Milestone_4_Raghuwanshi_Prashant_DSC540

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Term Project: Milestone 4, Data transformation or cleansing steps to API source data

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Course: DSC540-T301 Data Preparation (2221-1)

[1]:
```
# Import common Data preparation libraries:
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

API Data Source:

[2]:
```
# import libraries for Api Data Source
from requests import Request, Session
from requests.exceptions import ConnectionError, Timeout, TooManyRedirects
import json
```

Fetching all crypto currency latest price data from coinmarket api

[3]:
```
# Calling api request and storing the responce in dict
url = 'https://pro-api.coinmarketcap.com/v1/cryptocurrency/listings/latest'
parameters = {
  'start':'1',
  'limit':'100',
  'convert':'USD'
}
headers = {
  'Accepts': 'application/json',
  'X-CMC_PRO_API_KEY': 'c6d563eb-5020-4805-822e-422c3a9b018c',
}

session = Session()
session.headers.update(headers)

try:
  response = session.get(url, params=parameters)
# storing jason to Dict
```

```
    data = json.loads(response.text)
except (ConnectionError, Timeout, TooManyRedirects) as e:
    print(e)
```

Parsing nested Api Json data into Dataframe

[4]:
```
# crearted the list -step 1
cryptodata = data['data']
# display the first element, with all columns in dataset
cryptodata[0]
```

[4]:

```
{'id': 1,
 'name': 'Bitcoin',
 'symbol': 'BTC',
 'slug': 'bitcoin',
 'num_market_pairs': 8294,
 'date_added': '2013-04-28T00:00:00.000Z',
 'tags': ['mineable',
  'pow',
  'sha-256',
  'store-of-value',
  'state-channels',
  'coinbase-ventures-portfolio',
  'three-arrows-capital-portfolio',
  'polychain-capital-portfolio',
  'binance-labs-portfolio',
  'arrington-xrp-capital',
  'blockchain-capital-portfolio',
  'boostvc-portfolio',
  'cms-holdings-portfolio',
  'dcg-portfolio',
  'dragonfly-capital-portfolio',
  'electric-capital-portfolio',
  'fabric-ventures-portfolio',
  'framework-ventures',
  'galaxy-digital-portfolio',
  'huobi-capital',
  'alameda-research-portfolio',
  'a16z-portfolio',
  '1confirmation-portfolio',
  'winklevoss-capital',
  'usv-portfolio',
  'placeholder-ventures-portfolio',
  'pantera-capital-portfolio',
  'multicoin-capital-portfolio',
  'paradigm-xzy-screener'],
 'max_supply': 21000000,
 'circulating_supply': 18865700,
```

```
 'total_supply': 18865700,
 'platform': None,
 'cmc_rank': 1,
 'last_updated': '2021-11-06T18:25:02.000Z',
 'quote': {'USD': {'price': 60880.163530433216,
   'volume_24h': 28800647837.774776,
   'volume_change_24h': -8.5717,
   'percent_change_1h': 0.22619363,
   'percent_change_24h': -0.42704839,
   'percent_change_7d': -0.92915866,
   'percent_change_30d': 12.63062007,
   'percent_change_60d': 30.79229688,
   'percent_change_90d': 39.45999401,
   'market_cap': 1148546901116.094,
   'market_cap_dominance': 42.6861,
   'fully_diluted_market_cap': 1278483434139.1,
   'last_updated': '2021-11-06T18:25:02.000Z'}}}
```


[5]:
```
# Format data into a more readable format-- parsing the api data and writting␣
↪it to list
# parsing the nested Jason data present in quote collumns and creating␣
↪datafrane for data preparation requirment
rows=[]
for currency in cryptodata:
    currency_id = currency['id']
    slug = currency['slug']
    cmc_rank = currency['cmc_rank']
    total_supply = currency['total_supply']
    currency_name = currency['name']
    currency_symbol = currency['symbol']
    currenct_price = currency['quote']['USD']['price']
    last_updated = currency['quote']['USD']['last_updated']
    rows.append([currency_id, slug, currency_name , currency_symbol, cmc_rank,␣
↪currenct_price, total_supply,last_updated])
```

[6]:
```
# Created new Dataframe which contains required price quote columns
# Replace Headers
df_parse_nested_json = pd.DataFrame(rows, columns=["currency_id", "slug",␣
↪"currency_name", "currency_symbol", "cmc_rank", "currency_price",␣
↪"total_supply", "last_updated"])
```

[7]:
```
# Display the new df data, use full for creating the lookup file..which␣
↪contains the currency name and its corresponding short name
df_parse_nested_lookup = pd.DataFrame(df_parse_nested_json, columns = ['slug',␣
↪'currency_symbol'])
# writting the df to csv file for archiving the fetch data for future refrences
df_parse_nested_lookup.to_csv(r'C:/Users/dell/Documents/docker/coin_lookup.csv')
```

[8]:
```
# display parsed and reshaped dataframe
df_parse_nested_lookup. head()
```

[8]:
```
          slug currency_symbol
0      bitcoin             BTC
1     ethereum             ETH
2  binance-coin            BNB
3       solana             SOL
4       tether            USDT
```

[9]:
```
#Fix Header casing, updating columns name in uppercase
df_crypto_price = df_parse_nested_json.rename(columns=str.upper)
df_crypto_price.head()
```

[9]:
```
   CURRENCY_ID          SLUG CURRENCY_NAME CURRENCY_SYMBOL  CMC_RANK  \
0            1       bitcoin       Bitcoin             BTC         1
1         1027      ethereum      Ethereum             ETH         2
2         1839  binance-coin  Binance Coin             BNB         3
3         5426        solana        Solana             SOL         4
4          825        tether        Tether            USDT         5

   CURRENCY_PRICE  TOTAL_SUPPLY              LAST_UPDATED
0    60880.163530  1.886570e+07  2021-11-06T18:25:02.000Z
1     4441.364800  1.182345e+08  2021-11-06T18:25:02.000Z
2      618.904122  1.668011e+08  2021-11-06T18:24:12.000Z
3      252.331559  5.083843e+08  2021-11-06T18:25:05.000Z
4        1.000889  7.335785e+10  2021-11-06T18:24:20.000Z
```

[10]:
```
# transforming total supply value in millions
# create function, convert counts in million
def convert_to_million(total):
    total1 = total/1000000
    return total1
```

[11]:
```
# call created function and update the date column value by using lambda␣
 ↪function
df_crypto_price['TOTAL_SUPPLY'] = df_crypto_price['TOTAL_SUPPLY'].apply(lambda␣
 ↪x: convert_to_million(x))
```

[12]:
```
df_crypto_price.head()
```

[12]:
```
   CURRENCY_ID          SLUG CURRENCY_NAME CURRENCY_SYMBOL  CMC_RANK  \
0            1       bitcoin       Bitcoin             BTC         1
1         1027      ethereum      Ethereum             ETH         2
2         1839  binance-coin  Binance Coin             BNB         3
3         5426        solana        Solana             SOL         4
4          825        tether        Tether            USDT         5
```

```
   CURRENCY_PRICE  TOTAL_SUPPLY              LAST_UPDATED
0    60880.163530     18.865700  2021-11-06T18:25:02.000Z
1     4441.364800    118.234458  2021-11-06T18:25:02.000Z
2      618.904122    166.801148  2021-11-06T18:24:12.000Z
3      252.331559    508.384251  2021-11-06T18:25:05.000Z
4        1.000889  73357.845272  2021-11-06T18:24:20.000Z
```

[13]:
```
# drop dublicate currency price entries from dataframe
df_crypto_price_drop_dup = df_crypto_price.
 ↪drop_duplicates(subset=['CURRENCY_ID', 'CURRENCY_SYMBOL'], keep='first')
```

[14]:
```
df_crypto_price_drop_dup.shape
```

[14]:
```
(100, 8)
```

[15]:
```
#created function to convert timestame to date
def tstodate(ts):
    a2 = pd.to_datetime(ts)
    a3 = a2.strftime('%Y%m%d')
    return a3
```

[16]:
```
# call created function and update the date column value by using lambda␣
 ↪function
df_crypto_price_drop_dup['LAST_UPDATED'] =␣
 ↪df_crypto_price_drop_dup['LAST_UPDATED'].apply(lambda x: tstodate(x))
```

[17]:
```
df_crypto_price_drop_dup.head()
```

[17]:
```
   CURRENCY_ID          SLUG CURRENCY_NAME CURRENCY_SYMBOL  CMC_RANK  \
0            1       bitcoin       Bitcoin             BTC         1
1         1027      ethereum      Ethereum             ETH         2
2         1839  binance-coin  Binance Coin             BNB         3
3         5426        solana        Solana             SOL         4
4          825        tether        Tether            USDT         5

   CURRENCY_PRICE  TOTAL_SUPPLY LAST_UPDATED
0    60880.163530     18.865700     20211106
1     4441.364800    118.234458     20211106
2      618.904122    166.801148     20211106
3      252.331559    508.384251     20211106
4        1.000889  73357.845272     20211106
```

Web Data Source Import libraries for Web Scraping

[18]:
```
# import library to open urls and download htmls
# print out python data structures
```

```
from pprint import pprint
# for parsing all the tables present
# on the website
import urllib.request
from html_table_parser.parser import HTMLTableParser
# for converting the parsed data to pandas dataframe
from bs4 import BeautifulSoup
```

[19]:
```
# define function to pull the website html file
def url_load_html(url):
    # request to the website
    req = urllib.request.Request(url=url)
    f = urllib.request.urlopen(req)
    # reading contents of the website
    return f.read()
```

[20]:
```
# define the html contents of a URL.
xhtml = url_load_html('https://www.moneycontrol.com/stocks/marketstats/
 ↪fii_dii_activity/index.php').decode('utf-8')
# Defining the HTMLTableParser object
par = HTMLTableParser()
# feeding the html contents in the
# HTMLTableParser object
par.feed(xhtml)
```

[21]:
```
# Format data into a more readable format

#This step pulls the required table data from html file
#pprint(par.tables[4])
# converting the parsed web table data to dataframe
df_html_data = pd.DataFrame(par.tables[4])
# display the fetch table data in dataframe
df_html_data.head()
```

[21]:
```
                                 0               1               2  \
0                                     FII Rs Crores  DII Rs Crores
1                              Date  Gross Purchase     Gross Sales
2      October 2021    October 2021       185,566.83      211,139.02
3  September 2021    September 2021       217,636.41      216,722.64
4       August 2021     August 2021       175,168.36      177,736.88

                       3               4            5                       6
0                   None            None         None                    None
1  Net Purchase / Sales  Gross Purchase  Gross Sales  Net Purchase / Sales
2             -25,572.19      151,607.74   147,136.75                4,470.99
3                 913.77      144,147.33   138,198.48                5,948.85
4              -2,568.52      131,185.18   124,290.49                6,894.69
```

[22]:
```
# setting second row as header
# step-1 extracting the header information
new_header = df_html_data.iloc[1] #grab the first row for the header
```

[23]:
```
new_header[1] = 'Tot_Gross_Purchase'
new_header[2] = 'Gross_Sales'
new_header[3] = 'net_purchase'
new_header
```

[23]:
```
0                   Date
1     Tot_Gross_Purchase
2            Gross_Sales
3           net_purchase
4         Gross Purchase
5            Gross Sales
6   Net Purchase / Sales
Name: 1, dtype: object
```

[24]:
```
df_html_data1 = df_html_data[2:] #take out the data less the header row
```

[25]:
```
df_html_data1.head()
```

[25]:
```
                               0               1           2           3  \
2     October 2021    October 2021  185,566.83  211,139.02  -25,572.19
3   September 2021  September 2021  217,636.41  216,722.64      913.77
4      August 2021     August 2021  175,168.36  177,736.88   -2,568.52
5        July 2021       July 2021  125,896.68  149,090.07  -23,193.39
6        June 2021       June 2021  170,188.95  170,214.84      -25.89

            4           5          6
2  151,607.74  147,136.75   4,470.99
3  144,147.33  138,198.48   5,948.85
4  131,185.18  124,290.49   6,894.69
5  117,910.10   99,516.18  18,393.92
6  114,289.67  107,246.16   7,043.51
```

[26]:
```
df_html_data1.columns = new_header #set the header row as the df header
df_html_data1.head()
```

[26]:
```
1                             Date Tot_Gross_Purchase Gross_Sales  \
2     October 2021    October 2021         185,566.83  211,139.02
3   September 2021  September 2021         217,636.41  216,722.64
4      August 2021     August 2021         175,168.36  177,736.88
5        July 2021       July 2021         125,896.68  149,090.07
6        June 2021       June 2021         170,188.95  170,214.84

1 net_purchase Gross Purchase Gross Sales Net Purchase / Sales
2   -25,572.19     151,607.74  147,136.75             4,470.99
```

```
3       913.77      144,147.33  138,198.48              5,948.85
4    -2,568.52      131,185.18  124,290.49              6,894.69
5   -23,193.39      117,910.10   99,516.18             18,393.92
6       -25.89      114,289.67  107,246.16              7,043.51
```

[27]:
```
# renaming the columns names
df_html_data2 = df_html_data1.rename(columns={"Gross Purchase":
 ↪"Int_Gross_Purchase", "Gross Sales":"Int_Gross_Sales", "Net Purchase /␣
 ↪Sales":"int_Net_Purchase"})
df_html_data2.head()
```

[27]:
```
1                              Date Tot_Gross_Purchase Gross_Sales  \
2      October 2021    October 2021         185,566.83  211,139.02
3  September 2021   September 2021         217,636.41  216,722.64
4         August 2021    August 2021         175,168.36  177,736.88
5             July 2021    July 2021         125,896.68  149,090.07
6             June 2021    June 2021         170,188.95  170,214.84

1 net_purchase Int_Gross_Purchase Int_Gross_Sales int_Net_Purchase
2   -25,572.19         151,607.74      147,136.75         4,470.99
3       913.77         144,147.33      138,198.48         5,948.85
4    -2,568.52         131,185.18      124,290.49         6,894.69
5   -23,193.39         117,910.10       99,516.18        18,393.92
6       -25.89         114,289.67      107,246.16         7,043.51
```

[28]:
```
#Fix Header casing
# updating columns name in uppercase
df_html_data3 = df_html_data2.rename(columns=str.upper)
df_html_data3.head()
```

[28]:
```
1                              DATE TOT_GROSS_PURCHASE GROSS_SALES  \
2      October 2021    October 2021         185,566.83  211,139.02
3  September 2021   September 2021         217,636.41  216,722.64
4         August 2021    August 2021         175,168.36  177,736.88
5             July 2021    July 2021         125,896.68  149,090.07
6             June 2021    June 2021         170,188.95  170,214.84

1 NET_PURCHASE INT_GROSS_PURCHASE INT_GROSS_SALES INT_NET_PURCHASE
2   -25,572.19         151,607.74      147,136.75         4,470.99
3       913.77         144,147.33      138,198.48         5,948.85
4    -2,568.52         131,185.18      124,290.49         6,894.69
5   -23,193.39         117,910.10       99,516.18        18,393.92
6       -25.89         114,289.67      107,246.16         7,043.51
```

[29]:
```
# create lambda function to fix the date inconsistent values
# input -- September 2021 September 2021 --> out put : 2021-09-01
import re
```

```
def remove_dup_date(row):
        k = re.split("   ", row)
        k1 = re.split(" ", k[1])
        a = pd.to_datetime(k1[1] + k1[0], format='%Y%B')
        #print(a)
        return a
```

[30]:
```
# fixing inconsistent values for date columns -- date values are populting␣
 ↪twice
# step 1 create function and update the date column value by using lambda␣
 ↪function
df_html_data3['DATE'] = df_html_data3['DATE'].apply(lambda x:␣
 ↪remove_dup_date(x))
```

[31]:
```
# create lambda function to fix the amount inconsistent values
# input -- '175,168.36' --> out put : 175168.36
import re
def fix_amount_value(row):
        b = row.replace(',', '')
        b2 = float(b)
        #print(b2)
        return b
```

[32]:
```
# displaying df after fixing date value
df_html_data3.head()
```

[32]:
```
1       DATE TOT_GROSS_PURCHASE GROSS_SALES NET_PURCHASE INT_GROSS_PURCHASE  \
2 2021-10-01         185,566.83  211,139.02   -25,572.19         151,607.74
3 2021-09-01         217,636.41  216,722.64       913.77         144,147.33
4 2021-08-01         175,168.36  177,736.88    -2,568.52         131,185.18
5 2021-07-01         125,896.68  149,090.07   -23,193.39         117,910.10
6 2021-06-01         170,188.95  170,214.84       -25.89         114,289.67

1 INT_GROSS_SALES INT_NET_PURCHASE
2      147,136.75         4,470.99
3      138,198.48         5,948.85
4      124,290.49         6,894.69
5       99,516.18        18,393.92
6      107,246.16         7,043.51
```

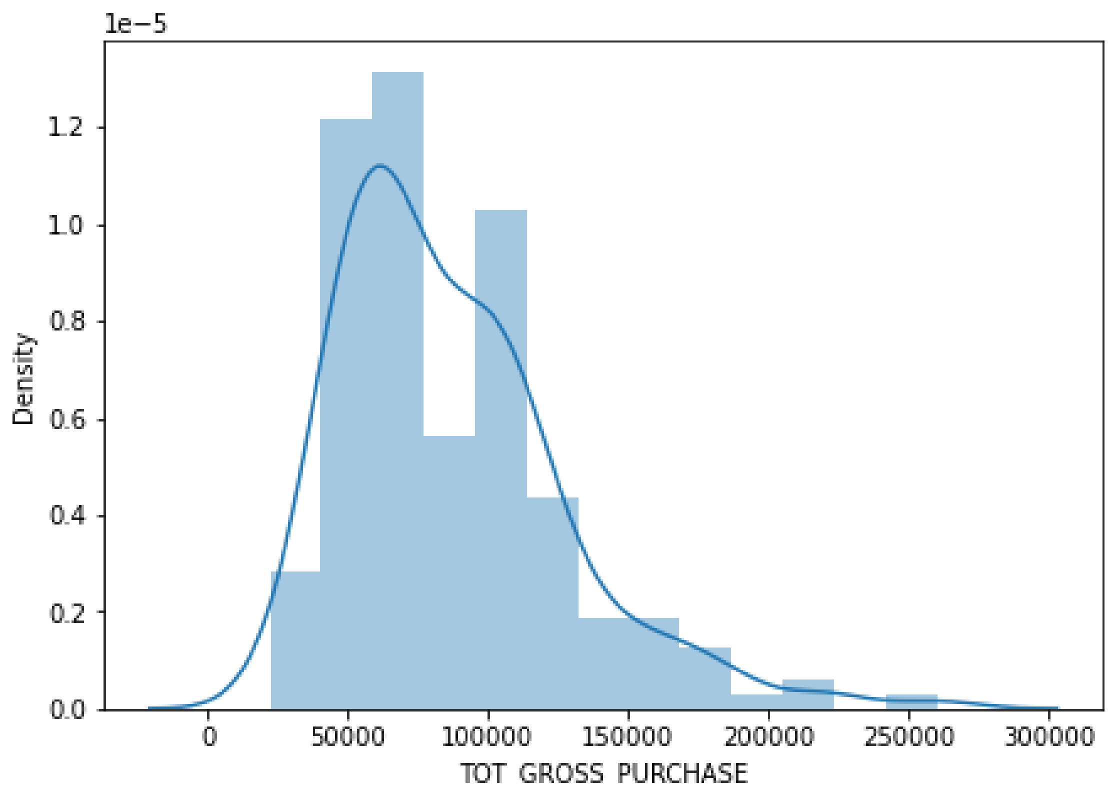
[33]:
```
df_html_data3['TOT_GROSS_PURCHASE'] = df_html_data3['TOT_GROSS_PURCHASE'].
 ↪apply(lambda x: fix_amount_value(x))
```

[34]:
```
# Remove duplicates based on second and third columns value
df_html_data3_rm_dup = df_html_data3.drop_duplicates(['TOT_GROSS_PURCHASE',␣
 ↪'GROSS_SALES'], keep='last')
df_html_data3_rm_dup.head()
```

[34]:
```
1       DATE TOT_GROSS_PURCHASE GROSS_SALES NET_PURCHASE INT_GROSS_PURCHASE  \
2 2021-10-01          185566.83  211,139.02   -25,572.19         151,607.74
3 2021-09-01          217636.41  216,722.64       913.77         144,147.33
4 2021-08-01          175168.36  177,736.88    -2,568.52         131,185.18
5 2021-07-01          125896.68  149,090.07   -23,193.39         117,910.10
6 2021-06-01          170188.95  170,214.84       -25.89         114,289.67

1 INT_GROSS_SALES INT_NET_PURCHASE
2      147,136.75         4,470.99
3      138,198.48         5,948.85
4      124,290.49         6,894.69
5       99,516.18        18,393.92
6      107,246.16         7,043.51
```

[35]:
```python
#Identify outliers and bad data
#plot boxplot to find outliers data
import warnings
import seaborn as sns
warnings.filterwarnings('ignore')
plt.figure(figsize=(16,5))
plt.subplot(1,2,1)
sns.distplot(df_html_data3_rm_dup['TOT_GROSS_PURCHASE'])
plt.show()
```



```
[36]: #  Finding the Outliers
df_html_data3_rm_dup[(df_html_data3_rm_dup['TOT_GROSS_PURCHASE'] > '250000') |␣
↪(df_html_data3_rm_dup['TOT_GROSS_PURCHASE'] < '25000')].head(5)
```

```
[36]: 1       DATE TOT_GROSS_PURCHASE GROSS_SALES NET_PURCHASE INT_GROSS_PURCHASE  \
2 2021-10-01          185566.83  211,139.02   -25,572.19         151,607.74
3 2021-09-01          217636.41  216,722.64       913.77         144,147.33
4 2021-08-01          175168.36  177,736.88    -2,568.52         131,185.18
5 2021-07-01          125896.68  149,090.07   -23,193.39         117,910.10
6 2021-06-01          170188.95  170,214.84       -25.89         114,289.67

1 INT_GROSS_SALES INT_NET_PURCHASE
2      147,136.75         4,470.99
3      138,198.48         5,948.85
4      124,290.49         6,894.69
5       99,516.18        18,393.92
6      107,246.16         7,043.51
```

```
[37]: #Trimming of Outliers
df_html_data_trim_out =␣
↪df_html_data3_rm_dup[(df_html_data3_rm_dup['TOT_GROSS_PURCHASE'] < '250000')␣
↪| (df_html_data3_rm_dup['TOT_GROSS_PURCHASE'] > '25000')]
df_html_data_trim_out.head()
```

```
[37]: 1       DATE TOT_GROSS_PURCHASE GROSS_SALES NET_PURCHASE INT_GROSS_PURCHASE  \
2 2021-10-01          185566.83  211,139.02   -25,572.19         151,607.74
3 2021-09-01          217636.41  216,722.64       913.77         144,147.33
4 2021-08-01          175168.36  177,736.88    -2,568.52         131,185.18
5 2021-07-01          125896.68  149,090.07   -23,193.39         117,910.10
6 2021-06-01          170188.95  170,214.84       -25.89         114,289.67

1 INT_GROSS_SALES INT_NET_PURCHASE
2      147,136.75         4,470.99
3      138,198.48         5,948.85
4      124,290.49         6,894.69
5       99,516.18        18,393.92
6      107,246.16         7,043.51
```

Flat File Source Data: Data Source : https://www.kaggle.com/danielbethell/adult-incomes-in-the-united-states

crypto_income for adult, updated the dataset by adding additional columns crypto_slang & crypto symbol

Data Set Details: Dataset columns details: age: continuous.

workclass: Private, Self-emp-not-inc, Self-emp-inc, Federal-gov, Local-gov, State-gov, Without-pay, Never-worked.

fnlwgt: continuous.

education: Bachelors, Some-college, 11th, HS-grad, Prof-school, Assoc-acdm, Assoc-voc, 9th, 7th-8th, 12th, Masters, 1st-4th, 10th, Doctorate, 5th-6th, Preschool.

education-num: continuous.

marital-status: Married-civ-spouse, Divorced, Never-married, Separated, Widowed, Married-spouse-absent, Married-AF-spouse.

relationship: Wife, Own-child, Husband, Not-in-family, Other-relative, Unmarried.

sex: Female, Male.

capital-gain: continuous.

capital-loss: continuous.

hours-per-week: continuous.

native-country: United-States, Cambodia, England, Puerto-Rico, Canada, Germany, Outlying-US(Guam-USVI-etc), India, Japan, Greece, South, China, Cuba, Iran, Honduras, Philippines, Italy, Poland, Jamaica, Vietnam, Mexico, Portugal, Ireland, France, Dominican-Republic, Laos, Ecuador, Taiwan, Haiti, Columbia, Hungary, Guatemala, Nicaragua, Scotland, Thailand, Yugoslavia, El-Salvador, Trinadad&Tobago, Peru, Hong, Holand-Netherlands. crypto_slang: 20 crypto currencires name like bitcoins crypto_symbol:

[38]:
```python
# read source file into dataframe
crypto_income_df = pd.read_csv("C:/Users/dell/Documents/docker/
↪crypto_income_data.txt", sep="|")
# display firt 5 records
crypto_income_df.head(5)
```

[38]:
```
   age         workclass  fnlwgt  education  education-num  \
0   39         State-gov   77516  Bachelors             13
1   50  Self-emp-not-inc   83311  Bachelors             13
2   38           Private  215646    HS-grad              9
3   53           Private  234721       11th              7
4   28           Private  338409  Bachelors             13

       marital-status   relationship     sex  capital-gain  capital-loss  \
0       Never-married  Not-in-family    Male          2174             0
1  Married-civ-spouse        Husband    Male             0             0
2            Divorced  Not-in-family    Male             0             0
3  Married-civ-spouse        Husband    Male             0             0
4  Married-civ-spouse           Wife  Female             0             0

   hours-per-week native-country total-income  crypto_slang crypto_symbol
0              40  United-States        <=50K       bitcoin           BTC
```

```
1             13  United-States        <=50K      ethereum            ETH
2             40  United-States        <=50K       cardano            ADA
3             40  United-States        <=50K  binance-coin            BNB
4             40           Cuba        <=50K        tether           USDT
```

[39]:
```python
# Headers, updating columns name in uppercase
crypto_income_df = crypto_income_df.rename(columns=str.upper)
crypto_income_df.head()
```

[39]:
```
   AGE         WORKCLASS  FNLWGT  EDUCATION  EDUCATION-NUM  \
0   39         State-gov   77516  Bachelors             13
1   50  Self-emp-not-inc   83311  Bachelors             13
2   38           Private  215646    HS-grad              9
3   53           Private  234721       11th              7
4   28           Private  338409  Bachelors             13

       MARITAL-STATUS   RELATIONSHIP     SEX  CAPITAL-GAIN  CAPITAL-LOSS  \
0       Never-married  Not-in-family    Male          2174             0
1  Married-civ-spouse        Husband    Male             0             0
2            Divorced  Not-in-family    Male             0             0
3  Married-civ-spouse        Husband    Male             0             0
4  Married-civ-spouse           Wife  Female             0             0

  HOURS-PER-WEEK NATIVE-COUNTRY TOTAL-INCOME  CRYPTO_SLANG CRYPTO_SYMBOL
0             40  United-States        <=50K       bitcoin           BTC
1             13  United-States        <=50K      ethereum           ETH
2             40  United-States        <=50K       cardano           ADA
3             40  United-States        <=50K  binance-coin           BNB
4             40           Cuba        <=50K        tether          USDT
```

Performing the transformation operation on File data source:

[40]:
```python
# renaming the columns names
crypto_income_df2 = crypto_income_df.rename(columns={"EDUCATION-NUM":
↪"EDUCATION_NUM", "CAPITAL-GAIN":"CAPITAL_GAIN", "HOURS-PER-WEEK":
↪"HOURS_PER_WEEK", "NATIVE-COUNTRY":"NATIVE_COUNTRY", "TOTAL-INCOME":
↪"TOTAL_INCOME"})
```

[41]:
```python
crypto_income_df2.head()
```

[41]:
```
   AGE         WORKCLASS  FNLWGT  EDUCATION  EDUCATION_NUM  \
0   39         State-gov   77516  Bachelors             13
1   50  Self-emp-not-inc   83311  Bachelors             13
2   38           Private  215646    HS-grad              9
3   53           Private  234721       11th              7
4   28           Private  338409  Bachelors             13

       MARITAL-STATUS   RELATIONSHIP     SEX  CAPITAL_GAIN  CAPITAL-LOSS  \
```

```
0       Never-married  Not-in-family    Male          2174            0
1  Married-civ-spouse        Husband    Male             0            0
2            Divorced  Not-in-family    Male             0            0
3  Married-civ-spouse        Husband    Male             0            0
4  Married-civ-spouse           Wife  Female             0            0

   HOURS_PER_WEEK NATIVE_COUNTRY TOTAL_INCOME  CRYPTO_SLANG CRYPTO_SYMBOL
0              40  United-States        <=50K       bitcoin           BTC
1              13  United-States        <=50K      ethereum           ETH
2              40  United-States        <=50K       cardano           ADA
3              40  United-States        <=50K  binance-coin           BNB
4              40           Cuba        <=50K        tether          USDT
```

[42]:
```
#5. Look at summary information about your data (total, mean, min, max,␣
#freq, unique, etc.) Does this present any more questions for you? Does it␣
#lead you to a conclusion yet?
print("\nDescribe Data\n")
print(crypto_income_df.describe())
print("\nSummarized Data\n")
print(crypto_income_df.describe(include=['O']))
```

```
Describe Data

                AGE        FNLWGT  EDUCATION-NUM  CAPITAL-GAIN  CAPITAL-LOSS  \
count  32561.000000  3.256100e+04   32561.000000  32561.000000  32561.000000
mean      38.581647  1.897784e+05      10.080679   1077.648844     87.303830
std       13.640433  1.055500e+05       2.572720   7385.292085    402.960219
min       17.000000  1.228500e+04       1.000000      0.000000      0.000000
25%       28.000000  1.178270e+05       9.000000      0.000000      0.000000
50%       37.000000  1.783560e+05      10.000000      0.000000      0.000000
75%       48.000000  2.370510e+05      12.000000      0.000000      0.000000
max       90.000000  1.484705e+06      16.000000  99999.000000   4356.000000

       HOURS-PER-WEEK
count    32561.000000
mean        40.437456
std         12.347429
min          1.000000
25%         40.000000
50%         40.000000
75%         45.000000
max         99.000000

Summarized Data

       WORKCLASS EDUCATION      MARITAL-STATUS RELATIONSHIP    SEX  \
count      32561     32561               32561        32561  32561
```

```
unique        9       16                   7          6      2
top     Private  HS-grad  Married-civ-spouse    Husband   Male
freq      22696    10501               14976      13193  21790

       NATIVE-COUNTRY TOTAL-INCOME CRYPTO_SLANG CRYPTO_SYMBOL
count           32561        32561        32561         32561
unique             42            2           47            47
top     United-States         <=50K      bitcoin           BTC
freq            29170        24720         9710          9710
```

[43]:
```
# find out the null present in required columns
print(f"is null is present in AGE -- {crypto_income_df.AGE.isnull().values.
 ↪any()}")
print(f"is null is present in CRYPTO_SYMBOL -- {crypto_income_df.CRYPTO_SYMBOL.
 ↪isnull().values.any()}")
print(f"is null is present in CRYPTO_SLANG -- {crypto_income_df.CRYPTO_SLANG.
 ↪isnull().values.any()}")
print(f"is null is present in CAPITAL_GAIN -- {crypto_income_df2.CAPITAL_GAIN.
 ↪isnull().values.any()}")
```

```
is null is present in AGE -- False
is null is present in CRYPTO_SYMBOL -- False
is null is present in CRYPTO_SLANG -- False
is null is present in CAPITAL_GAIN -- False
```

[44]:
```
from fuzzywuzzy import fuzz
from fuzzywuzzy import process
df_crypto_price['name_from_df2'] = df_crypto_price['CURRENCY_NAME'].
 ↪apply(lambda x: process.extractOne(x, crypto_income_df2['CRYPTO_SLANG'].
 ↪to_list(),score_cutoff=80))
name_from_df2_list = df_crypto_price['name_from_df2'].to_list()
name_from_df2_list = [_[0] if _ != None else None for _ in name_from_df2_list]
df_crypto_price['name_from_df2'] = name_from_df2_list

df_crypto_price = df_crypto_price.merge(crypto_income_df2, left_on =␣
 ↪'name_from_df2', right_on = 'CRYPTO_SLANG', suffixes=('','_2'))
df_crypto_price.drop(['CURRENCY_NAME','name_from_df2'],axis=1, inplace=True)
```

[45]:
```
# identifying outliers
# load libraries
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

[46]:
```
#plot boxplot to find outliers data
plt.boxplot(crypto_income_df2.CAPITAL_GAIN, notch=True)
```

[46]: {'whiskers': [<matplotlib.lines.Line2D at 0x1b6109b94c0>,
  <matplotlib.lines.Line2D at 0x1b6109b9820>],
 'caps': [<matplotlib.lines.Line2D at 0x1b6109b9b80>,
  <matplotlib.lines.Line2D at 0x1b6109b9ee0>],
 'boxes': [<matplotlib.lines.Line2D at 0x1b6109b9160>],
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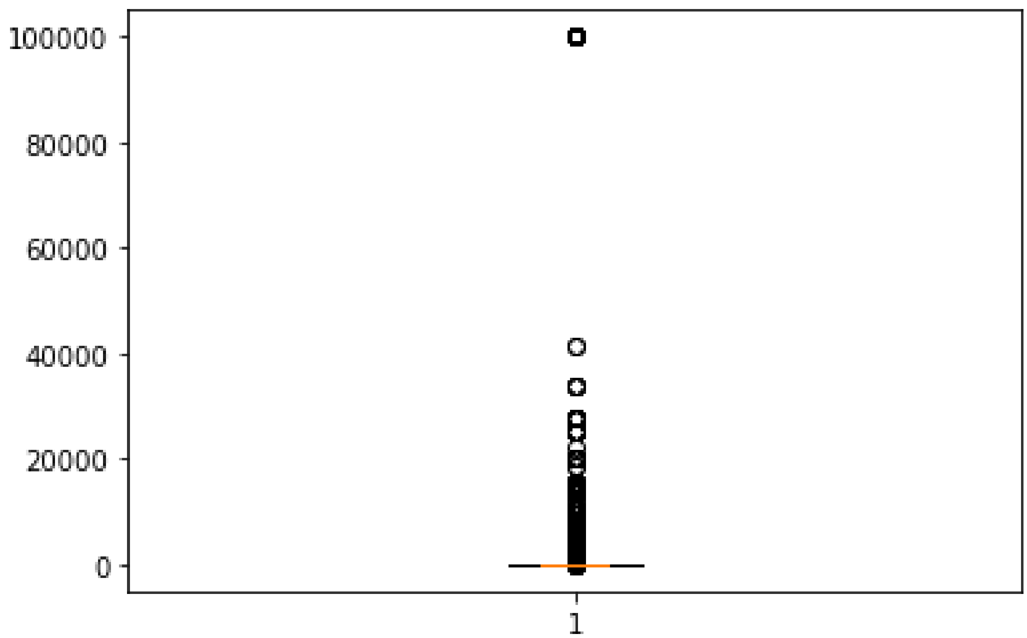
 'fliers': [<matplotlib.lines.Line2D at 0x1b6113525e0>],
 'means': []}



[47]:
```
# fixing outliers
crypto_income_df2_fix = crypto_income_df2[(crypto_income_df2['CAPITAL_GAIN'] <=␣
↪60000) & (crypto_income_df2['CAPITAL_GAIN'] >= 1)]
```

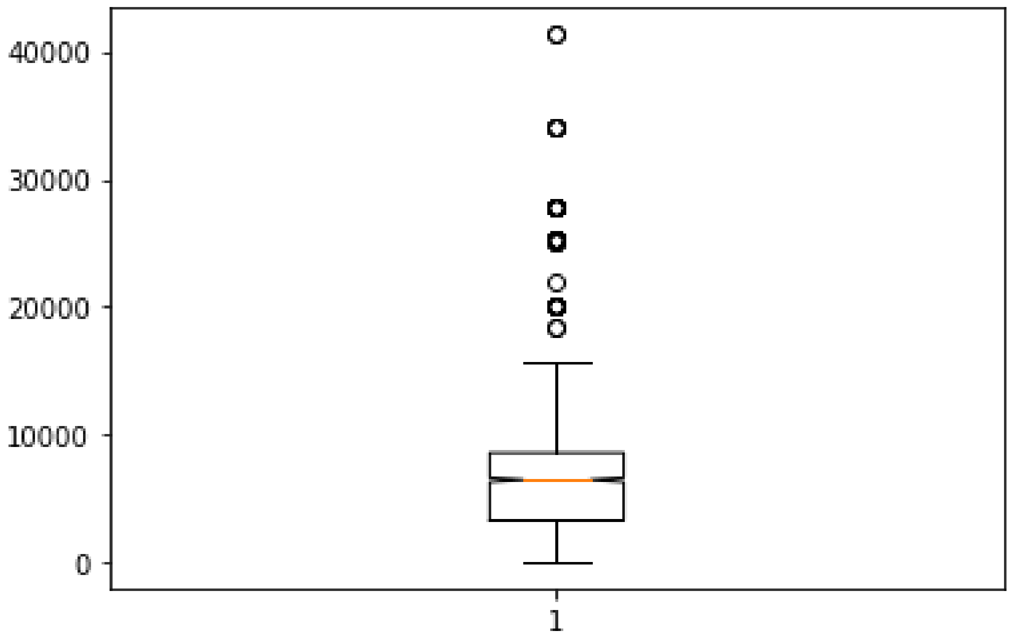
[48]:
```
# new shape of dh after fixing outliers
crypto_income_df2_fix.shape
```

[48]: (2553, 15)

[49]:
```
# plot after fixing outliers
#plot boxplot to after fixing outliers data
plt.boxplot(crypto_income_df2_fix.CAPITAL_GAIN, notch=True)
```

[49]: {'whiskers': [<matplotlib.lines.Line2D at 0x1b6113b2670>,
  <matplotlib.lines.Line2D at 0x1b6113b29d0>],
 'caps': [<matplotlib.lines.Line2D at 0x1b6113b2d30>,
  <matplotlib.lines.Line2D at 0x1b6113be0d0>],

```
'boxes': [<matplotlib.lines.Line2D at 0x1b6113b2310>],
'medians': [<matplotlib.lines.Line2D at 0x1b6113be430>],
'fliers': [<matplotlib.lines.Line2D at 0x1b6113be790>],
'means': []}
```




```
[ ]:
```