Copy of RU_F22 Winter Campaign Enrollment

February 13, 2023

[179]:
```
import pandas as pd
import numpy as np
import os
from datetime import datetime, timedelta
from fuzzywuzzy import fuzz #https://pypi.org/project/fuzzywuzzy/
#from fuzzywuzzy import process
import matplotlib.pyplot as plt
import seaborn as sns
import time
# disable chained assignments
pd.options.mode.chained_assignment = None
```

[180]:
```
os.getcwd()
```

[180]:
```
'C:\\Users\\s6438750\\Desktop\\files\\myw'
```

[181]:
```
# Path of your file
path = "/Users/s6438750/Desktop/files/Winter Campaign F22/F22 Winter Campaign/
 ↪New Account_Dbviz.csv"

# Path of Start directory
start = "/Users/s6438750/Desktop/files/myw"

# Compute the relative file path
# to the given path from the
# the given start directory.
relative_path = os.path.relpath(path, start)

# Print the relative file path
# to the given path from the
# the given start directory.
print(relative_path)
```

```
..\Winter Campaign F22\F22 Winter Campaign\New Account_Dbviz.csv
```

0.1 Data Source

[182]:
```
itrade = pd.read_csv("..\Winter Campaign F22\F22 Winter Campaign\All Existing␣
↪iTrade Clients.csv",encoding='unicode_escape',sep='\t')
na = pd.read_csv("..\Winter Campaign F22\F22 Winter Campaign\\New Account_Dbviz.
↪csv",encoding='unicode_escape', sep='\t')
ec = pd.read_csv("..\Winter Campaign F22\F22 Winter Campaign\F22 Winter␣
↪Campaign - Existing Clients.csv",encoding='unicode_escape')
be = pd.read_csv("..\Winter Campaign F22\F22 Winter Campaign\F22 Winter␣
↪Campaign - BNS Employee.csv",encoding='unicode_escape')
exc = pd.read_csv("..\Winter Campaign F22\F22 Winter Campaign\F22 Winter␣
↪Campaign Exception Form.csv")
```

Date

[183]:
```
#Change Date
d_date ='2022-02-22'
```

[184]:
```
d_date = datetime.strptime(d_date, '%Y-%m-%d') #convert to datetime (monday)
week_prior_start =  d_date - timedelta(days=8) #make sure is correct (sunday)
week_prior_end =  d_date - timedelta(days=2) #make sure is correct (saturday)
d_date = d_date.strftime('%Y-%m-%d') #convert back to string
week_prior_start = week_prior_start.strftime('%Y-%m-%d')
week_prior_end = week_prior_end.strftime('%Y-%m-%d')

'''
today = datetime.today()
d_date = today.strftime('%Y-%m-%d') #string
week_prior =  today - timedelta(weeks=1)
week_prior = week_prior.strftime('%Y-%m-%d')
'''

print("Today: ", d_date)
print("Week Prior (start): ", week_prior_start)
print("Week Prior (end): ", week_prior_end)

# iTRADE Clients & Enrollment Count
print("\n \033[1m" + "-------",d_date,"-------" +'\033[0m' ,\
      "\niTRADE Clients:",len(itrade), \
      "\033[4m" +   "\n\nEnrollment Count" +'\033[0m' \
      "\n 1. New Accounts (DbVisualizer):" , len(na),  \
      "\n 2. Exceptions (SharePoint):" , len(exc),\
      "\n 3. Existing Clients (Salesforce):" , len(ec), \
      "\n 4. BNS Employees (Salesforce):" , len(be), \
      "\nTotal Enrollment:", len(na)+len(ec)+len(be)+len(exc)
     )
```

```
Today:  2022-02-22
```

```
Week Prior (start):  2022-02-14
Week Prior (end):  2022-02-20

 ------- 2022-02-22 -------
iTRADE Clients: 720951 Enrollment Count
 1. New Accounts (DbVisualizer): 455
 2. Exceptions (SharePoint): 820
 3. Existing Clients (Salesforce): 274
 4. BNS Employees (Salesforce): 63
Total Enrollment: 1612
```

0.2 Transform

[185]:
```
column_order = ["Create Date","First Name","Last Name","Phone","Email","Client␣
 ↪ID", "Offer", "Enrollment Date","Enrollment Source"]
```

0.2.1 iTRADE

may take a while, b/c iTRADE has over 700,000 records

[186]:
```
itrade['ClientUserID'].astype('int')

# First name in caps, and remove non-alphabet characters
itrade["First Name"]=itrade['ClientFirstName'].str.upper()
itrade['First Name']=itrade['ClientFirstName'].str.replace(r'[^a-zA-Z]',␣
 ↪'',regex=True)

# last name in caps, and remove non-alphabet characters
itrade["Last Name"]=itrade['ClientLastName'].str.upper()
itrade['Last Name']=itrade['ClientLastName'].str.replace(r'[^a-zA-Z]',␣
 ↪'',regex=True)

#email in caps
itrade['Email']=itrade['ClientEMailAddress'].str.upper()

#trim phone
itrade['Phone']=itrade['ClientPhoneNumber'].str.replace(r'\D+','', regex=True)␣
 ↪# remove unwanted characters

#for phase 1 & 2
itrade['flpe']=itrade['First Name']+itrade['Last␣
 ↪Name']+itrade['Phone']+itrade['Email']
itrade['flp']=itrade['First Name']+itrade['Last Name']+itrade['Phone']
itrade['fle']=itrade['First Name']+itrade['Last Name']+itrade['Email']
itrade['fe']=itrade['First Name']+itrade['Email']
itrade['fp']=itrade['First Name']+itrade['Phone']
itrade['pe']=itrade['Phone']+itrade['Email']
```

```
#for phase 3
itrade['lpe']=itrade['Last Name']+itrade['Phone']+itrade['Email']
itrade['le']=itrade['Last Name']+itrade['Email']
itrade['lp']=itrade['Last Name']+itrade['Phone']
itrade['pr_lpe_f']=np.nan
itrade['pr_le_f']=np.nan
itrade['pr_lp_f']=np.nan

#for phase 4
itrade['fl']=itrade['First Name']+itrade['Last Name']

itrade.head(3)
```

[186]:

	ClientUserID	ClientFirstName	ClientLastName	ClientPhoneNumber	ClientEMailAddress	Client_CreateDate	First Name	Last Name	Email	Phone	…	fe	fp	pe	lpe	le	lp
0	1	TAG TEST CARD	SPECIAL ACCESS		CHRISTINA_MULLIN@E-SCOTIA.COM	1997-07-28 09:01:00	TAGTESTCARD	SPECIALACCESS	CHRISTINA_MULLIN@E-SCOTIA.COM		…	TAGTESTCARDCHRISTINA_MULLIN@E-SCOTIA.COM	TAGTESTCARD	CHRISTINA_MULLIN@E-SCOTIA.COM	SPECIALACCESSCHRISTINA_MULLIN@E-SCOTIA.COM	SPECIALACCESSCHRISTINA_MULLIN@E-SCOTIA.COM	SPECIALACCESS
1	10	ANDREW	SCIPIO DEL CAMPO	905 4688268	andrew.scipiodelcampo@gmail.com	2011-08-10 15:56:21	ANDREW	SCIPIODELCAMPO	ANDREW.SCIPIODELCAMPO@GMAIL.COM	9054688268	…	ANDREWANDREW.SCIPIODELCAMPO@GMAIL.COM	ANDREW9054688268	9054688268ANDREW.SCIPIODELCAMPO@GMAIL.COM	SCIPIODELCAMPO9054688268ANDREW.SCIPIODELCAMPO@…	SCIPIODELCAMPOANDREW.SCIPIODELCAMPO@GMAIL.COM	SCIPIODELCAMPO9054688268
2	100	DONALD	MACMULLEN	902 5641642	DMACMULLEN@ICLOUD.COM	2009-06-17 10:49:09	DONALD	MACMULLEN	DMACMULLEN@ICLOUD.COM	9025641642	…	DONALDDMACMULLEN@ICLOUD.COM	DONALD9025641642	9025641642DMACMULLEN@ICLOUD.COM	MACMULLEN9025641642DMACMULLEN@ICLOUD.COM		

```
2                 MACMULLENDMACMULLEN@ICLOUD.COM       MACMULLEN9025641642

  pr_lpe_f pr_le_f pr_lp_f                          fl
0      NaN     NaN     NaN  TAGTESTCARDSPECIALACCESS
1      NaN     NaN     NaN      ANDREWSCIPIODELCAMPO
2      NaN     NaN     NaN           DONALDMACMULLEN

[3 rows x 23 columns]
```

0.2.2 New Accounts

[187]:
```
# clean df
na_2 = na[['ClientUserID','Description','Account_CreateDate']]
na_2['Enrollment Date'] =pd.
 ↪to_datetime(na_2['Account_CreateDate'],format='%Y-%m-%d %H:%M:%S').dt.
 ↪strftime('%Y-%m-%d')
na_2.rename(columns={'ClientUserID': 'Client ID',"Description":
 ↪"Offer",'Account_CreateDate': 'Create Date'}, inplace=True)
na_2["Enrollment Source"]="New Account Query"

# sort by account create date, take the most recent one if duplicate found
na_2=na_2.sort_values('Create Date',ascending=False) # new to old
na_2.reset_index(drop=True, inplace=True)
na_2=na_2.drop_duplicates('Client ID')

#re-order columns
na_2 = na_2.reindex(columns=column_order)

na_enrollments=len(na)
na_2_unique_clients=len(na_2['Client ID'].unique())
print("\033[4m" +   "New Accounts" +'\033[0m', \
      "\nTotal New Accounts Enrollments:",na_enrollments, \
      "\nUnique clients enrolled:",na_2_unique_clients)

na_2
```

```
New Accounts
Total New Accounts Enrollments: 455
Unique clients enrolled: 341
```

[187]:
```
             Create Date  First Name  Last Name  Phone  Email  Client ID  \
0    2022-02-19 22:42:58         NaN        NaN    NaN    NaN    6934510
1    2022-02-19 21:49:02         NaN        NaN    NaN    NaN    7205076
2    2022-02-19 19:00:51         NaN        NaN    NaN    NaN    7205068
3    2022-02-19 18:42:35         NaN        NaN    NaN    NaN    7199348
4    2022-02-19 18:29:49         NaN        NaN    NaN    NaN    7205066
..                   …           …          …      …      …         …
```

```
448  2022-02-13 09:45:03         NaN        NaN    NaN    NaN    1782593
449  2022-02-13 08:32:03         NaN        NaN    NaN    NaN    7203608
452  2022-02-13 04:19:51         NaN        NaN    NaN    NaN    1459849
453  2022-02-13 03:03:44         NaN        NaN    NaN    NaN    7202235
454  2022-02-13 00:34:50         NaN        NaN    NaN    NaN    6976808
```

```
                Offer Enrollment Date  Enrollment Source
0          Cash Offer      2022-02-19  New Account Query
1          Cash Offer      2022-02-19  New Account Query
2          Cash Offer      2022-02-19  New Account Query
3          Cash Offer      2022-02-19  New Account Query
4    Free Trades offer      2022-02-19  New Account Query
..                 …              …                 …
448        Cash Offer      2022-02-13  New Account Query
449        Cash Offer      2022-02-13  New Account Query
452        Cash Offer      2022-02-13  New Account Query
453        Cash Offer      2022-02-13  New Account Query
454  Free Trades offer      2022-02-13  New Account Query

[341 rows x 9 columns]
```

0.2.3 Exception Forms

[188]:
```
exc_2= exc[["Client ID (Please do not add account numbers)","Offer␣
↪selected","Enrollment Date (Date since when we should monitor funding)␣
↪","Created"]]

exc_2=exc_2.rename(columns={'Client ID (Please do not add account numbers)':␣
↪'Client ID',
                            "Offer selected":"Offer",
                            'Enrollment Date (Date since when we should monitor␣
↪funding) ': 'Enrollment Date',
                            'Created':'Create Date'})

exc_2['Enrollment Date'] = pd.to_datetime(exc_2['Enrollment Date'],format='%m/
↪%d/%Y').dt.strftime('%Y-%m-%d')
exc_2["Enrollment Source"] = "Sharepoint Exception"
exc_2['Create Date'] = pd.to_datetime(exc_2['Create Date'],format='%m/%d/%Y %I:
↪%M %p').dt.strftime('%Y-%m-%d %H:%M:%S')


#filter on (Create Date) previous week (does not include last week sunday, but␣
↪does not matter because there are no enrollments on weekends)
exc_2 = exc_2[(exc_2['Create Date'] >= week_prior_start) & (exc_2['Create␣
↪Date'] <= week_prior_end)]
exc_2_enrollments=len(exc_2) #use this week's
```

```
#sort by create date, take the most recent one if duplicate found
exc_2=exc_2.sort_values('Create Date',ascending=False) # new to old
exc_2.reset_index(drop=True, inplace=True)
exc_2=exc_2.drop_duplicates('Client ID')

exc_2_unique_clients=len(exc_2['Client ID'].unique())

#re-order columns
exc_2 = exc_2.reindex(columns=column_order)

print("\033[4m" +   "Exceptions" +'\033[0m', \
"\nTotal Exception Enrollments:",exc_2_enrollments, \
"\nUnique clients enrolled:",exc_2_unique_clients) \

exc_2
```

Exceptions
Total Exception Enrollments: 96
Unique clients enrolled: 95

[188]:

	Create Date	First Name	Last Name	Phone	Email	Client ID	Offer	Enrollment Date
0	2022-02-18 18:25:00	NaN	NaN	NaN	NaN	1066674.0	BNS Employee- Cash +$0* (TFT)	2022-01-03
1	2022-02-18 18:07:00	NaN	NaN	NaN	NaN	77694.0	Mass, Acquisition & Lifecycle -Free Trades (FT22)	2022-02-18
2	2022-02-18 18:00:00	NaN	NaN	NaN	NaN	64395.0	Mass, Acquisition & Lifecycle - Cash +4.99 (C22)	2022-02-14
3	2022-02-18 17:37:00	NaN	NaN	NaN	NaN	7185846.0	Mass, Acquisition & Lifecycle -Free Trades (FT22)	2022-02-18
4	2022-02-18 17:16:00	NaN	NaN	NaN	NaN	1388903.0	Mass, Acquisition & Lifecycle -Free Trades (FT22)	2022-02-18
..	…	…	…	…	…	…	…	…
91	2022-02-14 11:24:00	NaN	NaN	NaN	NaN	7196717.0	Mass, Acquisition & Lifecycle -Free Trades (FT22)	2022-02-14
92	2022-02-14 10:05:00	NaN	NaN	NaN	NaN	7133163.0	Mass, Acquisition & Lifecycle - Cash +4.99 (C22)	2022-02-14
93	2022-02-14 09:04:00	NaN	NaN	NaN	NaN	1619003.0	Mass, Acquisition & Lifecycle -Free Trades (FT22)	2022-02-14
94	2022-02-14 08:36:00	NaN	NaN	NaN	NaN	1644811.0	Mass, Acquisition & Lifecycle - Cash +4.99 (C22)	2022-01-04
95	2022-02-14 08:13:00	NaN	NaN	NaN	NaN	673837.0	BNS Employee- Cash +$0* (TFT)	2022-01-31

```
       Enrollment Source
0   Sharepoint Exception
1   Sharepoint Exception
2   Sharepoint Exception
3   Sharepoint Exception
4   Sharepoint Exception
..                   …
91  Sharepoint Exception
92  Sharepoint Exception
93  Sharepoint Exception
94  Sharepoint Exception
95  Sharepoint Exception

[95 rows x 9 columns]
```

0.2.4 Existing Clients

[189]:
```
ec_2=ec[['Create Date','First Name','Last Name','Phone','Email','Which offer␣
 ↪would you like to enroll in?']]
ec_2=ec_2.rename(columns={"Which offer would you like to enroll in?":"Offer"})
ec_2['Enrollment Date'] = pd.to_datetime(ec_2['Create Date'],format='%d/%m/%Y').
 ↪dt.strftime('%Y-%m-%d')
ec_2['Create Date'] = pd.to_datetime(ec_2['Create Date'],format='%d/%m/%Y').dt.
 ↪strftime('%Y-%m-%d %H:%M:%S')

ec_2.dropna(subset=['Offer'], how='all', inplace=True) #drop rows which␣
 ↪contains nan in offer column

ec_2["Enrollment Source"] = "Salesforce Existing Clients"

#sort by create date, take the most recent one if duplicate found (newest is at␣
 ↪the top, oldest at the bottom)
# since enrollment date is not exact enough, we'll take the smaller index,␣
 ↪since that would be the 2nd enrollment of the same client
ec_2=ec_2.sort_index(axis=0)
ec_2=ec_2.drop_duplicates(['First Name','Last Name','Phone','Email']) #defaults␣
 ↪to keeping the first


ec_enrollments=len(ec)
ec_2_enrollments=len(ec_2)
#ec_unique_clients=len(ec['Client ID'].unique()) #cannot confirm yet
print("\033[4m" +   "Existing Clients" +'\033[0m', \
"\nTotal Existing Clients Enrollments:",ec_enrollments, \
 "\nUnique Existing Clients Enrollments:",ec_2_enrollments)
```

```
ec_2.head(3)
```

Existing Clients
Total Existing Clients Enrollments: 274
Unique Existing Clients Enrollments: 260

[189]:

	Create Date	First Name	Last Name	Phone	Email	Offer	Enrollment Date	Enrollment Source
0	2022-02-19 00:00:00	Duhyun	Kim	(604) 704-5674	kduhyun@gmail.com	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
1	2022-02-19 00:00:00	Sujin	Park	(604) 704-5677	ajtwla0623@yahoo.com	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
2	2022-02-19 00:00:00	Dinah	Goldberg	(416) 200-4612	D_goldberg22@hotmail.com	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients

0.2.5 BNS Employees

[190]:
```
be_2=be[['Create Date','First Name','Last Name','Phone','Email','BNS Employee␣
↪Option']]
be_2=be_2.rename(columns={"BNS Employee Option":"Offer"})
be_2['Enrollment Date']=pd.to_datetime(be_2['Create Date'],format='%d/%m/%Y').
↪dt.strftime('%Y-%m-%d')
be_2['Create Date'] = pd.to_datetime(be_2['Create Date'],format='%d/%m/%Y').dt.
↪strftime('%Y-%m-%d %H:%M:%S')

#filter on TFT
be_2=be_2.loc[be_2["Offer"]=="I just want to enroll in the Cash + up to 500␣
↪free stock and ETF trades offer."]

be_2["Enrollment Source"] = "Salesforce BNS Employees"

#don't need to dedup based on create date because the enrollments are all TFT
be_2=be_2.drop_duplicates(['First Name','Last Name','Phone','Email']) #defaults␣
↪to keeping the first

be_enrollments = len(be)
be_2_enrollments=len(be_2)
#ec_unique_clients=len(ec['Client ID'].unique()) #cannot confirm yet
print("\033[4m" +   "BNS Employees" +'\033[0m', \
       "\nTotal BNS Employees Enrollments:",be_enrollments,
```

```
        "\nUnique BNS Employees Enrollments:",be_2_enrollments)

be_2.head(3)
```

```
BNS Employees
Total BNS Employees Enrollments: 63
Unique BNS Employees Enrollments: 59
```

[190]:

	Create Date	First Name	Last Name	Phone	Email	Offer	Enrollment Date	Enrollment Source
0	2022-02-19 00:00:00	Nico	Verrier	(604) 230-0970	nicoverrier22@gmail.com	I just want to enroll in the Cash + up to 500 …	2022-02-19	Salesforce BNS Employees
1	2022-02-19 00:00:00	Nelson	Riquelme	(416) 859-5659	nelson.riquelme@scotiabank.com	I just want to enroll in the Cash + up to 500 …	2022-02-19	Salesforce BNS Employees
2	2022-02-19 00:00:00	Norene	Lee	(647) 896-1799	norene23@hotmail.com	I just want to enroll in the Cash + up to 500 …	2022-02-19	Salesforce BNS Employees

Existing Clients + BNS Employees

[191]:
```
#combine existing clients and bns employees
ecbe = pd.concat([ec_2,be_2], ignore_index=True)

# First name in caps > remove accents, replace as normal char > remove␣
 ↪non-alphabet characters (will also remove accented chars)
ecbe["First Name"]=ecbe['First Name'].str.upper()
ecbe['First Name']=ecbe['First Name'].str.normalize('NFKD').str.encode('ascii',␣
 ↪errors='ignore').str.decode('utf-8')
ecbe['First Name']=ecbe['First Name'].str.replace(r'[^a-zA-Z]', '',regex=True)

# last name in caps> remove accents, replace as normal char > remove␣
 ↪non-alphabet characters (will also remove accented chars)
ecbe["Last Name"]=ecbe['Last Name'].str.upper()
ecbe['Last Name']=ecbe['Last Name'].str.normalize('NFKD').str.encode('ascii',␣
 ↪errors='ignore').str.decode('utf-8')
ecbe['Last Name']=ecbe['Last Name'].str.replace(r'[^a-zA-Z]', '',regex=True)
```

```
#email in caps
ecbe['Email']=ecbe['Email'].str.upper()

#trim phone
ecbe['Phone']=ecbe['Phone'].str.replace(r'\D+','', regex=True) # remove␣
 ↪unwanted characters
#https://www3.ntu.edu.sg/home/ehchua/programming/howto/Regexe.html

#ecbe["Enrollment Source"] = "Salesforce Existing Clients"

# for phase 1 & 2
#1. firstname + lastname + trim(phone) + upper(email)
ecbe['flpe']=ecbe['First Name']+ecbe['Last Name']+ecbe['Phone']+ecbe['Email']
#2. firstname + lastname + trim(phone)
ecbe['flp']=ecbe['First Name']+ecbe['Last Name']+ecbe['Phone']
#3. firstname + lastname + upper(email)
ecbe['fle']=ecbe['First Name']+ecbe['Last Name']+ecbe['Email']
#4. firstname + upper(email)
ecbe['fe']=ecbe['First Name']+ecbe['Email']
#5. firstname + trim(phone)
ecbe['fp']=ecbe['First Name']+ecbe['Phone']
#6. trim(phone) + upper(email)
ecbe['pe']=ecbe['Phone']+ecbe['Email']

# for phase 3
ecbe['lpe']=ecbe['Last Name']+ecbe['Phone']+ecbe['Email']
ecbe['le']=ecbe['Last Name']+ecbe['Email']
ecbe['lp']=ecbe['Last Name']+ecbe['Phone']

# for phase 4
ecbe['fl']=ecbe['First Name']+ecbe['Last Name']
```

0.3 Phase 1 : Match

[192]:
```
def match(match_df):

    # matching keys
    '''have to dropna on the keys because some have NaN on email > causing flpe␣
 ↪to be NaN > pandas would merge on NaN keys > so you have to exclude NaN or␣
 ↪it will match with other NaN keys which would be wrong!'''
    a=match_df.merge(itrade[['flpe','ClientUserID']].dropna(subset =␣
 ↪['flpe']),on='flpe',how='left')
    a.rename(columns={'ClientUserID':'cid_flpe'}, inplace=True)

    a=a.merge(itrade[['flp','ClientUserID']].dropna(subset =␣
 ↪['flp']),on='flp',how='left')
```

```
    a.rename(columns={'ClientUserID':'cid_flp'}, inplace=True)

    a=a.merge(itrade[['fle','ClientUserID']].dropna(subset =␣
↪['fle']),on='fle',how='left')
    a.rename(columns={'ClientUserID':'cid_fle'}, inplace=True)

    a=a.merge(itrade[['fe','ClientUserID']].dropna(subset =␣
↪['fe']),on='fe',how='left')
    a.rename(columns={'ClientUserID':'cid_fe'}, inplace=True)

    a=a.merge(itrade[['fp','ClientUserID']].dropna(subset =␣
↪['fp']),on='fp',how='left')
    a.rename(columns={'ClientUserID':'cid_fp'}, inplace=True)

    a=a.merge(itrade[['pe','ClientUserID']].dropna(subset =␣
↪['pe']),on='pe',how='left') # idk (claire had the same key)
    a.rename(columns={'ClientUserID':'cid_pe'}, inplace=True)


    #fill cid (flpe -> flp -> fle -> fe -> fp -> pe)
    a['cid'] = np.where(a['cid_flpe'].isnull(), np.nan, a['cid_flpe'] )
    a.loc[a['cid'].isnull(),'cid'] = a['cid_flp']
    a.loc[a['cid'].isnull(),'cid'] = a['cid_fle']
    a.loc[a['cid'].isnull(),'cid'] = a['cid_fe']
    a.loc[a['cid'].isnull(),'cid'] = a['cid_fp']
    a.loc[a['cid'].isnull(),'cid'] = a['cid_pe']

    return a
```

[193]:
```
start = time.time()

match_df = ecbe.copy()
lets_match=match(match_df)

time.sleep(1)
end = time.time()
print(f"Runtime of the program is {end - start}")
```

```
Runtime of the program is 6.762873888015747
```

[194]:
```
key_success=pd.DataFrame({'key':  ['flpe',␣
↪'flp','fle','fe','fp'],'success_rate': [0,0,0,0,0]})
key_success.set_index('key',inplace=True)

key_success.loc['flpe','success_rate']="{:.1%}".format(lets_match['cid_flpe'].
↪count()/lets_match['Enrollment Date'].count())
```

```
key_success.loc['flp','success_rate']="{:.1%}".format(lets_match['cid_flp'].
 ↪count()/lets_match['Enrollment Date'].count())
key_success.loc['fle','success_rate']="{:.1%}".format(lets_match['cid_fle'].
 ↪count()/lets_match['Enrollment Date'].count())
key_success.loc['fe','success_rate']="{:.1%}".format(lets_match['cid_fe'].
 ↪count()/lets_match['Enrollment Date'].count())
key_success.loc['fp','success_rate']="{:.1%}".format(lets_match['cid_fp'].
 ↪count()/lets_match['Enrollment Date'].count())
key_success.loc['pe','success_rate']="{:.1%}".format(lets_match['cid_pe'].
 ↪count()/lets_match['Enrollment Date'].count())

key_success
```

[194]:

key	success_rate
flpe	70.7%
flp	74.9%
fle	83.0%
fe	86.4%
fp	79.2%
pe	82.0%

[195]:
```
a=lets_match[['Create Date','First Name','Last␣
 ↪Name','Phone','Email','Offer','Enrollment Date','Enrollment Source',
              'flpe', 'flp', 'fle', 'fe','fp', 'pe', 'lpe', 'le', 'lp',␣
 ↪'fl','cid']]
b=a.drop_duplicates(subset=['Create Date','Enrollment Date','First Name','Last␣
 ↪Name','Phone','Email','Offer','Enrollment Source','cid'])
b.reset_index(drop=True, inplace=True)

print('\n* Phase 1: Matching Process (Existing Clients & BNS Employees)')
#matched
b_matched = b.loc[b['cid'].notnull()]
print('Matched:',len(b_matched))

#unmatched
b_unmatched=b.loc[b['cid'].isnull()]
print('Not Matched:',len(b_unmatched))
```

```
* Phase 1: Matching Process (Existing Clients & BNS Employees)
Matched: 310
Not Matched: 18
```

0.4 Phase 2: Find

The finding keys should be specific as to pull one record only, if more than one record is found, it will get the first record

match first > find based on criteria : finds faster

[196]:
```
def find_unmatched(find_df):

    for i,i_row in find_df.iterrows():

        #1. flp%
        temp_1= itrade['ClientUserID'].loc[itrade['flp'].str.
↪startswith(i_row['flp'],na=False)]#.values
        #find_df.loc[i,'cid_flp%']=str(temp_1)[1:-1]
        if temp_1.size != 0:
            find_df.loc[i,'cid_flp%']=temp_1.values[0]
        del temp_1

        #2. =lastname & =trim(phone) & = upper(email) & First Name%
        temp_2= itrade.loc[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Phone']==i_row['Phone']) & (itrade['Email']==i_row['Email'])]
        temp_2= temp_2['ClientUserID'].loc[temp_2['First Name'].str.
↪startswith(i_row['First Name'],na=False)]#.values
        #find_df.loc[i,'cid_f%lpe']=str(temp_2)[1:-1]
        if temp_2.size != 0:
            find_df.loc[i,'cid_f%lpe']=temp_2.values[0]
        del temp_2

        #3. =lastname &= upper(email) & First Name%
        temp_3= itrade.loc[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Email']==i_row['Email'])]
        temp_3= temp_3['ClientUserID'].loc[temp_3['First Name'].str.
↪startswith(i_row['First Name'],na=False)]#.values
        #find_df.loc[i,'cid_f%le']=str(temp_4)[1:-1]
        if temp_3.size != 0:
            find_df.loc[i,'cid_f%le']=temp_3.values[0]
        del temp_3

        #4. =lastname & =trim(phone) & First Name%
        temp_4= itrade.loc[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Phone']==i_row['Phone'])]
        temp_4= temp_4['ClientUserID'].loc[temp_4['First Name'].str.
↪startswith(i_row['First Name'],na=False)]
        #find_df.loc[i,'cid_f%lp']=str(temp_4)[1:-1]
        if temp_4.size != 0:
            find_df.loc[i,'cid_f%lp']=temp_4.values[0]
        del temp_4
```

```
        #5. =lastname & =trim(phone) &= upper(email) & %First Name%
        temp_5= itrade[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Phone']==i_row['Phone']) & (itrade['Email']==i_row['Email'])]
        temp_5= temp_5['ClientUserID'].loc[itrade['First Name'].str.
↪contains(i_row['First Name'],na=False)]#.values
        #find_df.loc[i,'cid_%f%lpe']=str(temp_5)[1:-1]
        if temp_5.size != 0:
            find_df.loc[i,'cid_%f%lpe']=temp_5.values[0]
        del temp_5

        #6. =lastname & = upper(email) & %First Name%
        temp_6= itrade[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Email']==i_row['Email'])]
        temp_6= temp_6['ClientUserID'].loc[temp_6['First Name'].str.
↪contains(i_row['First Name'],na=False)]#.values
        #find_df.loc[i,'cid_%f%le']=str(temp_6)[1:-1]
        if temp_6.size != 0:
            find_df.loc[i,'cid_%f%le']=temp_6.values[0]
        del temp_6

        #7. =lastname & =trim(phone) & %First Name%
        temp_7= itrade[(itrade['Last Name']==i_row['Last Name']) &␣
↪(itrade['Phone']==i_row['Phone'])]
        temp_7= temp_7['ClientUserID'].loc[temp_7['First Name'].str.
↪contains(i_row['First Name'],na=False)]#.values
        #find_df.loc[i,'cid_%f%lp']=str(temp_7)[1:-1]
        if temp_7.size != 0:
            find_df.loc[i,'cid_%f%lp']=temp_7.values[0]
        del temp_7


    find_df.loc[:
↪,['cid_flp%','cid_f%lpe','cid_f%le','cid_f%lp','cid_%f%lpe','cid_%f%le','cid_%f%lp']]=find_
↪loc[:
↪,['cid_flp%','cid_f%lpe','cid_f%le','cid_f%lp','cid_%f%lpe','cid_%f%le','cid_%f%lp']].
↪replace('', np.NaN)
    find_df.loc[:
↪,['cid_flp%','cid_f%lpe','cid_f%le','cid_f%lp','cid_%f%lpe','cid_%f%le','cid_%f%lp']]=find_
↪loc[:
↪,['cid_flp%','cid_f%lpe','cid_f%le','cid_f%lp','cid_%f%lpe','cid_%f%le','cid_%f%lp']].
↪astype(float)


    #fill cid based on priority (cid_flp% -> cid_f%lpe -> cid_f%le -> cid_f%lp␣
↪-> cid_%f%lpe -> cid_%f%le -> cid_%f%lp)
```

```
    find_df['cid'] = np.where(find_df['cid_flp%'].isnull(), np.nan,␣
↪find_df['cid_flp%'])
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_f%lpe']
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_f%le']
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_f%lp']
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_%f%lpe']
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_%f%le']
    find_df.loc[find_df['cid'].isnull(),'cid'] = find_df['cid_%f%lp']

    return find_df
```

[197]:
```
start = time.time()

find_df = b_unmatched.copy()

find_df['cid_flp%'] = np.nan
find_df['cid_f%lpe'] = np.nan
find_df['cid_f%le'] = np.nan
find_df['cid_f%lp'] = np.nan
find_df['cid_%f%lpe'] = np.nan
find_df['cid_%f%le'] = np.nan
find_df['cid_%f%lp'] =np.nan

lets_find=find_unmatched(find_df)

time.sleep(1)
end = time.time()
print(f"Runtime of the program is {end - start}")
```

```
Runtime of the program is 42.406033754348755
```

[198]:
```
key_success=pd.DataFrame({'key': ␣
↪['flp%','f%lpe','f%le','f%lp','%f%lpe','%f%le','%f%lp'],'success_rate':␣
↪[0,0,0,0,0,0,0]})
key_success.set_index('key',inplace=True)

key_success.loc['flp%','success_rate']="{:.1%}".format(lets_find['cid_flp%'].
↪count()/lets_find['Enrollment Date'].count())
key_success.loc['f%lpe','success_rate']="{:.1%}".format(lets_find['cid_f%lpe'].
↪count()/lets_find['Enrollment Date'].count())
key_success.loc['f%le','success_rate']="{:.1%}".format(lets_find['cid_f%le'].
↪count()/lets_find['Enrollment Date'].count())
key_success.loc['f%lp','success_rate']="{:.1%}".format(lets_find['cid_f%lp'].
↪count()/lets_find['Enrollment Date'].count())
key_success.loc['%f%lpe','success_rate']="{:.1%}".
↪format(lets_find['cid_%f%lpe'].count()/lets_find['Enrollment Date'].count())
```

```
key_success.loc['%f%le','success_rate']="{:.1%}".format(lets_find['cid_%f%le'].
 ↪count()/lets_find['Enrollment Date'].count())
key_success.loc['%f%lp','success_rate']="{:.1%}".format(lets_find['cid_%f%lp'].
 ↪count()/lets_find['Enrollment Date'].count())

key_success
```

[198]:

key	success_rate
flp%	0.0%
f%lpe	0.0%
f%le	16.7%
f%lp	0.0%
%f%lpe	0.0%
%f%le	16.7%
%f%lp	0.0%

[199]:
```
b_unmatched_done = lets_find.loc[lets_find['cid'].notnull()]

c = b.copy()
c = c.drop_duplicates()

# updating the cid of the found records to the original df (b => c), since the␣
 ↪index would still be the same, we will use the index to match with that␣
 ↪record
for index, row in b_unmatched_done.iterrows():
    c['cid'].iloc[index]=row['cid']

print('\n* Phase 2: Finding Process (Existing Clients & BNS Employees)')

#found
c_found = c.loc[c['cid'].notnull()]
print('Found:',len(c_found))

#not found
c_notfound = c.loc[c['cid'].isnull()]
print('Not Found:',len(c_notfound))

c_found['cid'] = c_found['cid'].astype(int)
c_found = c_found.rename(columns={"cid":"Client ID"})
c_found = c_found.reindex(columns=column_order)
```

```
* Phase 2: Finding Process (Existing Clients & BNS Employees)
Found: 313
Not Found: 15
```

[200]:
```
c_found
```

[200]:

	Create Date	First Name	Last Name	Phone	Email	Client ID	Offer	Enrollment Date	Enrollment Source
0	2022-02-19 00:00:00	DUHYUN	KIM	6047045674	KDUHYUN@GMAIL.COM	7202733	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
1	2022-02-19 00:00:00	SUJIN	PARK	6047045677	AJTWLA0623@YAHOO.COM	6934510	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
2	2022-02-19 00:00:00	DINAH	GOLDBERG	4162004612	D_GOLDBERG22@HOTMAIL.COM	1429532	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
3	2022-02-19 00:00:00	CHANTEL	VANBUREN	4039387060	CHANTELVANBUREN@HOTMAIL.COM	1073420	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
4	2022-02-19 00:00:00	LILI	ZHENG	9058846671	MICHAEL_X_GAO@HOTMAIL.COM	7117997	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients
..	…	…	…	…	…	…	…	…	…
323	2022-02-13 00:00:00	ANDREW	DILLON	4164493737	ANDREW.DILLON@ROGERS.COM	6733	I just want to enroll in the Cash + up to 500 …	2022-02-13	Salesforce Existing Clients
324	2022-02-13 00:00:00	TANYA	PARAMAPATHY	7805547307	TANYA.PARAMAPATHY@GMAIL.COM	6960815	I just want to enroll in the Cash + up to 500 …	2022-02-13	Salesforce Existing Clients
325	2022-02-13 00:00:00	RONGJOYCE	YANG	4166169706	JOYCE.YANG@SCOTIABANK.COM	1445252	I just want to enroll in the Cash + up to 500 …	2022-02-13	Salesforce Existing Clients
326	2022-02-13 00:00:00	YINGER	CHEN	7788837862	YINGER617@HOTMAIL.COM	1746856	I just want to enroll in the Cash + up to 500 …	2022-02-13	Salesforce Existing Clients
327	2022-02-13 00:00:00	SVETLANA	BHARAJ	9059067352	SVETLANA.BHARAJ@SCOTIABANK.COM	1863073	I just want to enroll in the Cash + up to 500 …	2022-02-13	Salesforce Existing Clients

```
..                            …
323     Salesforce BNS Employees
324     Salesforce BNS Employees
325     Salesforce BNS Employees
326     Salesforce BNS Employees
327     Salesforce BNS Employees

[313 rows x 9 columns]
```

0.5 Phase 3 : Approximate Matching

ex: MUHAMMADT(df) vs MUHAMMAD(itrade) would not be found so use approx w/ fuzzywuzzy

creates a temporary table from itrade for each key, then doing partial ratio on the first name 1. lpe_f : match on lastname, phone, email > partial ratio on f (we only do fuzzywuzzy on the temp table because might be more accurate and reliable??? and also to avoid false positives) 2. le_f : match on lastname and email > partial ratio on f 3. lp_f : match on lastname and phone > partial ratio on f

we cannot do fuzzywuzzy on flpe, fle, flp alone, because this would create false positives 1. fuzz.ratio('applewong123467890','mikewong123467890') = 80 2. fuzz.partial_ratio('applewong123467890','mikewong123467890') = 82

[201]:
```
def approx_match(approx):

    # partial firt name on itrade vs name+extra on table
    for i, i_row in approx.iterrows():

        ''' 1. lpe_f '''
        #create a temporary table for itrade, for those that matches for the␣
↪chosen record on b_unmatched
        temp_itrade_lpe = itrade.loc[itrade['lpe']==approx.loc[i,'lpe']]

        for j,j_row in temp_itrade_lpe.iterrows():
            temp_itrade_lpe.loc[j,'pr_lpe_f']=fuzz.partial_ratio(i_row['First␣
↪Name'],j_row['First Name'])

        #take the record with the highest partial ratio
        best_pr_lpe_f =␣
↪temp_itrade_lpe[temp_itrade_lpe['pr_lpe_f']==temp_itrade_lpe['pr_lpe_f'].
↪max()]

        #pass on the values from the temp_itrade that has the best partial ratio
        if not best_pr_lpe_f.empty:
            approx.loc[i,'pr_lpe_f'] = best_pr_lpe_f.iloc[[0]]['pr_lpe_f'].
↪values
            approx.loc[i,'cid_lpe_f'] = best_pr_lpe_f.iloc[[0]]['ClientUserID'].
↪values
```

```
        #clear df so that those records that does not match on le can be nan,␣
↪otherwise will still pass on the dfeven when temp_itrade is empty
        del best_pr_lpe_f

        ''' 2. le_f '''
        temp_itrade_le = itrade.loc[itrade['le']==approx.loc[i,'le']]

        for k,k_row in temp_itrade_le.iterrows():
            temp_itrade_le.loc[k,'pr_le_f']=fuzz.partial_ratio(i_row['First␣
↪Name'],k_row['First Name'])

        best_pr_le_f =␣
↪temp_itrade_le[temp_itrade_le['pr_le_f']==temp_itrade_le['pr_le_f'].max()]

        if not best_pr_le_f.empty:
            approx.loc[i,'pr_le_f'] = best_pr_le_f.iloc[[0]]['pr_le_f'].values
            approx.loc[i,'cid_le_f'] = best_pr_le_f.iloc[[0]]['ClientUserID'].
↪values

        del best_pr_le_f


        ''' 3. lp_f '''
        temp_itrade_lp = itrade.loc[itrade['lp']==approx.loc[i,'lp']]

        for l,l_row in temp_itrade_lp.iterrows():
            temp_itrade_lp.loc[l,'pr_lp_f']=fuzz.partial_ratio(i_row['First␣
↪Name'],l_row['First Name'])

        best_pr_lp_f =␣
↪temp_itrade_lp[temp_itrade_lp['pr_lp_f']==temp_itrade_lp['pr_lp_f'].max()]

        if not best_pr_lp_f.empty:
            approx.loc[i,'pr_lp_f'] = best_pr_lp_f.iloc[[0]]['pr_lp_f'].values
            approx.loc[i,'cid_lp_f'] = best_pr_lp_f.iloc[[0]]['ClientUserID'].
↪values

        del best_pr_lp_f

    #https://stackoverflow.com/questions/37428218/
↪how-to-properly-apply-a-lambda-function-into-a-pandas-data-frame-column
    # maybe can use lambda to make process faster
    approx.loc[(approx['cid'].isnull()) & (approx['pr_lpe_f']>=80),'cid'] =␣
↪approx['cid_lpe_f']
```

```
    approx.loc[(approx['cid'].isnull()) & (approx['pr_le_f']>=80),'cid'] =␣
 ↪approx['cid_le_f']
    approx.loc[(approx['cid'].isnull()) & (approx['pr_lp_f']>=80),'cid'] =␣
 ↪approx['cid_lp_f']


    return approx
```

[202]:
```
start = time.time()

approx=c_notfound.copy()

approx['cid_lpe_f']=np.nan
approx['cid_le_f']=np.nan
approx['cid_lp_f']=np.nan

approx['pr_lpe_f']=np.nan
approx['pr_le_f']=np.nan
approx['pr_lp_f']=np.nan

lets_approx= approx_match(approx)

time.sleep(1)
end = time.time()
print(f"Runtime of the program is {end - start}")
```

```
Runtime of the program is 5.946249008178711
```

[203]:
```
key_success=pd.DataFrame({'key':  ['lpe_f','le_f','lp_f'],'success_rate':␣
 ↪[0,0,0]})
key_success.set_index('key',inplace=True)

key_success.loc['lpe_f','success_rate']="{:.1%}".
 ↪format(lets_approx['cid_lpe_f'].count()/lets_approx['Enrollment Date'].
 ↪count())
key_success.loc['le_f','success_rate']="{:.1%}".format(lets_approx['cid_le_f'].
 ↪count()/lets_approx['Enrollment Date'].count())
key_success.loc['lp_f','success_rate']="{:.1%}".format(lets_approx['cid_lp_f'].
 ↪count()/lets_approx['Enrollment Date'].count())

key_success
```

[203]:

key	success_rate
lpe_f	0.0%
le_f	20.0%
lp_f	0.0%

[204]:
```
c_notfound_done = lets_approx.loc[lets_approx['cid'].notnull()]

d = c.copy()
d = d.drop_duplicates()

# updating the cid of the found records to the original df (b => c), since the␣
 ↪index would still be the same, we will use the index to match with that␣
 ↪record
for index, row in c_notfound_done.iterrows():
    d['cid'].iloc[index]=row['cid']

print('\n* Phase 3: Approximate Matching (Existing Clients & BNS Employees)')

#approximate matched
d_apprmatched = d.loc[d['cid'].notnull()]
print('cid:',len(d_apprmatched))

#approximate not matched
d_notapprmatched  = d.loc[d['cid'].isnull()]
print('no cid:',len(d_notapprmatched))

d_apprmatched['cid'] = d_apprmatched['cid'].astype(int)
d_apprmatched = d_apprmatched.rename(columns={"cid":"Client ID"})
d_apprmatched = d_apprmatched.reindex(columns=column_order)
```

```
* Phase 3: Approximate Matching (Existing Clients & BNS Employees)
cid: 314
no cid: 14
```

0.6 Phase 4 : Only One

[205]:
```
def findone(onlyone):

    for i, i_row in onlyone.iterrows():

            #create a temporary table for itrade, for those that matches for␣
 ↪the chosen record
            temp_itrade_fl = itrade.loc[itrade['fl']==onlyone.loc[i,'fl']]
            if len(temp_itrade_fl)==1:
                onlyone.loc[i,'cid_fl']=temp_itrade_fl['ClientUserID'].values

            #clear df so that those records that does not match on le can be␣
 ↪nan, otherwise will still pass on the dfeven when temp_itrade is empty
            del temp_itrade_fl

    onlyone.loc[(onlyone['cid'].isnull()),'cid'] = onlyone['cid_fl']
```

```
    return onlyone
```

[206]:
```
start = time.time()

onlyone = d_notapprmatched.copy()
onlyone['cid_fl']=np.nan

lets_findone=findone(onlyone)

time.sleep(1)
end = time.time()
print(f"Runtime of the program is {end - start}")
```

```
Runtime of the program is 2.3297622203826904
```

[207]:
```
d_notapprmatched_done = lets_findone.loc[lets_findone['cid'].notnull()]

e = d.copy()
e = e.drop_duplicates()

# updating the cid of the found records to the original df (b => c), since the␣
 ↪index would still be the same, we will use the index to match with that␣
 ↪record
for index, row in d_notapprmatched_done.iterrows():
    e['cid'].iloc[index]=row['cid']

print('\n* Phase 4: Get Only One if found (Existing Clients & BNS Employees)')

#only one matched
e_matched = e.loc[e['cid'].notnull()]
print('cid:',len(e_matched))

#not matched
e_unmatched  = e.loc[e['cid'].isnull()]
print('no cid:',len(e_unmatched))

e_matched['cid'] = e_matched['cid'].astype(int)
e_matched = e_matched.rename(columns={"cid":"Client ID"})
e_matched = e_matched.reindex(columns=column_order)
```

```
* Phase 4: Get Only One if found (Existing Clients & BNS Employees)
cid: 322
no cid: 6
```

[208]:
```
e_unmatched
```

[208]:

	Create Date	First Name	Last Name	Phone	Email	Offer	Enrollment Date	Enrollment Source	flpe	flp	fle
7	2022-02-19 00:00:00	HANSHENGHENRY	CHEN	6047250926	HENRY@FORTUNEVALVE.COM	Cash and $4.99 stock and ETF commission pricing.	2022-02-19	Salesforce Existing Clients	HANSHENGHENRYCHEN6047250926HENRY@FORTUNEVALVE.COM	HANSHENGHENRYCHEN6047250926	HANSHENGHENRYCHENHENRY@FORTUNEVALVE.COM
150	2022-02-15 00:00:00	MIKE	MCINTYRE	5198162416	MIKEM@ITSWIN.COM	Cash and $4.99 stock and ETF commission pricing.	2022-02-15	Salesforce Existing Clients	MIKEMCINTYRE5198162416MIKEM@ITSWIN.COM	MIKEMCINTYRE5198162416	MIKEMCINTYREMIKEM@ITSWIN.COM
317	2022-02-14 00:00:00	SYLTA	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	I just want to enroll in the Cash + up to 500 …	2022-02-14	Salesforce BNS Employees	SYLTAHELLNER9544827224ARNOHELLNER@GMAIL.COM	SYLTAHELLNER9544827224	SYLTAHELLNERARNOHELLNER@GMAIL.COM
318	2022-02-14 00:00:00	HANNA	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	I just want to enroll in the Cash + up to 500 …	2022-02-14	Salesforce BNS Employees	HANNAHELLNER9544827224ARNOHELLNER@GMAIL.COM	HANNAHELLNER9544827224	HANNAHELLNERARNOHELLNER@GMAIL.COM
319	2022-02-14 00:00:00	ARNO	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	I just want to enroll in the Cash + up to 500 …	2022-02-14	Salesforce BNS Employees	ARNOHELLNER9544827224ARNOHELLNER@GMAIL.COM	ARNOHELLNER9544827224	ARNOHELLNERARNOHELLNER@GMAIL.COM
321	2022-02-14 00:00:00	SUKYIN	HUNG	9053051321	SHIRLEYHUNG01@HOTMAIL.COM	I just want to enroll in the Cash + up to 500 …	2022-02-14	Salesforce BNS Employees	SUKYINHUNG9053051321SHIRLEYHUNG01@HOTMAIL.COM	SUKYINHUNG9053051321	SUKYINHUNGSHIRLEYHUNG01@HOTMAIL.COM

```
                                      fe                        fp  \
7    HANSHENGHENRYHENRY@FORTUNEVALVE.COM  HANSHENGHENRY6047250926
150                 MIKEMIKEM@ITSWIN.COM           MIKE5198162416
317           SYLTAARNOHELLNER@GMAIL.COM          SYLTA9544827224
318           HANNAARNOHELLNER@GMAIL.COM          HANNA9544827224
319            ARNOARNOHELLNER@GMAIL.COM           ARNO9544827224
321      SUKYINSHIRLEYHUNG01@HOTMAIL.COM         SUKYIN9053051321

                                      pe  \
7       6047250926HENRY@FORTUNEVALVE.COM
150           5198162416MIKEM@ITSWIN.COM
317      9544827224ARNOHELLNER@GMAIL.COM
318      9544827224ARNOHELLNER@GMAIL.COM
319      9544827224ARNOHELLNER@GMAIL.COM
321  9053051321SHIRLEYHUNG01@HOTMAIL.COM

                                        lpe                             le  \
7       CHEN6047250926HENRY@FORTUNEVALVE.COM     CHENHENRY@FORTUNEVALVE.COM
150       MCINTYRE5198162416MIKEM@ITSWIN.COM       MCINTYREMIKEM@ITSWIN.COM
317   HELLNER9544827224ARNOHELLNER@GMAIL.COM   HELLNERARNOHELLNER@GMAIL.COM
318   HELLNER9544827224ARNOHELLNER@GMAIL.COM   HELLNERARNOHELLNER@GMAIL.COM
319   HELLNER9544827224ARNOHELLNER@GMAIL.COM   HELLNERARNOHELLNER@GMAIL.COM
321  HUNG9053051321SHIRLEYHUNG01@HOTMAIL.COM  HUNGSHIRLEYHUNG01@HOTMAIL.COM

                     lp                 fl  cid
7        CHEN6047250926  HANSHENGHENRYCHEN  NaN
150  MCINTYRE5198162416       MIKEMCINTYRE  NaN
317   HELLNER9544827224       SYLTAHELLNER  NaN
318   HELLNER9544827224       HANNAHELLNER  NaN
319   HELLNER9544827224        ARNOHELLNER  NaN
321      HUNG9053051321         SUKYINHUNG  NaN
```

[209]:
```
e_matched
```

[209]:
```
              Create Date First Name    Last Name       Phone  \
0    2022-02-19 00:00:00     DUHYUN          KIM  6047045674
1    2022-02-19 00:00:00      SUJIN         PARK  6047045677
2    2022-02-19 00:00:00      DINAH     GOLDBERG  4162004612
3    2022-02-19 00:00:00    CHANTEL     VANBUREN  4039387060
4    2022-02-19 00:00:00       LILI        ZHENG  9058846671
..                   …          …           …          …
323  2022-02-13 00:00:00     ANDREW       DILLON  4164493737
324  2022-02-13 00:00:00      TANYA  PARAMAPATHY  7805547307
325  2022-02-13 00:00:00  RONGJOYCE         YANG  4166169706
326  2022-02-13 00:00:00     YINGER         CHEN  7788837862
327  2022-02-13 00:00:00   SVETLANA       BHARAJ  9059067352
```

```
                              Email  Client ID  \
0                 KDUHYUN@GMAIL.COM    7202733
1              AJTWLAO623@YAHOO.COM    6934510
2          D_GOLDBERG22@HOTMAIL.COM    1429532
3       CHANTELVANBUREN@HOTMAIL.COM    1073420
4         MICHAEL_X_GAO@HOTMAIL.COM    7117997
..                              …        …
323        ANDREW.DILLON@ROGERS.COM       6733
324     TANYA.PARAMAPATHY@GMAIL.COM    6960815
325       JOYCE.YANG@SCOTIABANK.COM    1445252
326           YINGER617@HOTMAIL.COM    1746856
327  SVETLANA.BHARAJ@SCOTIABANK.COM    1863073

                                                  Offer Enrollment Date  \
0     Cash and $4.99 stock and ETF commission pricing.      2022-02-19
1     Cash and $4.99 stock and ETF commission pricing.      2022-02-19
2     Cash and $4.99 stock and ETF commission pricing.      2022-02-19
3     Cash and $4.99 stock and ETF commission pricing.      2022-02-19
4     Cash and $4.99 stock and ETF commission pricing.      2022-02-19
..                                                   …            …
323  I just want to enroll in the Cash + up to 500 …      2022-02-13
324  I just want to enroll in the Cash + up to 500 …      2022-02-13
325  I just want to enroll in the Cash + up to 500 …      2022-02-13
326  I just want to enroll in the Cash + up to 500 …      2022-02-13
327  I just want to enroll in the Cash + up to 500 …      2022-02-13

               Enrollment Source
0    Salesforce Existing Clients
1    Salesforce Existing Clients
2    Salesforce Existing Clients
3    Salesforce Existing Clients
4    Salesforce Existing Clients
..                           …
323     Salesforce BNS Employees
324     Salesforce BNS Employees
325     Salesforce BNS Employees
326     Salesforce BNS Employees
327     Salesforce BNS Employees

[322 rows x 9 columns]
```

0.7 Combine all

[210]:
```
def map_offers(map_df):

    offers_dict = {
                    #new accounts
                    'Free Trades offer': 'FT22',
                   'Cash Offer': 'C22',
                   'Targeted Free Trades': 'TFT',

                   #exception
                   'Mass, Acquisition & Lifecycle - Cash +4.99 (C22)':'C22',
                   'Mass, Acquisition & Lifecycle -Free Trades (FT22)':'FT22',
                   'BNS Employee- Cash +$0* (TFT)':'TFT',

                   #existing clients
                   'Cash and $4.99 stock and ETF commission pricing.': 'C22',
                   'Free stock and ETF trades.':'FT22' ,
                   'Prime et commission de 4,99 $ applicable aux opérations sur␣
 ↪actions et FNB.':'C22' ,
                   'Opérations sur actions et FNB gratuites.':'FT22',

                    #BNS Employees
                    'I just want to enroll in the Cash + up to 500 free stock␣
 ↪and ETF trades offer.':'TFT',
                    'Je veux bénéficier de l?offre pour recevoir une prime en␣
 ↪espèces et jusqu?à 500 opérations sur actions et FNB gratuites.':'TFT',
                   'C22':'C22',
                   'FT22':'FT22',
                   'TFT':'TFT'
                   }

    # Remap the values of the dataframe
    map_df['Offer']= map_df['Offer'].map(offers_dict)

    return map_df
```

[329]:
```
all_enrollments = pd.concat([na_2,exc_2,e_matched])

map_df=all_enrollments
lets_map=map_offers(map_df)

# lets_map vs all_enrollments
fin=lets_map
len(fin)
```

[329]: 758

0.7.1 Binary Duplicates Removal

- using binary table to account for all combinations
- OECS (Offer, Enrollment Date, Create Date, Enrollment Source)

Check	abbrev	binary
same	s	0
different	d	1

- ex: OECS = 1010 => means that the duplicates (Client ID) have "different offer, same enrollment date, different create date, same enrollment source"
- removed from the 0000 to 1111 (moving from the simplest to the most complicated, not from 1111 to 0000, as this will cause false positives)
- be reminded and careful that drop_duplicates will also remove nan

[334]:
```
def binaryremoval(fin):
    #priority level sort
    source_sort = {'Sharepoint Exception': 0, 'New Account Query': 1,␣
↪'Salesforce BNS Employees':2,'Salesforce Existing Clients':3}
    offer_sort = {'TFT': 0, 'C22': 1, 'FT22':2}

    # 1. 0, 0, 0, 0
    # fin[fin.duplicated(['Client ID', 'Offer','Enrollment Date','Create␣
↪Date','Enrollment Source'],keep=False)].sort_values('Client ID') #for check
    fin1 = fin.drop_duplicates(subset=['Client ID', 'Offer','Enrollment␣
↪Date','Create Date','Enrollment Source'])

    # 2. 1, 0, 0, 0
    #fin[fin.duplicated(['Client ID','Enrollment Date','Create␣
↪Date','Enrollment Source'],keep=False)].sort_values('Client ID')
    # cannot use smaller index because client could enroll from different␣
↪sources.
    fin2 = fin1.sort_index()
    fin2 = fin2.drop_duplicates(subset=['Client ID','Enrollment Date','Create␣
↪Date','Enrollment Source'])

    #3. 0, 0, 1, 1
    #fin[fin.duplicated(['Client ID','Create Date','Enrollment␣
↪Source'],keep=False)].sort_values('Client ID')
    fin3 = fin2.drop_duplicates(subset=['Client ID','Offer','Enrollment␣
↪Date'],keep='last') # last or first does not matter, but i'll take the first␣
↪input for this one

    #4. 0, 1, 0, 1
    #fin[fin.duplicated(['Client ID','Offer','Create Date'],keep=False)].
↪sort_values('Client ID')
    fin4 = fin3.sort_values('Enrollment Date', ascending=True)
```

```
    fin = fin.drop_duplicates(subset=['Client ID','Offer','Create Date'])

    #5. 0, 1, 1, 0
    #fin[fin.duplicated(['Client ID','Offer','Enrollment Source'],keep=False)].
↪sort_values('Client ID')
    fin5 = fin4.sort_values('Enrollment Date', ascending=True)
    fin5 = fin5.drop_duplicates(subset=['Client ID','Offer','Enrollment␣
↪Source'])

    #6. 1, 0, 0, 1
    #fin[fin.duplicated(['Client ID','Enrollment Date','Create␣
↪Date'],keep=False)].sort_values('Client ID')
    fin6 = fin5.sort_values(by=['Enrollment Source'], key=lambda x: x.
↪map(source_sort))
    fin6 = fin6.drop_duplicates(["Client ID","Enrollment Date","Create Date"])␣
↪#defaults keeping the first record , agents better be enrolling the correct␣
↪enrollment dates!

    #7. 1, 0, 1, 0
    #fin[fin.duplicated(['Client ID','Enrollment Date','Enrollment␣
↪Source'],keep=False)].sort_values('Client ID')
    fin7 = fin6.sort_values('Create Date', ascending=False)
    fin7 = fin7.drop_duplicates(subset=['Client ID','Enrollment␣
↪Date','Enrollment Source'])

    #8. 1, 1, 0, 0
    #fin[fin.duplicated(['Client ID','Create Date','Enrollment␣
↪Source'],keep=False)].sort_values('Client ID')
    fin8 = fin7.sort_index()
    fin8 = fin8.drop_duplicates(subset=['Client ID','Create Date','Enrollment␣
↪Source'])

    #9. 1, 1, 1, 0
    #fin[fin.duplicated(['Client ID','Enrollment Source'],keep=False)].
↪sort_values('Client ID')
    fin9 = fin8.sort_values('Create Date', ascending=False)
    fin9 = fin9.drop_duplicates(subset=['Client ID','Enrollment Source'])

    #10. 0, 1, 1, 1
    #fin[fin.duplicated(['Client ID','Offer'],keep=False)].sort_values('Client␣
↪ID')
    fin10 = fin9.sort_values('Enrollment Date', ascending=True) #take earliest E
    fin10 = fin10.drop_duplicates(subset=['Client ID','Offer'])

    #11. 1, 1, 0, 1
```

```
    #fin[fin.duplicated(['Client ID','Create Date'],keep=False)].
↪sort_values('Client ID')
    fin11 = fin10.sort_values(by=['Enrollment Source'], key=lambda x: x.
↪map(source_sort))
    fin11 = fin11.drop_duplicates(["Client ID","Create Date"])

    #12. 1, 0, 1, 1
    #fin[fin.duplicated(['Client ID','Enrollment Date'],keep=False)].
↪sort_values('Client ID')
    fin12 = fin11.sort_values('Create Date', ascending=False)
    fin12 = fin12.drop_duplicates(subset=['Client ID','Enrollment Date'])

    #13. 1, 1, 1, 1
    #fin[fin.duplicated(['Client ID'],keep=False)].sort_values('Client ID')
    fin13 = fin12.sort_values('Create Date', ascending=False)
    fin13 = fin13.drop_duplicates(subset=['Client ID'])

    return fin13
```

[335]:
```
#lets_map[lets_map.duplicated(['Client ID','Create Date','Enrollment␣
↪Source'],keep=False)].sort_values('Client ID').to_excel("dup_cid.xlsx")
```

[341]:
```
lets_bin = binaryremoval(fin)
fin_enrollments = lets_bin

#fin_enrollments.reset_index(drop=True, inplace=True)

fin_enrollments['Enrollment Date']=pd.to_datetime(fin_enrollments['Enrollment␣
↪Date'],format='%Y-%m-%d')
fin_enrollments = fin_enrollments.reindex(columns=column_order)
fin_enrollments=fin_enrollments.fillna('')
len(final_enrollments)
```

[341]: 730

0.7.2 Unmatched

[339]:
```
e_unmatched.reset_index(drop=True, inplace=True)

map_df=e_unmatched
lets_map=map_offers(map_df)
e_unmatched = lets_map
e_unmatched=e_unmatched.rename(columns={"cid":"Client ID"})
e_unmatched = e_unmatched.reindex(columns=column_order)
e_unmatched['Enrollment Date']=pd.to_datetime(e_unmatched['Enrollment␣
↪Date'],format='%Y-%m-%d')
```

```
e_unmatched
```

[339]:

	Create Date	First Name	Last Name	Phone	Email	Client ID	Offer	Enrollment Date	Enrollment Source
0	2022-02-19 00:00:00	HANSHENGHENRY	CHEN	6047250926	HENRY@FORTUNEVALVE.COM	NaN	C22	2022-02-19	Salesforce Existing Clients
1	2022-02-15 00:00:00	MIKE	MCINTYRE	5198162416	MIKEM@ITSWIN.COM	NaN	C22	2022-02-15	Salesforce Existing Clients
2	2022-02-14 00:00:00	SYLTA	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	NaN	TFT	2022-02-14	Salesforce BNS Employees
3	2022-02-14 00:00:00	HANNA	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	NaN	TFT	2022-02-14	Salesforce BNS Employees
4	2022-02-14 00:00:00	ARNO	HELLNER	9544827224	ARNOHELLNER@GMAIL.COM	NaN	TFT	2022-02-14	Salesforce BNS Employees
5	2022-02-14 00:00:00	SUKYIN	HUNG	9053051321	SHIRLEYHUNG01@HOTMAIL.COM	NaN	TFT	2022-02-14	Salesforce BNS Employees

[340]:
```
ready = len(fin_enrollments)
not_ready = len(e_unmatched)
print("\033[4m" +   '\nAll Enrollments' +'\033[0m',\
      '\nFound:',ready,\
    '\nNot Found:',not_ready,\
     '\nTotal:',(ready+not_ready))
```

All Enrollments
Found: 730
Not Found: 6
Total: 736

0.8 Output

[61]:
```
# Create a Pandas Excel writer using XlsxWriter as the engine.
writer = pd.ExcelWriter('New_Enrollments_'+d_date+'.xlsx',␣
 ↪engine='xlsxwriter',datetime_format='yyyy-mm-dd')

# Write each dataframe to a different worksheet.
fin_enrollments.to_excel(writer,sheet_name='Ready',index=False)
```

```
e_unmatched.to_excel(writer,sheet_name='Not Ready',index=False)

# Close the Pandas Excel writer and output the Excel file.
writer.save()
```

[ ]:
```
#writer.close()
```

1 Figure

[238]:
```
#enroll_pivot=all_enrollments.pivot_table(index='Enrollment Date',␣
 ↪columns='Offer',aggfunc='count')['Client ID']
enroll_pivot_data=fin_enrollments.copy()
enroll_pivot_data['Enrollment Date']=enroll_pivot_data['Enrollment Date'].dt.
 ↪strftime('%Y-%m-%d')
enroll_pivot=enroll_pivot_data.pivot_table(index='Enrollment Date',␣
 ↪columns='Offer',aggfunc='count',margins = True,margins_name =␣
 ↪'Total')['Client ID']

enroll_pivot = enroll_pivot.fillna(0).astype(int)
#enroll_pivot['Total'] = enroll_pivot.sum(axis=1)
#enroll_pivot['Total_Offers'] = enroll_pivot.sum(axis=0)
enroll_pivot
```

[238]:

Offer	C22	FT22	TFT	Total
Enrollment Date				
2021-12-13	1	0	0	1
2021-12-14	2	0	0	2
2021-12-29	0	1	0	1
2022-01-01	2	0	0	2
2022-01-03	2	0	0	2
2022-01-05	2	0	0	2
2022-01-06	1	0	0	1
2022-01-10	1	0	0	1
2022-01-14	1	0	0	1
2022-01-15	1	0	0	1
2022-01-17	0	0	1	1
2022-01-18	2	0	0	2
2022-01-20	1	1	0	2
2022-01-21	4	0	0	4
2022-01-24	1	0	0	1
2022-01-26	1	0	0	1
2022-02-01	2	0	0	2
2022-02-02	2	0	0	2
2022-02-03	1	0	0	1
2022-02-04	2	0	0	2
2022-02-06	30	10	10	50

```
2022-02-07       308    79   16    403
2022-02-08       170    30   10    210
2022-02-09       119    22    8    149
2022-02-10       110    18   12    140
2022-02-11       100    39   13    152
2022-02-12        52     8    4     64
2022-02-14         1     0    0      1
Total            919   208   74   1201
```

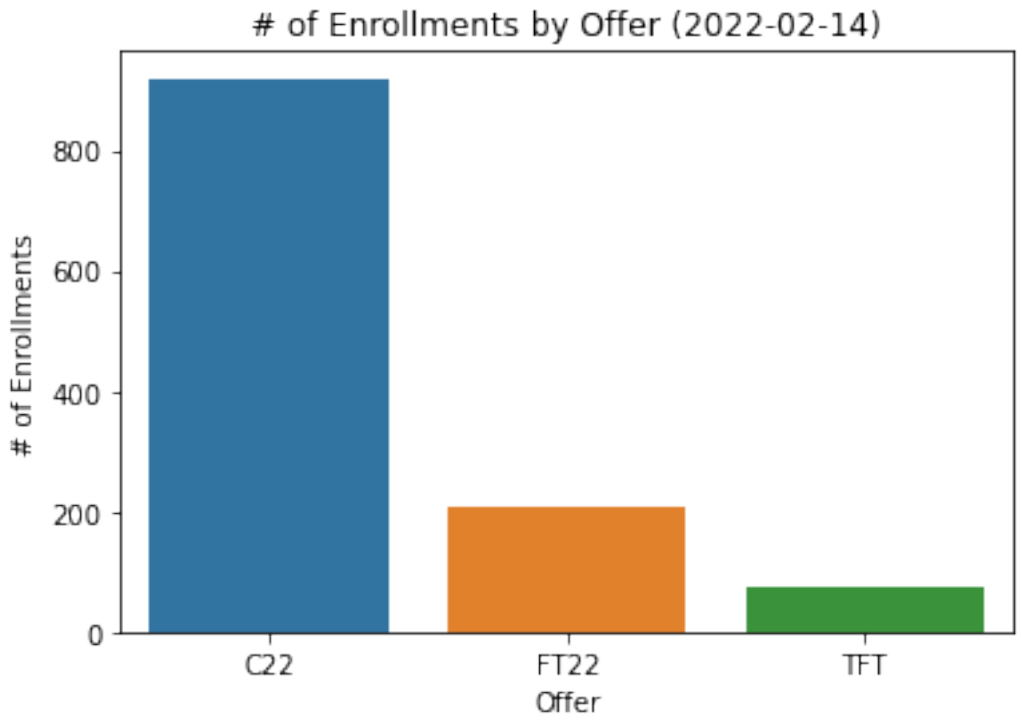
[239]:
```
enroll_pivot_data
```

[239]:
```
              Create Date  Client ID Offer Enrollment Date  \
0     2022-02-06 00:00:00    7039406   TFT      2022-02-06
1     2022-02-06 00:00:00    7196000   C22      2022-02-06
2     2022-02-06 00:00:00    7055705   C22      2022-02-06
3     2022-02-06 00:00:00    7096976   C22      2022-02-06
4     2022-02-06 00:00:00    7047127   C22      2022-02-06
…                     …          …   …              …
1196  2022-02-12 21:28:14    7203592   C22      2022-02-12
1197  2022-02-12 21:41:39    7203593   C22      2022-02-12
1198  2022-02-12 21:49:53    7203595   C22      2022-02-12
1199  2022-02-12 23:21:01    7203597   C22      2022-02-12
1200  2022-02-12 23:42:25    7203599   C22      2022-02-12

                Enrollment Source
0     Salesforce Existing Clients
1     Salesforce Existing Clients
2     Salesforce Existing Clients
3     Salesforce Existing Clients
4     Salesforce Existing Clients
…                             …
1196            New Account Query
1197            New Account Query
1198            New Account Query
1199            New Account Query
1200            New Account Query

[1201 rows x 5 columns]
```

[240]:
```
#countplot
ay=sns.
 ↪countplot(x=enroll_pivot_data['Offer'],data=enroll_pivot_data,order=['C22','FT22','TFT'])
ay.set_title('# of Enrollments by Offer ('+d_date+')')
ay.set_ylabel('# of Enrollments')
plt.show()
```



1.1 For Checking

[98]:
```
fin_enrollments[fin_enrollments['Client ID'].isin([6216])]
```

[98]:
```
             Create Date  Client ID Offer Enrollment Date  \
711  2022-02-09 00:00:00       6216   C22      2022-02-09

                Enrollment Source
711  Salesforce Existing Clients
```

[94]:
```
fin_enrollments=fin_enrollments.fillna('')
```

[96]:
```
fin_enrollments[fin_enrollments['First Name'].str.startswith('ST')]
```

[96]:
```
              Create Date First Name    Last Name  \
95    2022-02-07 00:00:00      STEVE       STREET
148   2022-02-07 00:00:00     STACEY         ARYA
159   2022-02-07 00:00:00     STUART      IMMONEN
164   2022-02-07 00:00:00      STEVE       FEDYNA
178   2022-02-07 00:00:00   STEPHANE      FILLION
221   2022-02-07 00:00:00     STEFAN        DAVIS
252   2022-02-07 00:00:00     STEVEN        KLEIN
305   2022-02-07 00:00:00     STACEY     CHAISSON
```

```
321   2022-02-07 00:00:00   STEPHANE   BLANCHETTE
324   2022-02-07 00:00:00  STEPHANIE       GENOIS
338   2022-02-07 00:00:00    STEPHEN  VANDERHORST
506   2022-02-08 00:00:00     STEVEN       CLARKE
569   2022-02-08 00:00:00    STEPHEN          LAU
1000  2022-02-11 00:00:00    STEPHEN      TRENNUM
1153  2022-02-12 00:00:00     STEVEN       DUBOIS

                                Email       Phone  Client ID Offer  \
95            STEVESTREET@WIGHTMAN.CA  5198433767    1423031   C22
148           STACEY@SANEALCAMERA.COM  4033984758    1698670  FT22
159         STUARTIMMONEN@OUTLOOK.COM  7055713118    1586604  FT22
164                 FEDYNAS@SHAW.CA  4036781969     456440   C22
178     STEPHANE.FILLION@VIDEOTRON.CA  5148872810    7008254  FT22
221     STEFAN.DAVIS@MAIL.UTORONTO.CA  6472687958    6968039  FT22
252                 SJK@SYMPATICO.CA  5144020955    7177014   C22
305        STACEYCHAISSON@HOTMAIL.COM  5194961637    7048273   C22
321             MRWHITE183@ICLOUD.COM  5149753941    7101946   C22
324      STEPHANIE_GENOIS@HOTMAIL.COM  4189323187     956545   C22
338     STEVE_VANDERHORST@HOTMAIL.COM  2898808629    7040610   C22
506   WHISTLERSTEVECLARKE@HOTMAIL.COM  6049079109    1232945   C22
569                TMLTS@HOTMAIL.COM  6043512351     127020   C22
1000              DTRENNUM@COGECO.CA  7057457068    7029819   C22
1153          DUDE_DUBOIS@HOTMAIL.COM  6134061917    7124244   C22

     Enrollment Date            Enrollment Source
95        2022-02-07  Salesforce Existing Clients
148       2022-02-07  Salesforce Existing Clients
159       2022-02-07  Salesforce Existing Clients
164       2022-02-07  Salesforce Existing Clients
178       2022-02-07  Salesforce Existing Clients
221       2022-02-07  Salesforce Existing Clients
252       2022-02-07  Salesforce Existing Clients
305       2022-02-07  Salesforce Existing Clients
321       2022-02-07  Salesforce Existing Clients
324       2022-02-07  Salesforce Existing Clients
338       2022-02-07  Salesforce Existing Clients
506       2022-02-08  Salesforce Existing Clients
569       2022-02-08  Salesforce Existing Clients
1000      2022-02-11  Salesforce Existing Clients
1153      2022-02-12  Salesforce Existing Clients
```

[113]:
```
itrade[itrade['Email'].isin(['DAVE.DEUTSCH@OUTLOOK.COM'])]
```

[113]:
```
        ClientUserID ClientFirstName ClientLastName  \
401319       7180630           DAVID        DEUTSCH
603265       7201200           DAVID        DEUTSCH
```

```
                ClientPhoneNumber        ClientEMailAddress  \
401319  613 5187935                DAVE.DEUTSCH@OUTLOOK.COM
603265  6134042836                 DAVE.DEUTSCH@OUTLOOK.COM

          Client_CreateDate First Name Last Name                    Email  \
401319  2021-11-09 06:30:33      DAVID   DEUTSCH  DAVE.DEUTSCH@OUTLOOK.COM
603265  2022-02-01 16:38:18      DAVID   DEUTSCH  DAVE.DEUTSCH@OUTLOOK.COM

             Phone  …                              fe               fp  \
401319  6135187935  …  DAVIDDAVE.DEUTSCH@OUTLOOK.COM  DAVID6135187935
603265  6134042836  …  DAVIDDAVE.DEUTSCH@OUTLOOK.COM  DAVID6134042836

                                        pe  \
401319  6135187935DAVE.DEUTSCH@OUTLOOK.COM
603265  6134042836DAVE.DEUTSCH@OUTLOOK.COM

                                              lpe  \
401319  DEUTSCH6135187935DAVE.DEUTSCH@OUTLOOK.COM
603265  DEUTSCH6134042836DAVE.DEUTSCH@OUTLOOK.COM

                                     le                 lp pr_lpe_f pr_le_f  \
401319  DEUTSCHDAVE.DEUTSCH@OUTLOOK.COM  DEUTSCH6135187935      NaN     NaN
603265  DEUTSCHDAVE.DEUTSCH@OUTLOOK.COM  DEUTSCH6134042836      NaN     NaN

       pr_lp_f            fl
401319     NaN  DAVIDDEUTSCH
603265     NaN  DAVIDDEUTSCH

[2 rows x 23 columns]
```

[92]:
```
ecbe[ecbe['First Name'].isin(['MARTY'])]
ecbe[ecbe['Last Name'].isin(['CHAN'])]
```

[92]:
```
             Create Date First Name Last Name       Phone  \
287  2022-02-16 00:00:00     STELLA      CHAN  7783890028

                    Email                                                Offer  \
287  STELLA_CHAN@TELUS.NET  I just want to enroll in the Cash + up to 500 …

    Enrollment Date            Enrollment Source  \
287      2022-02-16  Salesforce Existing Clients

                                         flpe                   flp  \
287  STELLACHAN7783890028STELLA_CHAN@TELUS.NET  STELLACHAN7783890028

                                fle                          fe  \
```

```
287  STELLACHANSTELLA_CHAN@TELUS.NET  STELLASTELLA_CHAN@TELUS.NET

                  fp                                pe  \
287  STELLA7783890028  7783890028STELLA_CHAN@TELUS.NET

                                     lpe                          le  \
287  CHAN7783890028STELLA_CHAN@TELUS.NET  CHANSTELLA_CHAN@TELUS.NET

                lp          fl
287  CHAN7783890028  STELLACHAN
```

[88]:
```
itrade[itrade['ClientUserID'].isin([1652714,
918622,
934518,
7095202])]
```

[88]:
```
        ClientUserID ClientFirstName ClientLastName  \
342435       1652714  MAHESH CORP ID      SHANGHAVI
387973        918622             RAJ      SHANGHAVI
572374       7095202           MARTY           CHAN
710875        934518        HENKUVER      SHANGHAVI

               ClientPhoneNumber    ClientEMailAddress    Client_CreateDate  \
342435  905-569-6858                 MAHESHS@ROGERS.COM  2014-07-21 09:52:38
387973  905 5696858                  MAHESHS@ROGERS.COM  2009-02-06 08:04:51
572374  647 9868485                CHAN.MARTY@GMAIL.COM  2021-01-09 11:18:45
710875  9055696858                   MAHESHS@ROGERS.COM  2006-02-01 16:46:48

          First Name  Last Name                 Email       Phone  …  \
342435  MAHESHCORPID  SHANGHAVI    MAHESHS@ROGERS.COM  9055696858  …
387973           RAJ  SHANGHAVI    MAHESHS@ROGERS.COM  9055696858  …
572374         MARTY       CHAN  CHAN.MARTY@GMAIL.COM  6479868485  …
710875      HENKUVER  SHANGHAVI    MAHESHS@ROGERS.COM  9055696858  …

                                    fe                     fp  \
342435  MAHESHCORPIDMAHESHS@ROGERS.COM  MAHESHCORPID9055696858
387973           RAJMAHESHS@ROGERS.COM           RAJ9055696858
572374        MARTYCHAN.MARTY@GMAIL.COM         MARTY6479868485
710875      HENKUVERMAHESHS@ROGERS.COM      HENKUVER9055696858

                                    pe                                      lpe  \
342435    9055696858MAHESHS@ROGERS.COM  SHANGHAVI9055696858MAHESHS@ROGERS.COM
387973    9055696858MAHESHS@ROGERS.COM  SHANGHAVI9055696858MAHESHS@ROGERS.COM
572374  6479868485CHAN.MARTY@GMAIL.COM     CHAN6479868485CHAN.MARTY@GMAIL.COM
710875    9055696858MAHESHS@ROGERS.COM  SHANGHAVI9055696858MAHESHS@ROGERS.COM

                                le                  lp pr_lpe_f pr_le_f  \
```

```
342435  SHANGHAVIMAHESHS@ROGERS.COM  SHANGHAVI9055696858      NaN     NaN
387973  SHANGHAVIMAHESHS@ROGERS.COM  SHANGHAVI9055696858      NaN     NaN
572374     CHANCHAN.MARTY@GMAIL.COM       CHAN6479868485      NaN     NaN
710875  SHANGHAVIMAHESHS@ROGERS.COM  SHANGHAVI9055696858      NaN     NaN

       pr_lp_f                    fl
342435     NaN  MAHESHCORPIDSHANGHAVI
387973     NaN           RAJSHANGHAVI
572374     NaN              MARTYCHAN
710875     NaN      HENKUVERSHANGHAVI

[4 rows x 23 columns]
```

[70]:
```
itrade[itrade['Last Name'].isin(['GOW'])]
itrade[itrade['Last Name'].str.startswith('WINAR',na=False)]
```

[70]:
```
        ClientUserID ClientFirstName ClientLastName  \
5787         1018060          DANIEL       WINARSKI
5788         1018061          JUDITH       WINARSKI
71322        1223980            DALE       WINARSKI
174147       7097811         HENDRIK        WINARTA

               ClientPhoneNumber        ClientEMailAddress  \
5787    519 7254983                  DWINARSKI@SYMPATICO.CA
5788    519-725-4983                 DWINARSKI@SYMPATICO.CA
71322   7804678309                 DALEWINARSKI@HOTMAIL.COM
174147  604 7298582                    HKWINARTA@GMAIL.COM

          Client_CreateDate First Name Last Name                    Email  \
5787    2006-12-06 16:59:47     DANIEL  WINARSKI    DWINARSKI@SYMPATICO.CA
5788    2006-12-06 16:59:47     JUDITH  WINARSKI    DWINARSKI@SYMPATICO.CA
71322   2009-11-28 06:36:10       DALE  WINARSKI  DALEWINARSKI@HOTMAIL.COM
174147  2021-01-14 22:59:07    HENDRIK   WINARTA       HKWINARTA@GMAIL.COM

            Phone  …                             fe                fp  \
5787    5197254983  …  DANIELDWINARSKI@SYMPATICO.CA   DANIEL5197254983
5788    5197254983  …  JUDITHDWINARSKI@SYMPATICO.CA   JUDITH5197254983
71322   7804678309  …  DALEDALEWINARSKI@HOTMAIL.COM     DALE7804678309
174147  6047298582  …    HENDRIKHKWINARTA@GMAIL.COM  HENDRIK6047298582

                                      pe  \
5787      5197254983DWINARSKI@SYMPATICO.CA
5788      5197254983DWINARSKI@SYMPATICO.CA
71322   7804678309DALEWINARSKI@HOTMAIL.COM
174147       6047298582HKWINARTA@GMAIL.COM

                                          lpe  \
```

```
5787      WINARSKI5197254983DWINARSKI@SYMPATICO.CA
5788      WINARSKI5197254983DWINARSKI@SYMPATICO.CA
71322   WINARSKI7804678309DALEWINARSKI@HOTMAIL.COM
174147        WINARTA6047298582HKWINARTA@GMAIL.COM

                                      le                  lp pr_lpe_f pr_le_f  \
5787      WINARSKIDWINARSKI@SYMPATICO.CA  WINARSKI5197254983      NaN     NaN
5788      WINARSKIDWINARSKI@SYMPATICO.CA  WINARSKI5197254983      NaN     NaN
71322   WINARSKIDALEWINARSKI@HOTMAIL.COM  WINARSKI7804678309      NaN     NaN
174147        WINARTAHKWINARTA@GMAIL.COM   WINARTA6047298582      NaN     NaN

       pr_lp_f             fl
5787       NaN  DANIELWINARSKI
5788       NaN  JUDITHWINARSKI
71322      NaN    DALEWINARSKI
174147     NaN  HENDRIKWINARTA

[4 rows x 23 columns]
```

[138]:
```
d[d['cid'].isin([1686699])]
```

[138]:
```
             Create Date   First Name Last Name       Phone  \
61  2022-02-04 00:00:00  PERCYSHUNWA      FONG  6476923866

                    Email                                                Offer  \
61  PERCY0629@HOTMAIL.COM  Cash and $4.99 stock and ETF commission pricing.

   Enrollment Date            Enrollment Source  \
61      2022-02-04  Salesforce Existing Clients

                                            flpe                         flp  \
61  PERCYSHUNWAFONG6476923866PERCY0629@HOTMAIL.COM  PERCYSHUNWAFONG6476923866

    …                          le              lp               fl cid_flpe  \
61  …  FONGPERCY0629@HOTMAIL.COM  FONG6476923866  PERCYSHUNWAFONG      NaN

   cid_flp cid_fle cid_fe cid_fp  cid_pe        cid
61     NaN     NaN    NaN    NaN     NaN  1686699.0

[1 rows x 25 columns]
```

[63]:
```
d[d['Last Name'].isin([''])]
```

[63]:
```
Empty DataFrame
Columns: [Create Date, First Name, Last Name, Phone, Email, Offer, Enrollment
Date, Enrollment Source, flpe, flp, fle, fe, fp, pe, lpe, le, lp, fl, cid]
Index: []
```

[144]:
```
d_notapprmatched[d_notapprmatched['Last Name'].isin(['MITTON'])]
```

[144]:
```
Empty DataFrame
Columns: [Create Date, Client ID, Offer, Enrollment Date, Enrollment Source,
First Name, Last Name, Phone, Email]
Index: []
```

[113]:
```
exc[exc["Client ID (Please do not add account numbers)"].isin([6216])]
```

[113]:
```
                          Campaign  \
704  F22 Winter Campaign Exception

     Client ID (Please do not add account numbers)  Card Number (16 digits)  \
704                                           6216         4536057612938200

    Client First Name Client Last Name  \
704            daniel             chow

                                       Offer selected  \
704  Mass, Acquisition & Lifecycle -Free Trades (FT22)

                        Exception Reason  \
704  Grant offer to non-targeted clients

    Enrollment Date (Date since when we should monitor funding)   \
704                                          2/11/2022

                Created    Created By
704  2/11/2022 3:29 PM  Singh, Hardy
```

[111]:
```
exc[exc["Client Last Name"].isin(['CHOW'])]
```

[111]:
```
Empty DataFrame
Columns: [Campaign, Client ID (Please do not add account numbers), Card Number
(16 digits), Client First Name, Client Last Name, Offer selected, Exception
Reason, Enrollment Date (Date since when we should monitor funding) , Created,
Created By]
Index: []
```

[109]:
```
ec[ec['Last Name'].isin(['Chow'])]
```

[109]:

	Lead ID	Create Date	First Name	Last Name	Phone
47	00Q4w00001RbY4i	11/02/2022	Gloria	Chow	(416) 598-1551
48	00Q4w00001RbY4J	11/02/2022	Paul	Chow	(416) 598-1551
174	00Q4w00001RbV7g	09/02/2022	Daniel Siu Chuen	Chow	(705) 241-9298
426	00Q4w00001RbSCW	07/02/2022	Wing-Chi	Chow	(647) 895-3356
496	00Q4w00001RbRyD	07/02/2022	Elsie	Chow	(604) 807-6923

```
                          Email Language Preferred  \
47     glorialeechow@hotmail.com            English
48   paulchowactuary@hotmail.com            English
174          dchow0808@gmail.com            English
426            wchowid@gmail.com            English
496      fatlady_no2@hotmail.com            English

                                        Lead Source    Lead Owner  \
47   iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
48   iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
174  iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
426  iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
496  iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin

             Which offer would you like to enroll in?  \
47   Cash and $4.99 stock and ETF commission pricing.
48   Cash and $4.99 stock and ETF commission pricing.
174  Cash and $4.99 stock and ETF commission pricing.
426  Cash and $4.99 stock and ETF commission pricing.
496  Cash and $4.99 stock and ETF commission pricing.

     Wish to be contacted by Scotia iTRADE Lead Status
47                                     0         New
48                                     0         New
174                                    0         New
426                                    0         New
496                                    0         New
```

[94]:
```
be[be['First Name'].isin(['Sara'])]
```

[94]:
```
             Lead ID Create Date First Name    Last Name           Phone  \
103  00Q4w00001RbMsN  31/01/2022       Sara  Ash-Elliott  (780) 499-2889

                         Email Language Preferred  \
103  sara.ashelliott@gmail.com            English

                                        Lead Source    Lead Owner  \
103  Scotia iTRADE 2021 Winter Campaign - BNS Employee  iTRADE Admin

     Campaign                                BNS Employee Option
103       NaN  I just want to enroll in the Cash + up to 500 …
```

[106]:
```
ecbe[ecbe['First Name'].isin(['DANIEL'])]
```

[106]:
```
             Create Date First Name Last Name       Phone  \
32   2022-02-11 00:00:00     DANIEL   PROVOST  7059880440
```

```
214  2022-02-08 00:00:00     DANIEL   MCVICAR  2507587757
505  2022-02-07 00:00:00     DANIEL    HILTON  6045623540

                      Email                                                Offer  \
32     DPROVOST@ALUM.MIT.EDU  Cash and $4.99 stock and ETF commission pricing.
214  DANNYMCVICAR@TELUS.NET  Cash and $4.99 stock and ETF commission pricing.
505         DANH28@GMAIL.COM  Cash and $4.99 stock and ETF commission pricing.

    Enrollment Date            Enrollment Source  \
32       2022-02-11  Salesforce Existing Clients
214      2022-02-08  Salesforce Existing Clients
505      2022-02-07  Salesforce Existing Clients

                                              flpe                        flp  \
32    DANIELPROVOST7059880440DPROVOST@ALUM.MIT.EDU  DANIELPROVOST7059880440
214  DANIELMCVICAR2507587757DANNYMCVICAR@TELUS.NET  DANIELMCVICAR2507587757
505         DANIELHILTON6045623540DANH28@GMAIL.COM   DANIELHILTON6045623540

                                      fle                              fe  \
32     DANIELPROVOSTDPROVOST@ALUM.MIT.EDU   DANIELDPROVOST@ALUM.MIT.EDU
214  DANIELMCVICARDANNYMCVICAR@TELUS.NET  DANIELDANNYMCVICAR@TELUS.NET
505         DANIELHILTONDANH28@GMAIL.COM        DANIELDANH28@GMAIL.COM

                  fp                                  pe  \
32   DANIEL7059880440   7059880440DPROVOST@ALUM.MIT.EDU
214  DANIEL2507587757  2507587757DANNYMCVICAR@TELUS.NET
505  DANIEL6045623540        6045623540DANH28@GMAIL.COM

                                       lpe                              le  \
32     PROVOST7059880440DPROVOST@ALUM.MIT.EDU   PROVOSTDPROVOST@ALUM.MIT.EDU
214  MCVICAR2507587757DANNYMCVICAR@TELUS.NET  MCVICARDANNYMCVICAR@TELUS.NET
505         HILTON6045623540DANH28@GMAIL.COM         HILTONDANH28@GMAIL.COM

                   lp            fl
32   PROVOST7059880440  DANIELPROVOST
214  MCVICAR2507587757  DANIELMCVICAR
505   HILTON6045623540   DANIELHILTON
```

[76]:
```
ec[ec['First Name'].isin(['jaskaransingh'])]
```

[76]:
```
Empty DataFrame
Columns: [Lead ID, Create Date, First Name, Last Name, Phone, Email, Language
Preferred, Lead Source, Lead Owner, Which offer would you like to enroll in?,
Wish to be contacted by Scotia iTRADE, Lead Status]
Index: []
```

[127]:
```
na[na['ClientUserID'].isin([1125686])]
```

[127]:
```
     AccountNumber  ClientUserID  ReferralType   Account_CreateDate  \
430       57557095       1125686           233  2022-02-04 11:11:03

       Client_CreateDate Description
430  2008-08-29 14:46:11  Cash Offer
```

[118]:
```
na_2[na_2['Client ID'].isin([7200596])]
```

[118]:
```
             Create Date  Client ID       Offer Enrollment Date  \
415  2022-02-04 00:46:42    7200596  Cash Offer      2022-02-04

     Enrollment Source
415  New Account Query
```

[72]:
```
ecbe[ecbe["First Name"].isin(["JASKARANSINGH"])]
```

[72]:
```
            Create Date     First Name Last Name       Phone  \
39  2022-02-18 00:00:00  JASKARANSINGH   TAKHTAR  2048696974

                          Email                        Offer Enrollment Date  \
39  TAKHTAR.JASKARAN@GMAIL.COM  Free stock and ETF trades.      2022-02-18

              Enrollment Source  \
39  Salesforce Existing Clients

                                                    flpe  \
39  JASKARANSINGHTAKHTAR2048696974TAKHTAR.JASKARAN…

                                 flp  \
39  JASKARANSINGHTAKHTAR2048696974

                                              fle  \
39  JASKARANSINGHTAKHTARTAKHTAR.JASKARAN@GMAIL.COM

                                         fe                        fp  \
39  JASKARANSINGHTAKHTAR.JASKARAN@GMAIL.COM  JASKARANSINGH2048696974

                                       pe  \
39  2048696974TAKHTAR.JASKARAN@GMAIL.COM

                                            lpe  \
39  TAKHTAR2048696974TAKHTAR.JASKARAN@GMAIL.COM

                                    le                 lp                     fl
39  TAKHTARTAKHTAR.JASKARAN@GMAIL.COM  TAKHTAR2048696974  JASKARANSINGHTAKHTAR
```

[84]:
```
ecbe[ecbe["Last Name"].isin(["EMERY"])]
```

[84]:
```
Empty DataFrame
Columns: [Create Date, First Name, Last Name, Phone, Email, Offer, Enrollment
Date, Enrollment Source, flpe, flp, fle, fe, fp, pe, lpe, le, lp, fl]
Index: []
```

[81]:
```
ec[ec["Last Name"].isin(["Takhtar"])]
```

[81]:
```
            Lead ID Create Date      First Name Last Name           Phone  \
41  00Q4w00001RbquS  18/02/2022  Jaskaran singh   Takhtar  (204) 869-6974

                          Email Language Preferred  \
41  takhtar.jaskaran@gmail.com            English

                                        Lead Source          Lead Owner  \
41  iTRADE-21Winter Campaign-Existing iTRADE Customer  Nilen Thamphirasan

   Which offer would you like to enroll in?  \
41               Free stock and ETF trades.

    Wish to be contacted by Scotia iTRADE Lead Status
41                                     1         New
```

[ ]:
```
itrade.loc[(itrade['First Name']=='CRAIG') & (itrade['Last Name']=='LEVANGIE')]
```

[ ]:
```
        ClientUserID ClientFirstName ClientLastName  \
363734        574813           CRAIG       LEVANGIE

               ClientPhoneNumber             ClientEMailAddress  \
363734  902 4353299               CRAIG.LEVANGIE@SCOTIABANK.COM

          Client_CreateDate First Name Last Name  \
363734  2011-07-25 13:20:05      CRAIG  LEVANGIE

                                Email       Phone  …  \
363734  CRAIG.LEVANGIE@SCOTIABANK.COM  9024353299  …

                                       fe               fp  \
363734  CRAIGCRAIG.LEVANGIE@SCOTIABANK.COM  CRAIG9024353299

                                            pe  \
363734  9024353299CRAIG.LEVANGIE@SCOTIABANK.COM

                                                lpe  \
363734  LEVANGIE9024353299CRAIG.LEVANGIE@SCOTIABANK.COM

                                         le                  lp pr_lpe_f  \
363734  LEVANGIECRAIG.LEVANGIE@SCOTIABANK.COM  LEVANGIE9024353299      NaN
```

```
       pr_le_f pr_lp_f             fl
363734     NaN     NaN  CRAIGLEVANGIE

[1 rows x 23 columns]
```

[83]:
```
fn='JOSHUA'
ln='LIEBLEIN'
itrade.loc[(itrade['First Name'].str.contains(fn,na=False)) & (itrade['Last␣
↪Name'].isin([ln]))]
```

[83]:
```
        ClientUserID ClientFirstName ClientLastName  \
354922       7201431          JOSHUA       LIEBLEIN

                ClientPhoneNumber       ClientEMailAddress  \
354922  6474676763                 RUBY@REUBENLIEBLEIN.COM

          Client_CreateDate First Name Last Name                     Email  \
354922  2022-02-02 14:18:51     JOSHUA  LIEBLEIN  RUBY@REUBENLIEBLEIN.COM

             Phone  …                                fe                fp  \
354922  6474676763  …  JOSHUARUBY@REUBENLIEBLEIN.COM  JOSHUA6474676763

                                      pe  \
354922  6474676763RUBY@REUBENLIEBLEIN.COM

                                                lpe  \
354922  LIEBLEIN6474676763RUBY@REUBENLIEBLEIN.COM

                                    le                  lp pr_lpe_f pr_le_f  \
354922  LIEBLEINRUBY@REUBENLIEBLEIN.COM  LIEBLEIN6474676763      NaN     NaN

       pr_lp_f              fl
354922     NaN  JOSHUALIEBLEIN

[1 rows x 23 columns]
```

[235]:
```
itrade.loc[(itrade['Phone'].isin(['4032542337']))]
```

[235]:
```
Empty DataFrame
Columns: [ClientUserID, ClientFirstName, ClientLastName, ClientPhoneNumber,
ClientEMailAddress, Client_CreateDate, First Name, Last Name, Email, Phone,
flpe, flp, fle, fe, fp, pe, lpe, le, lp, pr_lpe_f, pr_le_f, pr_lp_f]
Index: []

[0 rows x 22 columns]
```

[198]:
```
fuzz.partial_ratio('MIKE','MICHAEL')
```

[198]:
```
50
```

[140]:
```
#ec[ec['First Name'].isin(['Stephane'])]
ec[ec['First Name'].str.startswith("Julie",na=False)]
```

[140]:
```
             Lead ID Create Date First Name Last Name           Phone  \
16   00Q4w00001RbMFj  2022-01-29   Juliette   Merritt  (902) 870-1937
31   00Q4w00001RbM3Y  2022-01-29     Julien   Ragbeer  (416) 671-6114
338  00Q4w00001RbK5b  2022-01-26     Juliet   Francis  (647) 807-3360

                         Email Language Preferred  \
16   capebluejewels@gmail.com            English
31         jragbeer@gmail.com            English
338    kisliving333@gmail.com            English

                                        Lead Source    Lead Owner  \
16   iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
31   iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin
338  iTRADE-21Winter Campaign-Existing iTRADE Customer  iTRADE Admin

             Which offer would you like to enroll in?  \
16   Cash and $4.99 stock and ETF commission pricing.
31   Cash and $4.99 stock and ETF commission pricing.
338  Cash and $4.99 stock and ETF commission pricing.

     Wish to be contacted by Scotia iTRADE
16                                       1
31                                       0
338                                      0
```

[141]:
```
#be[be['Last Name'].isin(['Ba'])]
be[be['First Name'].str.startswith("Julie",na=False)]
```

[141]:
```
             Lead ID Create Date First Name Last Name           Phone  \
13   00Q4w00001RbM4R  2022-01-29      Julie    Turner  (613) 809-0297

                       Email Language Preferred  \
13   azwturner@sympatico.ca            English

                                       Lead Source    Lead Owner  Campaign  \
13   Scotia iTRADE 2021 Winter Campaign - BNS Employee  iTRADE Admin       NaN

                                  BNS Employee Option
13   I just want to enroll in the Cash + up to 500 …
```

2 Test

[ ]:
```
dups=all_enrollments[all_enrollments['Client ID'].duplicated(keep=False)]
dups.sort_values('Client ID')
```

[323]:
```
df['v_5'] = np.where(~df['pfv'].isnull(),df['pfv'],df['v_5']))
df['real_lastName'] = np.where(df['LastName'].isnull(), df['Middle'],␣
 ↪df['LastName'] )

a['cid'] = np.where(~a['cid_flpe'].isnotnull())



if a['cid_flpe']=="":
    a['cid']=a['cid_flpe']
```

```
  File "C:\Users\s6438750\AppData\Local\Temp\1/ipykernel_20268/3877912106.py",␣
 ↪line 1
    df['v_5'] = np.where(~df['pfv'].isnull(),df['pfv'],df['v_5']))
                                                               ^

SyntaxError: unmatched ')'
```

[166]:
```
datax = {'fn':  ['jo+', 'Jej','BEN','maa','','take','BEN'],
         'ln': ['u+errr', np.nan,'DAN','ppppp',np.nan,np.nan,'efd'],
        'ph':['(647) 561-3467',np.nan,'55433322',np.nan,'','','22']}
x=pd.DataFrame(datax)

x["fn"]=x['fn'].str.upper()
x['fn']=x['fn'].str.replace(r'[^a-zA-Z]', '',regex=True)

x["ln"]=x['ln'].str.upper()
x['ln']=x['ln'].str.replace(r'[^a-zA-Z]', '',regex=True)

x['ph']=x['ph'].str.replace(r'\D+','', regex=True)

x
```

[166]:

	fn	ln	ph
0	JO	UERRR	6475613467
1	JEJ	NaN	NaN
2	BEN	DAN	55433322
3	MAA	PPPPP	NaN
4		NaN	
5	TAKE	NaN	
6	BEN	EFD	22

[167]:
```
x.sort_values('ph')
```

[167]:

	fn	ln	ph
4		NaN	
5	TAKE	NaN	
6	BEN	EFD	22
2	BEN	DAN	55433322
0	JO	UERRR	6475613467
1	JEJ	NaN	NaN
3	MAA	PPPPP	NaN

[168]:
```
x.drop_duplicates('ln')
```

[168]:

	fn	ln	ph
0	JO	UERRR	6475613467
1	JEJ	NaN	NaN
2	BEN	DAN	55433322
3	MAA	PPPPP	NaN
6	BEN	EFD	22

[1]:
```
datay = {'cid':['1234','2222','2'],
        'fn':  ['', 'Ben','BEN'],
        'ln': ['LINCOLN', 'DAN','DAN'],
       'ph':['(647) 561-3467','55433322','55433322']}
y=pd.DataFrame(datay)

y["fn"]=y['fn'].str.upper()
y['fn']=y['fn'].str.replace(r'[^a-zA-Z]', '',regex=True)

y["ln"]=y['ln'].str.upper()
y['ln']=y['ln'].str.replace(r'[^a-zA-Z]', '',regex=True)

y['ph']=y['ph'].str.replace(r'\D+','', regex=True)

y
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
~\AppData\Local\Temp\1/ipykernel_16020/3790051237.py in <module>
      3         'ln': ['LINCOLN', 'DAN','DAN'],
      4        'ph':['(647) 561-3467','55433322','55433322']}
----> 5 y=pd.DataFrame(datay)
      6
      7 y["fn"]=y['fn'].str.upper()

NameError: name 'pd' is not defined
```

[224]:
```
y[y['fn']=='']
```

[224]:

	cid	fn	ln	ph
0	1234		LINCOLN	6475613467

[216]:
```
y[y['ph']==y['ph'].max()]
```

[216]:

	cid	fn	ln	ph
0	1234	ABRAHAM	LINCOLN	6475613467

[217]:
```
pd.merge(x,y[['cid','fn']],left_on='fn',right_on='fn',how='left')
```

[217]:

	fn	ln	ph	cid
0	JO	UERRR	6475613467	NaN
1	JEJ	NaN	NaN	NaN
2	BEN	DAN	55433322	2
3	MAA	PPPPP	NaN	NaN
4		NaN		NaN
5	TAKE	NaN		NaN
6	BEAN	EFD	22	NaN

[139]:
```
join_map = {i['fn']:i['ph'] for ind,i in x.iterrows()}
join_map
```

[139]:
```
{'JO': '6475613467', 'JEJ': nan, nan: '', '': '', 'BEAN': '22'}
```

[154]:
```
for ind,val in join_map.items():
    print(ind,val)
```

```
JO 6475613467
JEJ nan
nan

BEAN 22
```

[220]:
```
for i,i_row in x[2:3].iterrows():

    #1. flp%
    #temp_1= y['cid'].loc[y['flp'].str.startswith(i_row['flp'],na=False)]#.
 ↪values
    #find_df.loc[i,'cid_flp%']=str(temp_1)[1:-1]
    #if temp_1.size != 0:
    #    find_df.loc[i,'cid_f%lpe']=temp_1.values[0]
    #del temp_1

    #2. =lastname & =trim(phone) & = upper(email) & First Name%
    temp_2= y.loc[(y['ln']==i_row['ln']) & (y['ph']==i_row['ph'])]
```

```
    temp_2= temp_2['cid'].loc[temp_2['fn'].str.
 ↪startswith(i_row['fn'],na=False)]#.values
    #find_df.loc[i,'cid_f%lpe']=str(temp_2)[1:-1]
    if temp_2.size != 0:
        x.loc[i,'cid_f%lpe']=temp_2.values[0]
    #del temp_2

temp_2
x
```

[220]:

	fn	ln	ph	cid_f%lpe
0	JO	UERRR	6475613467	NaN
1	JEJ	NaN	NaN	NaN
2	BEN	DAN	55433322	2222
3	MAA	PPPPP	NaN	NaN
4		NaN		NaN
5	TAKE	NaN		NaN
6	BEAN	EFD	22	NaN

[153]:
```
join_map = {i['fn']:i['ph'] for key,i in x.iterrows()}
join_map
df1['Category'] = df1['Description'].apply(lambda x: [val for key,val in␣
 ↪join_map.items() if key in x][0] if [val for key,val in join_map.items() if␣
 ↪key in x] else None)
```

[153]:
```
{'JO': '6475613467', 'JEJ': nan, nan: '', '': '', 'BEAN': '22'}
```

[177]:
```
datax = {'cid':['1234','2222','0000','9999','0111','0111','929929'],
        'fn':  ['BEAN', 'TAKE',np.nan,'OOW','jpo','poop','Poop'],
        'ln': ['u+dD', 'sm4sd55','ee','mondays',"lo",'first','second'],
       'ph':['(647) 561-3467','554.333.22','rr','33','0999','1432','1432']}
x=pd.DataFrame(datax)
x
```

[177]:

	cid	fn	ln	ph
0	1234	BEAN	u+dD	(647) 561-3467
1	2222	TAKE	sm4sd55	554.333.22
2	0000	NaN	ee	rr
3	9999	OOW	mondays	33
4	0111	jpo	lo	0999
5	0111	poop	first	1432
6	929929	Poop	second	1432

[178]:
```
x.sort_values(['cid'])
```

[178]:

	cid	fn	ln	ph
2	0000	NaN	ee	rr

```
4    0111   jpo       lo            0999
5    0111  poop    first            1432
0    1234  BEAN     u+dD  (647) 561-3467
1    2222  TAKE  sm4sd55      554.333.22
6  929929  Poop   second            1432
3    9999   OOW  mondays              33
```

[9]:
```
x[x['fn'].duplicated(keep=False)]
```

[9]:
```
Empty DataFrame
Columns: [cid, fn, ln, ph]
Index: []
```

[15]:
```
datay = {'fn':  ['TAKE', np.nan,'OOM','poop','PooP'],
         'ln': ['u+dD', 'sm4sd55','ee','first','moo'],
        'ph':['(647) 561-3467','554.333.22','rr','1432','9009'],
         'cid':['','','','','']}
y=pd.DataFrame(datay)
y
```

[15]:
```
     fn       ln              ph cid
0  TAKE     u+dD  (647) 561-3467
1   NaN  sm4sd55      554.333.22
2   OOM       ee              rr
3  poop    first            1432
4  PooP      moo            9009
```

[31]:
```
#x.merge(y.notnull(),on='fn',how='left')
x.merge(y.dropna(subset=['fn','ln']), on='fn', how='left')
```

[31]:
```
    cid_x    fn     ln_x            ph_x   ln_y            ph_y cid_y
0    1234  BEAN     u+dD  (647) 561-3467    NaN             NaN   NaN
1    2222  TAKE  sm4sd55      554.333.22   u+dD  (647) 561-3467
2    0000   NaN       ee              rr    NaN             NaN   NaN
3    9999   OOW  mondays              33    NaN             NaN   NaN
4    0111   jpo       lo            0999    NaN             NaN   NaN
5  010101  poop    first            1432  first            1432
6  929929  poop   second            1432  first            1432
```

[16]:
```
y=y.drop_duplicates(['fn'])
y
```

[16]:
```
     fn       ln              ph cid
0  TAKE     u+dD  (647) 561-3467
1   NaN  sm4sd55      554.333.22
2   OOM       ee              rr
3  poop    first            1432
```

```
4  PooP      moo            9009
```

[164]:
```
pd.merge(y,x[['cid','fn']],left_on='fn',right_on='fn',how='left')
```

[164]:
```
     fn       ln              ph cid_x   cid_y
0  TAKE     u+dD  (647) 561-3467           NaN
1   BEA  sm4sd55      554.333.22           NaN
2   OOM       ee              rr           NaN
3  poop    first            1432        010101
4  poop    first            1432        929929
```

[86]:
```
join_map = {i['fn']:i['cid'] for key,i in x.iterrows()}
join_map
```

[86]:
```
{'BEAN': '1234', 'TAK': '2222', 'BOOOM': '0000', 'OOW': '9999', 'jpo': '0111'}
```

[94]:
```
join_map = {i['fn']:i['cid'] for key,i in x.iterrows()}
y['cid']=y['fn'].apply(lambda x: [val for key,val in join_map.items() if key in␣
 ↪x ][0] if [val for key,val in join_map.items() if key in x] else None)
y
```

[94]:
```
     fn       ln              ph   cid
0  TAKE     u+dD  (647) 561-3467  2222
1   BEA  sm4sd55      554.333.22  None
2   OOM       ee              rr  None
```

[93]:
```
if "ABCD" in "ABC":
    print("True")
else:
    print("False")
```

```
False
```

[480]:
```
#https://datatofish.com/substring-pandas-dataframe/
# %fn
for i,row in y.iterrows():
    contain_values = x[x['fn'].str.startswith(row['fn'],na=False)]
    values= contain_values.loc[(contain_values['ln']=='u+dD') &␣
 ↪(contain_values['ph']=='(647) 561-3467'),'cid'].values
    row['cid']=str(values)[2:-2]

'''
for i,row in y.iterrows():
    if(pd.isnull(row['cid'])):
        print('true')

y.loc[y['cid']=='']
```

```
'''
y
```

[480]:
```
     fn       ln              ph   cid
0  TAKE     u+dD  (647) 561-3467
1   BEA  sm4sd55      554.333.22  1234
2   OOM       ee              rr
```

[286]:
```
#https://datatofish.com/substring-pandas-dataframe/
# %fn%
for i,row in y.iterrows():
    contain_values = x[x['fn'].str.contains(row['fn'])]
    print (contain_values)
```

```
Empty DataFrame
Columns: [cid, fn, ln, ph]
Index: []
    cid    fn    ln              ph
0  1234  BEAN  u+dD  (647) 561-3467
    cid     fn  ln  ph
2  0000  BOOOM  ee  rr
```

[ ]:
```
dataFrameOut = y[['column name'].str.contains('string')]
dataFrameOut
```

[280]:
```
x['cid']=np.where(x['fn'].isnull(),np.nan,x['fn'])
x
```

[280]:
```
    fn     ln          ph  cid
0   JO  UERRR  6475613467   JO
1  JEJ    NaN         NaN  JEJ
2  NaN   EEEE     4324432  NaN
3  NaN  PPPPP         NaN  NaN
4        NaN
5  NaN    NaN             NaN
```

[281]:
```
x.loc[x['cid'].isnull(),'cid'] = x['ln']
x
```

[281]:
```
    fn     ln          ph    cid
0   JO  UERRR  6475613467     JO
1  JEJ    NaN         NaN    JEJ
2  NaN   EEEE     4324432   EEEE
3  NaN  PPPPP         NaN  PPPPP
4        NaN
5  NaN    NaN               NaN
```

[239]:
```
dataa_abc = {'cid':['2222','2222','1'],
        'date':  ['2022-01-04', '2022-01-03','2022-01-06'],
         'status':['two','two','two']}
data_abc=pd.DataFrame(dataa_abc)
data_abc['date']=data_abc['date'].astype('datetime64[ns]')


data_abc
```

[239]:

	cid	date	status
0	2222	2022-01-04	two
1	2222	2022-01-03	two
2	1	2022-01-06	two

[244]:
```
data_abc=data_abc.drop_duplicates(subset=['cid','status'])#('cid',keep='last')
data_abc
```

[244]:

	cid	date	status
0	2222	2022-01-04	two
2	1	2022-01-06	two

[30]:
```
data_abc=data_abc.sort_values('date').drop_duplicates('cid',keep='first')
data_abc
```

[30]:

	cid	date	status
1	2222	2022-01-03	one
2	1	2022-01-06	yes

[197]:
```
dataa_abc = {'cid':['V','V','2222','1'],
        'date':  ['2022-12-05','2022-12-04', '2022-01-04','2022-01-06'],
         'status':['one','one','two','yes']}
data_abc=pd.DataFrame(dataa_abc)
data_abc['date']=data_abc['date'].astype('datetime64[ns]')
data_abc=data_abc.sort_values('date').
 ↪drop_duplicates(('cid','status'),keep='last')

data_abc
```

[197]:

	cid	date	status
2	2222	2022-01-04	two
3	1	2022-01-06	yes
0	V	2022-12-05	one

[ ]:
```
data_abc.drop_duplicates()
```

[22]:
```
data_abc
```

[22]:
```
     cid       date status
0      V 2022-01-04    one
1      V 2022-01-04    one
2   2222 2022-01-04    two
3      1 2022-01-06    yes
```

[49]:
```
data_abc=data_abc.sort_values('date').
 ↪drop_duplicates(['cid','date'],keep='last')
data_abc
```

[49]:
```
     cid       date status
1   2222 2022-01-04    two
2      1 2022-01-06    yes
```

[ ]:
```
a['cid'] = np.where(a['cid_flpe'].isnull(), np.nan, a['cid_flpe'] )
a['cid']
```

[279]:
```
data = {'month':␣
 ↪['January','February','March','April','May','June','July','August','September','October','N
        'days_in_month': [31,28,31,30,31,30,31,31,30,31,30,31]
        }

df = pd.DataFrame(data, columns = ['month', 'days_in_month'])

contain_values = df[df['month'].str.contains('Jun')]
print (contain_values)
```

```
  month  days_in_month
5  June             30
```

[103]:
```
test=ec['First Name'].str.encode('utf-8').str.decode('ascii', 'ignore')
test
```

[103]:
```
0          Keith
1         Marvin
2          James
3          Marie
4          Isaac
          ...
237       Sherry
238     caroline
239        Sevag
240    Catherine
241       Martin
Name: First Name, Length: 242, dtype: object
```

[ ]:
```
df_new = df.query("A==0")
```

[ ]:
```
df3 = df1.merge(df2, on='Number', how='left')
df3['Matching'] = np.where(df3.Productdetailed == df3.Item, 'Matched', 'No␣
↪Match')
df3.drop('Productdetailed', axis=1, inplace=True)
```