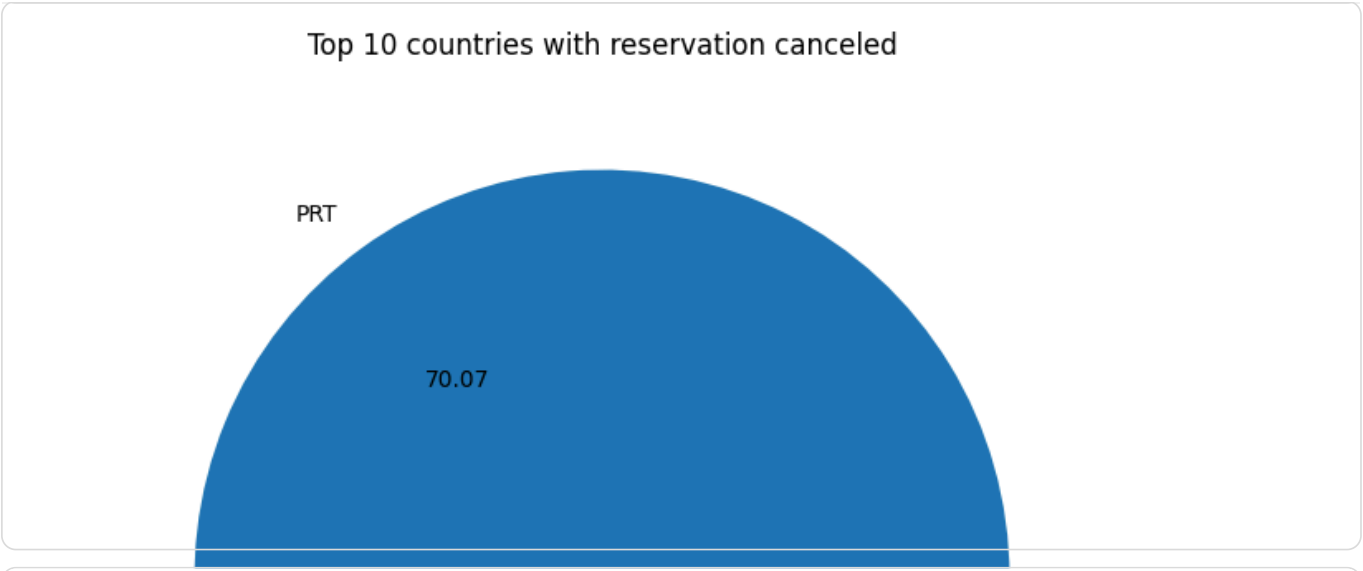

```
plt.figure(figsize = (15,8))
plt.title('ADR per month', fontsize = 30)
sns.barplot('month', 'adr', data = df[df['is_canceled'] == 1].groupby(
plt.show()
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
/tmp/ipython-input-1831860823.py in <cell line: 0>()
      1 plt.figure(figsize = (15,8))
      2 plt.title('ADR per month', fontsize = 30)
----> 3 sns.barplot('month', 'adr', data = df[df['is_canceled'] == 1].groupby('month')
[['adr']].sum().reset_index())
      4 plt.show()

TypeError: barplot() got multiple values for argument 'data'
```

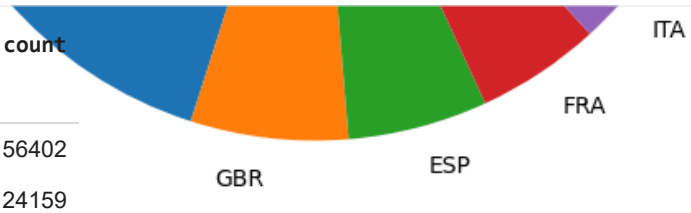


Next steps: Explain error

```
cancelled_data = df[df['is_canceled'] == 1]
top_10_country = cancelled_data['country'].value_counts()[:10]
plt.figure(figsize = (8,8))
plt.title('Top 10 countries with reservation canceled')
plt.pie(top_10_country, autopct = '%.2f', labels = top_10_country.inde
plt.show()
```




```
df['market_segment'].value_counts()
```



market_segment	count
Online TA	56402
Offline TA/TO	24159
Groups	19806
Direct	12448
Corporate	5111
Complementary	734
Aviation	237

dtype: int64

```
df['market_segment'].value_counts(normalize=True)
```

	proportion