satisfaccion-industria-hotelera

November 6, 2024

1 Analizando la Satisfacción de Clientes en la Industria Hotelera

Link al Dataset

Limpiar y explorar un dataset que contiene información sobre la satisfacción de los clientes en la industria hotelera. Este análisis es crucial para los ejecutivos de la empresa que buscan entender mejor las opiniones y experiencias de sus clientes para mejorar los servicios ofrecidos.

```
[37]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

#cargar
df = pd.read_csv('hotel_bookings.csv')
```

Exploración Inicial de los Datos

```
[38]: #ver dataset
df.head(5)
df.tail(5)
```

```
[38]:
                   hotel
                           is_canceled
                                        lead_time
                                                    arrival_date_year
      119385 City Hotel
                                                                  2017
                                     0
                                                23
      119386 City Hotel
                                     0
                                               102
                                                                  2017
      119387 City Hotel
                                     0
                                                                  2017
                                                34
      119388 City Hotel
                                     0
                                               109
                                                                  2017
             City Hotel
                                               205
      119389
                                     0
                                                                  2017
             arrival_date_month arrival_date_week_number
      119385
                          August
                                                         35
      119386
                          August
                                                         35
      119387
                          August
                                                         35
```

```
119388 August 35

119389 August 35

arrival_date_day_of_month stays_in_weekend_nights \
119385 30 2
```

```
31
                                                           2
119386
119387
                                31
                                                           2
                                31
                                                           2
119388
                                                           2
                                29
119389
        stays_in_week_nights
                              adults ...
                                          deposit_type agent company \
                                            No Deposit
                                                         394.0
                            5
                                    2 ...
                                                                    NaN
119385
119386
                            5
                                    3 ...
                                            No Deposit
                                                           9.0
                                                                    NaN
                            5
                                    2 ...
                                            No Deposit
                                                           9.0
119387
                                                                    NaN
119388
                            5
                                    2 ...
                                            No Deposit
                                                          89.0
                                                                    NaN
                            7
                                    2 ...
                                            No Deposit
119389
                                                           9.0
                                                                    NaN
       days_in_waiting_list customer_type
                                                adr \
119385
                                 Transient
                                             96.14
119386
                           0
                                 Transient 225.43
                           0
                                 Transient 157.71
119387
                           0
                                 Transient 104.40
119388
119389
                                 Transient 151.20
        required_car_parking_spaces
                                     total_of_special_requests
119385
                                   0
                                                               2
119386
119387
                                   0
                                                                4
119388
                                   0
                                                               0
119389
                                   0
                                                                2
        reservation_status reservation_status_date
119385
                 Check-Out
                                         2017-09-06
                 Check-Out
                                         2017-09-07
119386
119387
                 Check-Out
                                         2017-09-07
119388
                 Check-Out
                                         2017-09-07
119389
                 Check-Out
                                         2017-09-07
[5 rows x 32 columns]
```

[39]: #Verificación y ajuste de tipos de datos: 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

```
arrival_date_month
      5
          arrival_date_week_number
                                                            int64
                                           119390 non-null
      6
          arrival_date_day_of_month
                                           119390 non-null
                                                            int64
      7
          stays_in_weekend_nights
                                           119390 non-null int64
          stays in week nights
                                           119390 non-null int64
      8
      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
          distribution_channel
                                           119390 non-null
                                                            object
      15
      16
          is_repeated_guest
                                           119390 non-null
                                                            int64
          previous_cancellations
                                           119390 non-null int64
      17
          previous_bookings_not_canceled
                                          119390 non-null
                                                            int64
                                           119390 non-null object
         reserved_room_type
      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
          days in waiting list
                                           119390 non-null int64
      26
          customer_type
                                           119390 non-null object
      27
                                           119390 non-null float64
          adr
      28
         required_car_parking_spaces
                                           119390 non-null int64
          total_of_special_requests
                                           119390 non-null int64
      29
      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
[40]: #esumen estadístico del dataset, incluyendo medidas de tendencia central y
       ⇔dispersión para las variables numéricas.
      df.describe()
[40]:
               is canceled
                                lead time
                                           arrival date year \
            119390.000000 119390.000000
                                               119390.000000
      count
     mean
                  0.370416
                               104.011416
                                                 2016.156554
      std
                  0.482918
                               106.863097
                                                    0.707476
     min
                  0.000000
                                 0.000000
                                                 2015.000000
      25%
                  0.000000
                                18.000000
                                                 2016.000000
                                                 2016.000000
      50%
                  0.000000
                                69.000000
      75%
                  1.000000
                               160.000000
                                                 2017.000000
```

119390 non-null

object

4

2017.000000

119390.000000

arrival_date_day_of_month \

737.000000

1.000000

arrival_date_week_number

119390.000000

max

count

```
27.165173
                                                    15.798241
mean
                                                     8.780829
                       13.605138
std
min
                        1.000000
                                                     1.000000
25%
                       16.000000
                                                     8.000000
50%
                       28,000000
                                                    16.000000
75%
                       38.000000
                                                    23.000000
                       53.000000
                                                    31.000000
max
       stays_in_weekend_nights
                                  stays_in_week_nights
                                                                 adults
                  119390.000000
                                          119390.000000
                                                          119390.000000
count
                                               2.500302
                       0.927599
mean
                                                               1.856403
std
                       0.998613
                                               1.908286
                                                               0.579261
min
                       0.00000
                                               0.00000
                                                               0.000000
25%
                       0.000000
                                               1.000000
                                                               2.000000
50%
                       1.000000
                                               2.000000
                                                               2.000000
75%
                       2.000000
                                               3.000000
                                                               2.000000
                      19.000000
                                              50.000000
                                                              55.000000
max
             children
                               babies
                                       is_repeated_guest
       119386.000000
                       119390.000000
                                            119390.000000
count
                             0.007949
mean
             0.103890
                                                 0.031912
std
            0.398561
                             0.097436
                                                 0.175767
            0.000000
                            0.000000
                                                 0.00000
min
25%
             0.000000
                             0.000000
                                                 0.000000
50%
             0.00000
                             0.000000
                                                 0.00000
75%
             0.000000
                             0.000000
                                                 0.000000
max
            10.000000
                            10.000000
                                                 1.000000
       previous_cancellations
                                 previous_bookings_not_canceled
                 119390.000000
                                                   119390.000000
count
                      0.087118
                                                        0.137097
mean
                      0.844336
                                                        1.497437
std
min
                      0.000000
                                                        0.000000
25%
                      0.000000
                                                        0.00000
50%
                      0.000000
                                                        0.000000
75%
                      0.00000
                                                        0.00000
                     26.000000
                                                       72.000000
max
       booking changes
                                                       days in waiting list
                                  agent
                                              company
         119390.000000
                         103050.000000
                                         6797.000000
                                                               119390.000000
count
               0.221124
                                           189.266735
                                                                    2.321149
mean
                              86.693382
std
               0.652306
                             110.774548
                                           131.655015
                                                                   17.594721
min
               0.00000
                               1.000000
                                             6.000000
                                                                    0.00000
25%
               0.000000
                               9.000000
                                            62.000000
                                                                    0.000000
                             14.000000
50%
               0.000000
                                           179.000000
                                                                    0.00000
75%
               0.000000
                             229.000000
                                           270.000000
                                                                    0.00000
                             535.000000
max
              21.000000
                                           543.000000
                                                                  391.000000
```

```
required_car_parking_spaces total_of_special_requests
                                     119390.000000
                                                                 119390.000000
       119390.000000
                                                                      0.571363
          101.831122
                                          0.062518
mean
           50.535790
                                          0.245291
                                                                      0.792798
std
min
           -6.380000
                                          0.000000
                                                                      0.000000
25%
           69.290000
                                          0.000000
                                                                      0.000000
50%
           94.575000
                                          0.000000
                                                                      0.000000
75%
          126.000000
                                          0.000000
                                                                      1.000000
         5400.000000
                                          8.000000
                                                                      5.000000
max
```

Limpieza de datos

```
[41]: #Detección y eliminación de valores duplicados, muy importante porque los⊔
duplicados pueden distorsionar el análisis.

print(df.duplicated().sum())
#111304 filas totales
```

31994

```
[42]: df = df.drop_duplicates()
#la tabla ahora posee 80645 filas
```

```
[43]: df = pd.read csv('hotel bookings.csv', dtype = {
          "hotel": "category",
          "is canceled": "boolean",
          "lead time": "int16",
          "arrival_date_year": "int16",
          "arrival_date_month": "category",
          "arrival_date_week_number": "int8",
          "arrival_date_day_of_month": "int8",
          "stays_in_weekend_nights": "int8",
          "stays_in_week_nights": "int8",
          "adults": "int8",
          "children": "Int32",
          "babies": "int8",
          "meal": "category",
          "country": "category",
          "market segment": "category",
          "distribution_channel": "category",
          "is repeated guest": "boolean",
          "previous_cancellations": "int8",
          "previous_bookings_not_canceled": "int8",
          "reserved_room_type": "category",
          "assigned_room_type": "category",
          "booking_changes": "int8",
          "deposit_type": "category",
```

```
"agent": "Int32",
    "company": "Int32",
    "days_in_waiting_list": "int16",
    "customer_type": "category",
    "adr": "float32",
    "required_car_parking_spaces": "int8",
    "total_of_special_requests": "int8",
    "reservation_status": "category"
})
df["reservation_status_date"] = pd.to_datetime(df["reservation_status_date"])
#Agregar columna de año y mes
df['year_month'] = df['reservation_status_date'].dt.to_period('M')
df.info()
#con estas conversiones a tipos de datos mas adecuados, el uso de memoria fueu
\hookrightarrow optimizado
#Antes: memory usage: 20.3 MB
#Ahora: memory usage: 6.8 MB
```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119390 entries, 0 to 119389

Data columns (total 33 columns):

#	Column	Non-Null Count	Dtype
0	hotel	119390 non-null	category
1	is_canceled	119390 non-null	boolean
2	lead_time	119390 non-null	int16
3	arrival_date_year	119390 non-null	int16
4	arrival_date_month	119390 non-null	category
5	arrival_date_week_number	119390 non-null	int8
6	arrival_date_day_of_month	119390 non-null	int8
7	stays_in_weekend_nights	119390 non-null	int8
8	stays_in_week_nights	119390 non-null	int8
9	adults	119390 non-null	int8
10	children	119386 non-null	Int32
11	babies	119390 non-null	int8
12	meal	119390 non-null	category
13	country	118902 non-null	category
14	market_segment	119390 non-null	category
15	distribution_channel	119390 non-null	category
16	is_repeated_guest	119390 non-null	boolean
17	previous_cancellations	119390 non-null	int8
18	previous_bookings_not_canceled	119390 non-null	int8
19	reserved_room_type	119390 non-null	category

```
20 assigned_room_type
                                          119390 non-null category
      21 booking_changes
                                         119390 non-null int8
      22 deposit_type
                                          119390 non-null category
      23 agent
                                          103050 non-null Int32
      24 company
                                          6797 non-null Int32
      25 days_in_waiting_list
                                          119390 non-null int16
                                         119390 non-null category
      26 customer type
                                         119390 non-null float32
      27 adr
      28 required car parking spaces
                                         119390 non-null int8
                                          119390 non-null int8
      29 total_of_special_requests
                                          119390 non-null category
      30 reservation_status
      31 reservation_status_date
                                         119390 non-null datetime64[ns]
      32 year_month
                                          119390 non-null period[M]
     dtypes: Int32(3), boolean(2), category(11), datetime64[ns](1), float32(1),
     int16(3), int8(11), period[M](1)
     memory usage: 7.8 MB
[44]: #Consistencia en valores categóricos:
      #Elegi convertir todos los valores que denomine como 'Categoricos' a Numpu
      →Arrays para una visualizacion
      #de errores mas sencilla, en caso de que los hayan
     print(np.array(df['hotel'].unique()))
     print('\n')
     print(np.array(df['arrival_date_month'].unique()))
     print('\n')
     print(np.array(df['deposit_type'].unique()))
     print('\n')
     print(np.array(df['meal'].unique()))
     print('\n')
     print(np.array(df['country'].unique()))
     print('\n')
     print(np.array(df['market_segment'].unique()))
     print('\n')
     print(np.array(df['distribution_channel'].unique()))
     print('\n')
     print(np.array(df['reserved_room_type'].unique()))
     print('\n')
     print(np.array(df['assigned_room_type'].unique()))
```

```
print('\n')
print(np.array(df['customer_type'].unique()))
print('\n')
print(np.array(df['reservation_status'].unique()))
print('\n')
['Resort Hotel' 'City Hotel']
['July' 'August' 'September' 'October' 'November' 'December' 'January'
'February' 'March' 'April' 'May' 'June']
['No Deposit' 'Refundable' 'Non Refund']
['BB' 'FB' 'HB' 'SC' 'Undefined']
['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']
['Direct' 'Corporate' 'Online TA' 'Offline TA/TO' 'Complementary' 'Groups'
'Undefined' 'Aviation']
['Direct' 'Corporate' 'TA/TO' 'Undefined' 'GDS']
['C' 'A' 'D' 'E' 'G' 'F' 'H' 'L' 'P' 'B']
```

```
['Transient' 'Contract' 'Transient-Party' 'Group']
     ['Check-Out' 'Canceled' 'No-Show']
[45]: #Correccion:
      #Varias columnas contenian valores 'Undefined', decidi corregirlas basandome en
       → la informacion (que adjunte) del DataSet proporcionada
      #en la pagina de Kaggle
      #Type of meal booked. Categories are presented in standard hospitality meal
       →packages: Undefined/SC - no meal
      df['meal'] = df['meal'].replace(['Undefined', 'SC'], 'No Meal')
      #Market segment designation. In categories, the term "TA" means "Travel Agents"
       ⇔and "TO" means "Tour Operators"
      df['market segment'] = df['market segment'].replace(['Undefined'], ' ')
      #Booking distribution channel. The term "TA" means "Travel Agents" and "TO"
       ⇔means "Tour Operators"
      df['distribution_channel'] = df['distribution_channel'].replace(['Undefined'],__
       \hookrightarrow 1 1)
     <ipython-input-45-c77d8cf8b761>:6: FutureWarning: The behavior of Series.replace
     (and DataFrame.replace) with CategoricalDtype is deprecated. In a future
     version, replace will only be used for cases that preserve the categories. To
     change the categories, use ser.cat.rename_categories instead.
       df['meal'] = df['meal'].replace(['Undefined', 'SC'], 'No Meal')
     <ipython-input-45-c77d8cf8b761>:9: FutureWarning: The behavior of Series.replace
     (and DataFrame.replace) with CategoricalDtype is deprecated. In a future
     version, replace will only be used for cases that preserve the categories. To
     change the categories, use ser.cat.rename_categories instead.
       df['market_segment'] = df['market_segment'].replace(['Undefined'], ' ')
     <ipython-input-45-c77d8cf8b761>:12: FutureWarning: The behavior of
     Series.replace (and DataFrame.replace) with CategoricalDtype is deprecated. In a
     future version, replace will only be used for cases that preserve the
     categories. To change the categories, use ser.cat.rename_categories instead.
       df['distribution_channel'] = df['distribution_channel'].replace(['Undefined'],
     ' ')
```

['C' 'A' 'D' 'E' 'G' 'F' 'I' 'B' 'H' 'P' 'L' 'K']

```
[46]: #Manejo de valores faltantes
      df.columns[df.isnull().any()]
                                      #Index(['children', 'country', 'agent', __
       ⇔'company'], dtype='object')
      null = df[['children', 'country', 'agent', 'company']].isnull().sum()
      print(null)
     children
     country
                    488
     agent
                  16340
     company
                 112593
     dtype: int64
[47]: #Correccion:
      #Number of children
      df['children'] = df['children'].fillna(0)
      #Country of origin. Categories are represented in the ISO 3155-3:2013 format
      df['country'] = df['country'].cat.add_categories('Unknown') #primero agregar la_1
       →categoria Unknown, ya que es una columna tipo Categorico
      df['country'] = df['country'].fillna('Unknown')
      #ID of the travel agency that made the booking
      df['agent'] = df['agent'].fillna(-1) #ya que la columna es de tipo INT, elu
       ⇔valor '-1' significaria lo mismo que 'UNKNOWN'
      #ID of the company/entity that made the booking or responsible for paying the
      shooking. ID is presented instead of designation for anonymity reasons
      df['company'] = df['company'].fillna(-1)
      #comprobar exito
      null = df[['children', 'country', 'agent', 'company']].isnull().sum()
      print(null)
     children
     country
     agent
                 0
     company
                 0
     dtype: int64
[48]: #Detección de datos anómalos: por ejemplo, estancias mayores a 30 noches
      #cree una columna nueva para calcular el total de noches que el huesped se_{\sqcup}
       ⇔hospedo en el hotel
      df['Total_Stays'] = df['stays_in_weekend_nights'] + df['stays_in_week_nights']
```

```
print(df[df['Total_Stays'] > 100])
#No existe algun valor que se pueda considerar anomalo
```

Empty DataFrame

Columns: [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, year_month, Total_Stays]
Index: []

[0 rows x 34 columns]

Análisis estadístico descriptivo basico

```
[49]: variables_clave = ['adr', 'lead_time', 'stays_in_week_nights']
df[variables_clave].describe()
```

```
[49]:
                       adr
                                lead_time stays_in_week_nights
      count 119390.000000 119390.000000
                                                   119390.000000
     mean
                101.831123
                               104.011416
                                                        2.500302
      std
                 50.533749
                               106.863097
                                                        1.908286
     min
                 -6.380000
                                 0.000000
                                                        0.000000
      25%
                 69.290001
                                18.000000
                                                        1.000000
      50%
                 94.574997
                                69.000000
                                                        2.000000
      75%
                126.000000
                               160.000000
                                                        3.000000
               5400.000000
                               737.000000
                                                       50.000000
     max
```

```
[50]: cancelaciones = df['is_canceled'].value_counts(normalize=True)
    print("Proporción de reservas canceladas:")
    print(cancelaciones)
```

Proporción de reservas canceladas:

is canceled

False 0.629584 True 0.370416

Name: proportion, dtype: Float64

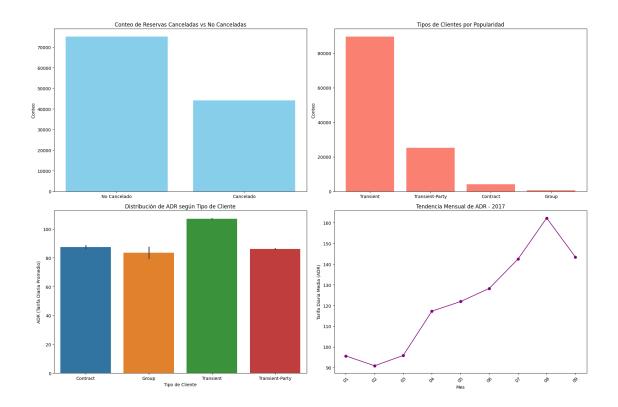
Visualización de Resultados

```
[51]: fig, axes = plt.subplots(nrows=2, ncols=2, figsize=(18, 12))

tipo_cliente = df['customer_type'].value_counts()
cancelado = df['is_canceled'].value_counts()
```

```
#Conteo de Reservas Canceladas vs No Canceladas
axes[0, 0].bar(cancelado.index.astype(str), cancelado.values, color='skyblue')
axes[0, 0].set_title('Conteo de Reservas Canceladas vs No Canceladas')
axes[0, 0].set_ylabel('Conteo')
axes[0, 0].set_xticks([0, 1])
axes[0, 0].set_xticklabels(['No Cancelado', 'Cancelado'])
#La mayoría de las reservas no fueron canceladas.
#Tipos de Clientes por Popularidad
axes[0, 1].bar(tipo_cliente.index.astype(str), tipo_cliente.values,_

¬color='salmon')
axes[0, 1].set_title('Tipos de Clientes por Popularidad')
axes[0, 1].set_ylabel('Conteo')
#El tipo de cliente "Transient" es el más popular.
#Distribución de ADR según Tipo de Cliente
sns.barplot(x='customer_type', y='adr', data=df, ax=axes[1, 0], __
 ⇔hue='customer type')
axes[1, 0].set_title('Distribución de ADR según Tipo de Cliente')
axes[1, 0].set_xlabel('Tipo de Cliente')
axes[1, 0].set_ylabel('ADR (Tarifa Diaria Promedio)')
#Tendencia Mensual de ADR
ano_reciente = df['year_month'].max().year
adr_mensual_ano_reciente = df[df['year_month'].dt.year == este_ano].
 ⇒groupby('year month')['adr'].mean()
axes[1, 1].plot(adr_mensual_ano_reciente.index.strftime('\m'),_
 →adr_mensual_ano_reciente.values, marker='o', color='purple')
axes[1, 1].set_title(f'Tendencia Mensual de ADR - {ano_reciente}')
axes[1, 1].set_xlabel('Mes')
axes[1, 1].set ylabel('Tarifa Diaria Media (ADR)')
axes[1, 1].tick_params(axis='x', rotation=45)
# Ajustar diseño y mostrar
plt.tight_layout()
plt.show()
```



```
[52]: #Visualizaciones exploratorias multivariadas:
      fig, axes = plt.subplots(ncols=2, figsize=(15,5))
      #primer grafico
      df['month'] = df['reservation_status_date'].dt.to_period('M')
      sumario_meses = df.groupby(['month', 'is_canceled']).size().

unstack(fill_value=0)
      sumario_meses.plot(kind='line', ax=axes[0])
      axes[0].set_title('Tendencias Mensuales de Reservas y Cancelaciones')
      axes[0].set_ylabel('Conteo')
      axes[0].set_xlabel('Mes y Año')
      axes[0].legend(title='Reservas', labels=['No cancelado', 'Cancelado'])
      #segundo grafico
      hotel_deposito = df.groupby(['hotel', 'deposit_type']).size().

unstack(fill_value=0)
      hotel_deposito.plot(kind='bar', ax=axes[1])
      axes[1].set_title('Tipo de deposito mas popular segun el tipo de hotel')
      axes[1].set_ylabel('Conteo')
      axes[1].set_xlabel('Tipo de Hotel')
      axes[1].legend(title='Tipo de Deposito')
      plt.xticks(rotation=0)
```

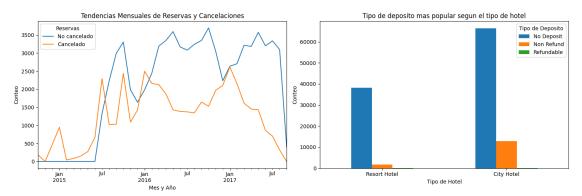
```
#Se observa que en ambos tipos de hoteles, la gran mayoria de clientes no dejou un deposito previo

#Analisis estadístico descriptivo variables_clave = ['adr', 'lead_time', 'stays_in_week_nights'] df[variables_clave].describe()

plt.tight_layout() plt.show()
```

<ipython-input-52-f846348ceb00>:14: FutureWarning: The default of observed=False
is deprecated and will be changed to True in a future version of pandas. Pass
observed=False to retain current behavior or observed=True to adopt the future
default and silence this warning.

```
hotel_deposito = df.groupby(['hotel',
'deposit_type']).size().unstack(fill_value=0)
```



2 Identificación de tendencias:

Tendencias de Cancelación:

Al analizar los datos de los gráficos, podemos ver tendencias importantes en la cancelación de reservas. En el gráfico lineal "Tendencias Mensuales de Reservas y Cancelaciones", especialmente a mediados de año, hay un aumento en las cancelaciones. Esto podría indicar tendencias estacionales o factores externos que afectan las cancelaciones en esos momentos. En el gráfico de barras "Conteo de Reservas Canceladas vs No Canceladas", vemos que la mayoría de los clientes cumplen con sus reservas.

Perfil de Clientes:

En el gráfico "Tipos de clientes por popularidad", la mayoría son del segmento "transitorio", lo que sugiere que la mayor parte de los clientes son viajeros individuales, mientras que las reservas "grupales" son menos comunes. Esto da información sobre la composición de clientes según el tipo de reservas.

Política de Depósitos por Tipo de Hotel:

En el gráfico de tipos de depósitos, la opción "Sin depósito" es común tanto en hoteles urbanos como turísticos. Pero los depósitos no reembolsables son más comunes en hoteles urbanos, lo que indica políticas de cancelación más estrictas en los hoteles urbanos.

Tendencias Mensuales:

Al examinar las tendencias mensuales, vemos un patrón cíclico en las reservas a lo largo de los años. Hay picos en ciertos meses, probablemente en verano o vacaciones, reflejando una mayor demanda en esos momentos. Estas tendencias destacan aspectos importantes que los directores de hoteles deberían considerar al establecer precios, implementar estrategias de marketing y gestionar inventarios, especialmente cuando hay alta demanda y riesgo de cancelaciones. Si le interesa un análisis más detallado de esta información, por favor infórmenos.