call-list

February 2, 2024

Data cleaning in pandas

[1]:
```
# Import the pandas library
import pandas as pd
```

[2]:
```
# Read the CSV file into a DataFrame and assign it to the variable 'df'
df = pd.read_csv("E:\PYTHON\Customer call list\Customer Call List.csv")
```

```
<>:2: SyntaxWarning: invalid escape sequence '\P'
<>:2: SyntaxWarning: invalid escape sequence '\P'
C:\Users\Admin\AppData\Local\Temp\ipykernel_9896\2024009910.py:2: SyntaxWarning:
invalid escape sequence '\P'
  df = pd.read_csv("E:\PYTHON\Customer call list\Customer Call List.csv")
```

[3]:
```
df
```

[3]:

	CustomerID	First_Name	Last_Name	Phone_Number	\
0	1001	Frodo	Baggins	123-545-5421	
1	1002	Abed	Nadir	123/643/9775	
2	1003	Walter	/White	7066950392	
3	1004	Dwight	Schrute	123-543-2345	
4	1005	Jon	Snow	876|678|3469	
5	1006	Ron	Swanson	304-762-2467	
6	1007	Jeff	Winger	NaN	
7	1008	Sherlock	Holmes	876|678|3469	
8	1009	Gandalf	NaN	N/a	
9	1010	Peter	Parker	123-545-5421	
10	1011	Samwise	Gamgee	NaN	
11	1012	Harry	…Potter	7066950392	
12	1013	Don	Draper	123-543-2345	
13	1014	Leslie	Knope	876|678|3469	
14	1015	Toby	Flenderson_	304-762-2467	
15	1016	Ron	Weasley	123-545-5421	
16	1017	Michael	Scott	123/643/9775	
17	1018	Clark	Kent	7066950392	
18	1019	Creed	Braton	N/a	
19	1020	Anakin	Skywalker	876|678|3469	
20	1020	Anakin	Skywalker	876|678|3469	

	Address	Paying Customer	Do_Not_Contact	\
0	123 Shire Lane, Shire	Yes	No	
1	93 West Main Street	No	Yes	
2	298 Drugs Driveway	N	NaN	
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y	
4	123 Dragons Road	Y	No	
5	768 City Parkway	Yes	Yes	
6	1209 South Street	No	No	
7	98 Clue Drive	N	No	
8	123 Middle Earth	Yes	NaN	
9	25th Main Street, New York	Yes	No	
10	612 Shire Lane, Shire	Yes	No	
11	2394 Hogwarts Avenue	Y	NaN	
12	2039 Main Street	Yes	N	
13	343 City Parkway	Yes	No	
14	214 HR Avenue	N	No	
15	2395 Hogwarts Avenue	No	N	
16	121 Paper Avenue, Pennsylvania	Yes	No	
17	3498 Super Lane	Y	NaN	
18	N/a	N/a	Yes	
19	910 Tatooine Road, Tatooine	Yes	N	
20	910 Tatooine Road, Tatooine	Yes	N	

	Not_Useful_Column
0	True
1	False
2	True
3	True
4	True
5	True
6	False
7	False
8	False
9	True
10	True
11	True
12	False
13	False
14	False
15	False
16	False
17	True
18	True
19	True
20	True

Remove duplicates

[4]:
```
# Remove duplicate rows from the DataFrame 'df'

df = df.drop_duplicates()
```

[5]:
```
df
```

[5]:

	CustomerID	First_Name	Last_Name	Phone_Number	Address	Paying Customer	Do_Not_Contact
0	1001	Frodo	Baggins	123-545-5421	123 Shire Lane, Shire	Yes	No
1	1002	Abed	Nadir	123/643/9775	93 West Main Street	No	Yes
2	1003	Walter	/White	7066950392	298 Drugs Driveway	N	NaN
3	1004	Dwight	Schrute	123-543-2345	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	1005	Jon	Snow	876|678|3469	123 Dragons Road	Y	No
5	1006	Ron	Swanson	304-762-2467	768 City Parkway	Yes	Yes
6	1007	Jeff	Winger	NaN	1209 South Street	No	No
7	1008	Sherlock	Holmes	876|678|3469	98 Clue Drive	N	No
8	1009	Gandalf	NaN	N/a	123 Middle Earth	Yes	NaN
9	1010	Peter	Parker	123-545-5421	25th Main Street, New York	Yes	No
10	1011	Samwise	Gamgee	NaN	612 Shire Lane, Shire	Yes	No
11	1012	Harry	…Potter	7066950392	2394 Hogwarts Avenue	Y	NaN
12	1013	Don	Draper	123-543-2345	2039 Main Street	Yes	N
13	1014	Leslie	Knope	876|678|3469	343 City Parkway	Yes	No
14	1015	Toby	Flenderson_	304-762-2467	214 HR Avenue	N	No
15	1016	Ron	Weasley	123-545-5421	2395 Hogwarts Avenue	No	N
16	1017	Michael	Scott	123/643/9775	121 Paper Avenue, Pennsylvania	Yes	No
17	1018	Clark	Kent	7066950392	3498 Super Lane	Y	NaN
18	1019	Creed	Braton	N/a			
19	1020	Anakin	Skywalker	876|678|3469			

```
18                                    N/a             N/a            Yes
19            910 Tatooine Road, Tatooine             Yes              N

    Not_Useful_Column
0                True
1               False
2                True
3                True
4                True
5                True
6               False
7               False
8               False
9                True
10               True
11               True
12              False
13              False
14              False
15              False
16              False
17               True
18               True
19               True
```

Droping column

[6]:
```
# Drop the column named "Not_Useful_Column" from the DataFrame 'df'

df =  df.drop(columns="Not_Useful_Column")
```

[7]:
```
df
```

[7]:
```
    CustomerID First_Name    Last_Name  Phone_Number  \
0         1001      Frodo      Baggins  123-545-5421
1         1002       Abed        Nadir  123/643/9775
2         1003     Walter       /White    7066950392
3         1004     Dwight      Schrute  123-543-2345
4         1005        Jon         Snow  876|678|3469
5         1006        Ron      Swanson  304-762-2467
6         1007       Jeff       Winger           NaN
7         1008   Sherlock       Holmes  876|678|3469
8         1009    Gandalf          NaN           N/a
9         1010      Peter       Parker  123-545-5421
10        1011    Samwise       Gamgee           NaN
11        1012      Harry    …Potter    7066950392
12        1013        Don       Draper  123-543-2345
```

```
13         1014     Leslie        Knope  876|678|3469
14         1015       Toby  Flenderson_  304-762-2467
15         1016        Ron      Weasley  123-545-5421
16         1017   Michael         Scott  123/643/9775
17         1018      Clark         Kent    7066950392
18         1019      Creed       Braton           N/a
19         1020     Anakin    Skywalker  876|678|3469
```

	Address	Paying Customer	Do_Not_Contact
0	123 Shire Lane, Shire	Yes	No
1	93 West Main Street	No	Yes
2	298 Drugs Driveway	N	NaN
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	123 Dragons Road	Y	No
5	768 City Parkway	Yes	Yes
6	1209 South Street	No	No
7	98 Clue Drive	N	No
8	123 Middle Earth	Yes	NaN
9	25th Main Street, New York	Yes	No
10	612 Shire Lane, Shire	Yes	No
11	2394 Hogwarts Avenue	Y	NaN
12	2039 Main Street	Yes	N
13	343 City Parkway	Yes	No
14	214 HR Avenue	N	No
15	2395 Hogwarts Avenue	No	N
16	121 Paper Avenue, Pennsylvania	Yes	No
17	3498 Super Lane	Y	NaN
18	N/a	N/a	Yes
19	910 Tatooine Road, Tatooine	Yes	N

Using `strip` to Remove Unnecessary Strings in `Last Name` Column

[8]:
```
# Strip specified characters from the 'Last_Name' column in the DataFrame 'df'
#df["Last_Name"] = df["Last_Name"].str.lstrip("...")
#df["Last_Name"] = df["Last_Name"].str.lstrip("/")
#df["Last_Name"] = df["Last_Name"].str.rstrip("_")
df['Last_Name'] = df['Last_Name'].str.strip("123./_")
```

[9]:
```
df
```

[9]:

	CustomerID	First_Name	Last_Name	Phone_Number
0	1001	Frodo	Baggins	123-545-5421
1	1002	Abed	Nadir	123/643/9775
2	1003	Walter	White	7066950392
3	1004	Dwight	Schrute	123-543-2345
4	1005	Jon	Snow	876|678|3469
5	1006	Ron	Swanson	304-762-2467

6	1007	Jeff	Winger	NaN	
7	1008	Sherlock	Holmes	876|678|3469	
8	1009	Gandalf	NaN	N/a	
9	1010	Peter	Parker	123-545-5421	
10	1011	Samwise	Gamgee	NaN	
11	1012	Harry	Potter	7066950392	
12	1013	Don	Draper	123-543-2345	
13	1014	Leslie	Knope	876|678|3469	
14	1015	Toby	Flenderson	304-762-2467	
15	1016	Ron	Weasley	123-545-5421	
16	1017	Michael	Scott	123/643/9775	
17	1018	Clark	Kent	7066950392	
18	1019	Creed	Braton	N/a	
19	1020	Anakin	Skywalker	876|678|3469	

	Address	Paying Customer	Do_Not_Contact
0	123 Shire Lane, Shire	Yes	No
1	93 West Main Street	No	Yes
2	298 Drugs Driveway	N	NaN
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	123 Dragons Road	Y	No
5	768 City Parkway	Yes	Yes
6	1209 South Street	No	No
7	98 Clue Drive	N	No
8	123 Middle Earth	Yes	NaN
9	25th Main Street, New York	Yes	No
10	612 Shire Lane, Shire	Yes	No
11	2394 Hogwarts Avenue	Y	NaN
12	2039 Main Street	Yes	N
13	343 City Parkway	Yes	No
14	214 HR Avenue	N	No
15	2395 Hogwarts Avenue	No	N
16	121 Paper Avenue, Pennsylvania	Yes	No
17	3498 Super Lane	Y	NaN
18	N/a	N/a	Yes
19	910 Tatooine Road, Tatooine	Yes	N

Using `strip` to Remove Unnecessary Strings in `Phone Number` Column

[10]:
```
df
```

[10]:

	CustomerID	First_Name	Last_Name	Phone_Number	\
0	1001	Frodo	Baggins	123-545-5421	
1	1002	Abed	Nadir	123/643/9775	
2	1003	Walter	White	7066950392	
3	1004	Dwight	Schrute	123-543-2345	
4	1005	Jon	Snow	876|678|3469	

```
5         1006        Ron     Swanson  304-762-2467
6         1007       Jeff      Winger           NaN
7         1008   Sherlock      Holmes  876|678|3469
8         1009    Gandalf         NaN           N/a
9         1010      Peter      Parker  123-545-5421
10        1011    Samwise      Gamgee           NaN
11        1012      Harry      Potter    7066950392
12        1013        Don      Draper  123-543-2345
13        1014     Leslie       Knope  876|678|3469
14        1015       Toby  Flenderson  304-762-2467
15        1016        Ron     Weasley  123-545-5421
16        1017   Michael        Scott  123/643/9775
17        1018      Clark        Kent    7066950392
18        1019      Creed      Braton           N/a
19        1020     Anakin   Skywalker  876|678|3469
```

	Address	Paying Customer	Do_Not_Contact
0	123 Shire Lane, Shire	Yes	No
1	93 West Main Street	No	Yes
2	298 Drugs Driveway	N	NaN
3	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	123 Dragons Road	Y	No
5	768 City Parkway	Yes	Yes
6	1209 South Street	No	No
7	98 Clue Drive	N	No
8	123 Middle Earth	Yes	NaN
9	25th Main Street, New York	Yes	No
10	612 Shire Lane, Shire	Yes	No
11	2394 Hogwarts Avenue	Y	NaN
12	2039 Main Street	Yes	N
13	343 City Parkway	Yes	No
14	214 HR Avenue	N	No
15	2395 Hogwarts Avenue	No	N
16	121 Paper Avenue, Pennsylvania	Yes	No
17	3498 Super Lane	Y	NaN
18	N/a	N/a	Yes
19	910 Tatooine Road, Tatooine	Yes	N

[11]:
```
#Phone Number cleaning
df['Phone_Number'] = df['Phone_Number'].str.replace(r'\D', '', regex=True)  #␣
 ↪Remove non-numeric characters
df['Phone_Number'] = df['Phone_Number'].str[-10:]  # Keep the last 10 digits
df['Phone_Number'] = df['Phone_Number'].str[:3] + '-' + df['Phone_Number'].
 ↪str[3:6] + '-' + df['Phone_Number'].str[6:]  # Format as XXX-XXX-XXXX
```

[12]:
```
df['Phone_Number']
```

[12]:
```
0     123-545-5421
1     123-643-9775
2     706-695-0392
3     123-543-2345
4     876-678-3469
5     304-762-2467
6              NaN
7     876-678-3469
8               --
9     123-545-5421
10             NaN
11    706-695-0392
12    123-543-2345
13    876-678-3469
14    304-762-2467
15    123-545-5421
16    123-643-9775
17    706-695-0392
18              --
19    876-678-3469
Name: Phone_Number, dtype: object
```

[13]:
```
# Replace NaN values with blank (empty string) in the 'Phone_Number' column
df['Phone_Number'] = df['Phone_Number'].fillna('')
```

[14]:
```
df['Phone_Number']
```

[14]:
```
0     123-545-5421
1     123-643-9775
2     706-695-0392
3     123-543-2345
4     876-678-3469
5     304-762-2467
6
7     876-678-3469
8               --
9     123-545-5421
10
11    706-695-0392
12    123-543-2345
13    876-678-3469
14    304-762-2467
15    123-545-5421
16    123-643-9775
17    706-695-0392
18              --
19    876-678-3469
```

```
Name: Phone_Number, dtype: object
```

[15]:
```
# Remove occurrences of '--' in the 'Phone_Number' column
df['Phone_Number'] = df['Phone_Number'].str.replace('--', '')
```

[16]:
```
df
```

[16]:

	CustomerID	First_Name	Last_Name	Phone_Number	Address	Paying Customer	Do_Not_Contact
0	1001	Frodo	Baggins	123-545-5421	123 Shire Lane, Shire	Yes	No
1	1002	Abed	Nadir	123-643-9775	93 West Main Street	No	Yes
2	1003	Walter	White	706-695-0392	298 Drugs Driveway	N	NaN
3	1004	Dwight	Schrute	123-543-2345	980 Paper Avenue, Pennsylvania, 18503	Yes	Y
4	1005	Jon	Snow	876-678-3469	123 Dragons Road	Y	No
5	1006	Ron	Swanson	304-762-2467	768 City Parkway	Yes	Yes
6	1007	Jeff	Winger		1209 South Street	No	No
7	1008	Sherlock	Holmes	876-678-3469	98 Clue Drive	N	No
8	1009	Gandalf	NaN		123 Middle Earth	Yes	NaN
9	1010	Peter	Parker	123-545-5421	25th Main Street, New York	Yes	No
10	1011	Samwise	Gamgee		612 Shire Lane, Shire	Yes	No
11	1012	Harry	Potter	706-695-0392	2394 Hogwarts Avenue	Y	NaN
12	1013	Don	Draper	123-543-2345	2039 Main Street	Yes	N
13	1014	Leslie	Knope	876-678-3469	343 City Parkway	Yes	No
14	1015	Toby	Flenderson	304-762-2467	214 HR Avenue	N	No
15	1016	Ron	Weasley	123-545-5421	2395 Hogwarts Avenue	No	N
16	1017	Michael	Scott	123-643-9775	121 Paper Avenue, Pennsylvania	Yes	No
17	1018	Clark	Kent	706-695-0392			
18	1019	Creed	Braton				
19	1020	Anakin	Skywalker	876-678-3469			

```
17                          3498 Super Lane               Y            NaN
18                                     N/a             N/a            Yes
19             910 Tatooine Road, Tatooine             Yes              N
```

Spliting Address column

[17]:
```
df[['Street_Address', 'State', 'Zipcode']] = df['Address'].str.split(',',␣
↪expand=True)

df['Address']
```

[17]:
```
0                     123 Shire Lane, Shire
1                       93 West Main Street
2                        298 Drugs Driveway
3     980 Paper Avenue, Pennsylvania, 18503
4                           123 Dragons Road
5                           768 City Parkway
6                          1209 South Street
7                              98 Clue Drive
8                           123 Middle Earth
9                  25th Main Street, New York
10                      612 Shire Lane, Shire
11                       2394 Hogwarts Avenue
12                           2039 Main Street
13                           343 City Parkway
14                              214 HR Avenue
15                       2395 Hogwarts Avenue
16             121 Paper Avenue, Pennsylvania
17                           3498 Super Lane
18                                       N/a
19                910 Tatooine Road, Tatooine
Name: Address, dtype: object
```

[18]:
```
df
```

[18]:
```
    CustomerID First_Name   Last_Name  Phone_Number  \
0         1001      Frodo     Baggins  123-545-5421
1         1002       Abed       Nadir  123-643-9775
2         1003     Walter       White  706-695-0392
3         1004     Dwight     Schrute  123-543-2345
4         1005        Jon        Snow  876-678-3469
5         1006        Ron     Swanson  304-762-2467
6         1007       Jeff      Winger
7         1008   Sherlock      Holmes  876-678-3469
8         1009    Gandalf         NaN
9         1010      Peter      Parker  123-545-5421
10        1011    Samwise      Gamgee
```

```
11        1012      Harry      Potter  706-695-0392
12        1013        Don      Draper  123-543-2345
13        1014     Leslie       Knope  876-678-3469
14        1015       Toby  Flenderson  304-762-2467
15        1016        Ron     Weasley  123-545-5421
16        1017   Michael        Scott  123-643-9775
17        1018      Clark         Kent  706-695-0392
18        1019      Creed      Braton
19        1020     Anakin   Skywalker  876-678-3469

                                  Address Paying Customer Do_Not_Contact  \
0                   123 Shire Lane, Shire             Yes             No
1                     93 West Main Street              No            Yes
2                      298 Drugs Driveway               N            NaN
3   980 Paper Avenue, Pennsylvania, 18503             Yes              Y
4                         123 Dragons Road               Y             No
5                         768 City Parkway             Yes            Yes
6                        1209 South Street              No             No
7                            98 Clue Drive               N             No
8                         123 Middle Earth             Yes            NaN
9               25th Main Street, New York             Yes             No
10                   612 Shire Lane, Shire             Yes             No
11                    2394 Hogwarts Avenue               Y            NaN
12                        2039 Main Street             Yes              N
13                        343 City Parkway             Yes             No
14                           214 HR Avenue               N             No
15                    2395 Hogwarts Avenue              No              N
16          121 Paper Avenue, Pennsylvania             Yes             No
17                          3498 Super Lane               Y            NaN
18                                     N/a             N/a            Yes
19             910 Tatooine Road, Tatooine             Yes              N

          Street_Address          State Zipcode
0          123 Shire Lane          Shire    None
1     93 West Main Street           None    None
2      298 Drugs Driveway           None    None
3        980 Paper Avenue   Pennsylvania   18503
4        123 Dragons Road           None    None
5        768 City Parkway           None    None
6       1209 South Street           None    None
7           98 Clue Drive           None    None
8        123 Middle Earth           None    None
9        25th Main Street       New York    None
10         612 Shire Lane          Shire    None
11  2394 Hogwarts Avenue           None    None
12      2039 Main Street           None    None
13      343 City Parkway           None    None
```

```
14         214 HR Avenue            None    None
15  2395 Hogwarts Avenue            None    None
16     121 Paper Avenue    Pennsylvania    None
17      3498 Super Lane            None    None
18                  N/a            None    None
19    910 Tatooine Road         Tatooine    None
```

Replace values in Paying Customer and data cleaning

[19]:
```
df['Paying Customer'] = df['Paying Customer'].str.replace('No', 'N')
```

[20]:
```
df['Paying Customer'] = df['Paying Customer'].str.replace('Yes', 'Y')
```

[21]:
```
df['Paying Customer']
```

[21]:
```
0       Y
1       N
2       N
3       Y
4       Y
5       Y
6       N
7       N
8       Y
9       Y
10      Y
11      Y
12      Y
13      Y
14      N
15      N
16      Y
17      Y
18    N/a
19      Y
Name: Paying Customer, dtype: object
```

Replace N/a and NaN values to Blank

[22]:
```
df = df.replace('N/a','')
```

[23]:
```
df = df.replace('NaN','') # this not works because its actually blank

# another method

df = df.fillna('')
```

[24]:
```
df
```

[24]:

	CustomerID	First_Name	Last_Name	Phone_Number	Address	Paying Customer	Do_Not_Contact	Street_Address	State	Zipcode
0	1001	Frodo	Baggins	123-545-5421	123 Shire Lane, Shire	Y	No			
1	1002	Abed	Nadir	123-643-9775	93 West Main Street	N	Yes			
2	1003	Walter	White	706-695-0392	298 Drugs Driveway	N				
3	1004	Dwight	Schrute	123-543-2345	980 Paper Avenue, Pennsylvania, 18503	Y	Y			
4	1005	Jon	Snow	876-678-3469	123 Dragons Road	Y	No			
5	1006	Ron	Swanson	304-762-2467	768 City Parkway	Y	Yes			
6	1007	Jeff	Winger		1209 South Street	N	No			
7	1008	Sherlock	Holmes	876-678-3469	98 Clue Drive	N	No			
8	1009	Gandalf			123 Middle Earth	Y				
9	1010	Peter	Parker	123-545-5421	25th Main Street, New York	Y	No			
10	1011	Samwise	Gamgee		612 Shire Lane, Shire	Y	No			
11	1012	Harry	Potter	706-695-0392	2394 Hogwarts Avenue	Y				
12	1013	Don	Draper	123-543-2345	2039 Main Street	Y	N			
13	1014	Leslie	Knope	876-678-3469	343 City Parkway	Y	No			
14	1015	Toby	Flenderson	304-762-2467	214 HR Avenue	N	No			
15	1016	Ron	Weasley	123-545-5421	2395 Hogwarts Avenue	N	N			
16	1017	Michael	Scott	123-643-9775	121 Paper Avenue, Pennsylvania	Y	No			
17	1018	Clark	Kent	706-695-0392	3498 Super Lane	Y				
18	1019	Creed	Braton				Yes			
19	1020	Anakin	Skywalker	876-678-3469	910 Tatooine Road, Tatooine	Y	N			

```
0         123 Shire Lane          Shire
1    93 West Main Street
2     298 Drugs Driveway
3       980 Paper Avenue   Pennsylvania   18503
4       123 Dragons Road
5       768 City Parkway
6      1209 South Street
7          98 Clue Drive
8       123 Middle Earth
9       25th Main Street       New York
10        612 Shire Lane          Shire
11  2394 Hogwarts Avenue
12      2039 Main Street
13      343 City Parkway
14         214 HR Avenue
15  2395 Hogwarts Avenue
16      121 Paper Avenue   Pennsylvania
17       3498 Super Lane
18
19     910 Tatooine Road       Tatooine
```

Replace values in Do_Not_Contact and data cleaning

[25]:
```
df['Do_Not_Contact'] = df['Do_Not_Contact'].str.replace('Yes', 'Y')
```

[26]:
```
df['Do_Not_Contact'] = df['Do_Not_Contact'].str.replace('No', 'N')
```

[27]:
```
df['Do_Not_Contact']
```

[27]:
```
0     N
1     Y
2
3     Y
4     N
5     Y
6     N
7     N
8
9     N
10    N
11
12    N
13    N
14    N
15    N
16    N
17
```

```
18    Y
19    N
Name: Do_Not_Contact, dtype: object
```

oop through each index in the DataFrame

Check if the `Do_Not_Contact` value at index x is equal to 'Y'

Drop the row with index x if `Do_Not_Contact` is 'Y'

[28]:
```
# Iterate over each index in the DataFrame
for x in df.index:
    # Check if the 'Do_Not_Contact' value at index x is equal to 'Y'
    if df.loc[x, "Do_Not_Contact"] == 'Y':
        # Drop the row with index x if 'Do_Not_Contact' is 'Y'
        df.drop(x, inplace=True)
df
```

[28]:

	CustomerID	First_Name	Last_Name	Phone_Number	Address	Paying Customer	Do_Not_Contact
0	1001	Frodo	Baggins	123-545-5421	123 Shire Lane, Shire	Y	N
2	1003	Walter	White	706-695-0392	298 Drugs Driveway	N	
4	1005	Jon	Snow	876-678-3469	123 Dragons Road	Y	N
6	1007	Jeff	Winger		1209 South Street	N	N
7	1008	Sherlock	Holmes	876-678-3469	98 Clue Drive	N	N
8	1009	Gandalf			123 Middle Earth	Y	
9	1010	Peter	Parker	123-545-5421	25th Main Street, New York	Y	N
10	1011	Samwise	Gamgee		612 Shire Lane, Shire	Y	N
11	1012	Harry	Potter	706-695-0392	2394 Hogwarts Avenue	Y	
12	1013	Don	Draper	123-543-2345	2039 Main Street	Y	N
13	1014	Leslie	Knope	876-678-3469			
14	1015	Toby	Flenderson	304-762-2467			
15	1016	Ron	Weasley	123-545-5421			
16	1017	Michael	Scott	123-643-9775			
17	1018	Clark	Kent	706-695-0392			
19	1020	Anakin	Skywalker	876-678-3469			

```
13                343 City Parkway                Y              N
14                   214 HR Avenue                N              N
15             2395 Hogwarts Avenue                N              N
16  121 Paper Avenue, Pennsylvania                 Y              N
17                 3498 Super Lane                 Y
19     910 Tatooine Road, Tatooine                 Y              N

          Street_Address          State Zipcode
0          123 Shire Lane          Shire
2      298 Drugs Driveway
4        123 Dragons Road
6       1209 South Street
7           98 Clue Drive
8        123 Middle Earth
9        25th Main Street       New York
10         612 Shire Lane          Shire
11  2394 Hogwarts Avenue
12      2039 Main Street
13      343 City Parkway
14         214 HR Avenue
15  2395 Hogwarts Avenue
16      121 Paper Avenue   Pennsylvania
17       3498 Super Lane
19     910 Tatooine Road       Tatooine
```

Iterate over each index in the DataFrame

Check if the `Phone_Number` value at index x is an empty string

Drop the row with index x if `Phone_Number` is an empty string

[29]:
```
# Iterate over each index in the DataFrame
for x in df.index:
    # Check if the 'Phone_Number' value at index x is an empty string
    if df.loc[x, "Phone_Number"] == '':
        # Drop the row with index x if 'Phone_Number' is an empty string
        df.drop(x, inplace=True)


df

#Another way to drop null values
#df = df.dropna(subset="Phone_Number"), inplace=True)
```

[29]:
```
    CustomerID First_Name   Last_Name  Phone_Number  \
0         1001      Frodo     Baggins  123-545-5421
2         1003     Walter       White  706-695-0392
```

```
4          1005        Jon        Snow  876-678-3469
7          1008   Sherlock      Holmes  876-678-3469
9          1010      Peter      Parker  123-545-5421
11         1012      Harry      Potter  706-695-0392
12         1013        Don      Draper  123-543-2345
13         1014     Leslie       Knope  876-678-3469
14         1015       Toby  Flenderson  304-762-2467
15         1016        Ron     Weasley  123-545-5421
16         1017   Michael        Scott  123-643-9775
17         1018      Clark        Kent  706-695-0392
19         1020     Anakin   Skywalker  876-678-3469

                          Address Paying Customer Do_Not_Contact  \
0            123 Shire Lane, Shire                Y              N
2               298 Drugs Driveway                N
4                 123 Dragons Road                Y              N
7                    98 Clue Drive                N              N
9       25th Main Street, New York                Y              N
11            2394 Hogwarts Avenue                Y
12                2039 Main Street                Y              N
13                343 City Parkway                Y              N
14                   214 HR Avenue                N              N
15            2395 Hogwarts Avenue                N              N
16  121 Paper Avenue, Pennsylvania                Y              N
17                 3498 Super Lane                Y
19     910 Tatooine Road, Tatooine                Y              N

          Street_Address          State Zipcode
0          123 Shire Lane          Shire
2     298 Drugs Driveway
4       123 Dragons Road
7          98 Clue Drive
9       25th Main Street       New York
11  2394 Hogwarts Avenue
12      2039 Main Street
13      343 City Parkway
14         214 HR Avenue
15  2395 Hogwarts Avenue
16      121 Paper Avenue   Pennsylvania
17       3498 Super Lane
19     910 Tatooine Road       Tatooine
```

[30]:
```
df = df.reset_index(drop=True)
df
```

[30]:
```
    CustomerID First_Name   Last_Name  Phone_Number  \
0         1001      Frodo     Baggins  123-545-5421
```

```
1         1003     Walter       White  706-695-0392
2         1005        Jon        Snow  876-678-3469
3         1008   Sherlock      Holmes  876-678-3469
4         1010      Peter      Parker  123-545-5421
5         1012      Harry      Potter  706-695-0392
6         1013        Don      Draper  123-543-2345
7         1014     Leslie       Knope  876-678-3469
8         1015       Toby  Flenderson  304-762-2467
9         1016        Ron     Weasley  123-545-5421
10        1017   Michael        Scott  123-643-9775
11        1018      Clark        Kent  706-695-0392
12        1020     Anakin   Skywalker  876-678-3469

                         Address Paying Customer Do_Not_Contact  \
0            123 Shire Lane, Shire               Y              N
1               298 Drugs Driveway               N
2                 123 Dragons Road               Y              N
3                    98 Clue Drive               N              N
4       25th Main Street, New York               Y              N
5             2394 Hogwarts Avenue               Y
6                 2039 Main Street               Y              N
7                 343 City Parkway               Y              N
8                    214 HR Avenue               N              N
9             2395 Hogwarts Avenue               N              N
10  121 Paper Avenue, Pennsylvania               Y              N
11                 3498 Super Lane               Y
12     910 Tatooine Road, Tatooine               Y              N

          Street_Address          State Zipcode
0         123 Shire Lane          Shire
1     298 Drugs Driveway
2       123 Dragons Road
3          98 Clue Drive
4       25th Main Street       New York
5   2394 Hogwarts Avenue
6       2039 Main Street
7       343 City Parkway
8          214 HR Avenue
9   2395 Hogwarts Avenue
10      121 Paper Avenue   Pennsylvania
11       3498 Super Lane
12     910 Tatooine Road       Tatooine
```