Basics

June 20, 2025

[1]:
```
import pandas as pd
```

[2]:
```
chunk_iter = pd.read_csv('crunchbase-investments.csv', chunksize=5000,␣
 ↪encoding='Latin-1')
#we must specify the different encoding other than utf, it doesnt run as it␣
 ↪cant decode all the data.
```

0.0.1 Here the data is not just 5000, so we are going to iterate the chunks and then run the statement.

[3]:
```
cb_length = []

# looking at dataset's length
for chunk in chunk_iter:
    cb_length.append(len(chunk))

cb_length = sum(cb_length)

print(f"Total number of rows in the dataset: {cb_length}")
```

```
Total number of rows in the dataset: 52870
```

0.0.2 Now we are going to re initialize and look for missing values.

[4]:
```
# Counting missing values by column
chunk_iter = pd.read_csv('crunchbase-investments.csv', chunksize=5000,␣
 ↪encoding='Latin-1')
#empty list
mv_list = []
for chunk in chunk_iter:
    if not mv_list:  # check if mv_list is empty
        columns = chunk.columns
        print(columns.sort_values())
    mv_list.append(chunk.isnull().sum())
combined_mv_vc = pd.concat(mv_list)
unique_combined_mv_vc = combined_mv_vc.groupby(combined_mv_vc.index).sum()
unique_combined_mv_vc
```

```
Index(['company_category_code', 'company_city', 'company_country_code',
       'company_name', 'company_permalink', 'company_region',
       'company_state_code', 'funded_at', 'funded_month', 'funded_quarter',
       'funded_year', 'funding_round_type', 'investor_category_code',
       'investor_city', 'investor_country_code', 'investor_name',
       'investor_permalink', 'investor_region', 'investor_state_code',
       'raised_amount_usd'],
      dtype='object')
```

[4]:
```
company_category_code      643
company_city               533
company_country_code         1
company_name                 1
company_permalink            1
company_region               1
company_state_code         492
funded_at                    3
funded_month                 3
funded_quarter               3
funded_year                  3
funding_round_type           3
investor_category_code   50427
investor_city            12480
investor_country_code    12001
investor_name                2
investor_permalink           2
investor_region              2
investor_state_code      16809
raised_amount_usd         3599
dtype: int64
```

As we can see, we have around 52k rows and the investor category code has around 50k empty columns which makes it a good choice to drop the column.

Now lets look at the memory usage of the columns.

[5]:
```python
# Total memory footprint for each column

chunk_iter = pd.read_csv('crunchbase-investments.csv', chunksize=5000,␣
 ↪encoding='Latin-1')
counter = 0
series_memory_fp = pd.Series(dtype='float64')
for chunk in chunk_iter:
    if counter == 0:
        series_memory_fp = chunk.memory_usage(deep=True)
    else:
        series_memory_fp += chunk.memory_usage(deep=True)
    counter += 1

# Drop memory footprint calculation for the index.
series_memory_fp_before = series_memory_fp.drop('Index').sort_values()
series_memory_fp_before
```

[5]:
```
funded_year                 422960
raised_amount_usd           422960
investor_category_code      622424
investor_state_code        2476607
investor_country_code      2647292
investor_city              2885083
company_state_code         3106051
company_country_code       3172176
funded_month               3383584
funded_quarter             3383584
investor_region            3396281
funding_round_type         3410707
company_region             3411545
company_category_code      3421104
company_city               3505886
funded_at                  3542185
company_name               3591326
investor_name              3915666
company_permalink          4057788
investor_permalink         4980548
dtype: int64
```

checking the total memory usage!

[6]:
```
# Total memory footprint of the data (in megabytes)
series_memory_fp_before.sum() / (1024 * 1024)
```

[6]:
```
np.float64(56.98753070831299)
```

[7]:
```
# Drop columns representing URLs or containing too many missing values (>90%␣
↪missing)
drop_cols = ['investor_permalink', 'company_permalink',␣
↪'investor_category_code', 'funded_month', 'funded_quarter', 'funded_year']
keep_cols = chunk.columns.drop(drop_cols)
```

[8]:
```
keep_cols.tolist
```

[8]:
```
<bound method IndexOpsMixin.tolist of Index(['company_name',
'company_category_code', 'company_country_code',
       'company_state_code', 'company_region', 'company_city', 'investor_name',
       'investor_country_code', 'investor_state_code', 'investor_region',
       'investor_city', 'funding_round_type', 'funded_at',
       'raised_amount_usd'],
      dtype='object')>
```

0.0.3 Selecting the data types

[9]:
```
# Key: Column name, Value: List of types
col_types = {}
chunk_iter = pd.read_csv('crunchbase-investments.csv', chunksize=5000,␣
 ↪encoding='Latin-1', usecols=keep_cols)

for chunk in chunk_iter:
    for col in chunk.columns:
        if col not in col_types:
            col_types[col] = [str(chunk.dtypes[col])]
        else:
            col_types[col].append(str(chunk.dtypes[col]))
```

[10]:
```
uniq_col_types = {}
for k,v in col_types.items():
    uniq_col_types[k] = set(col_types[k])
uniq_col_types
```

[10]:
```
{'company_name': {'object'},
 'company_category_code': {'object'},
 'company_country_code': {'object'},
 'company_state_code': {'object'},
 'company_region': {'object'},
 'company_city': {'object'},
 'investor_name': {'object'},
 'investor_country_code': {'float64', 'object'},
 'investor_state_code': {'float64', 'object'},
 'investor_region': {'object'},
 'investor_city': {'float64', 'object'},
 'funding_round_type': {'object'},
 'funded_at': {'object'},
 'raised_amount_usd': {'float64'}}
```

[11]:
```
chunk.head(3)
```

[11]:
```
      company_name company_category_code company_country_code  \
50000      NuORDER               fashion                  USA
50001       ChaCha           advertising                  USA
50002      Binfire              software                  USA

      company_state_code company_region    company_city    investor_name  \
50000                 CA    Los Angeles  West Hollywood  Mortimer Singer
```

```
50001                  IN   Indianapolis         Carmel  Morton Meyerson
50002                  FL    Bocat Raton    Bocat Raton      Moshe Ariel

       investor_country_code  investor_state_code investor_region  \
50000                    NaN                  NaN         unknown
50001                    NaN                  NaN         unknown
50002                    NaN                  NaN         unknown

       investor_city funding_round_type   funded_at  raised_amount_usd
50000            NaN           series-a  2012-10-01          3060000.0
50001            NaN           series-b  2007-10-01         12000000.0
50002            NaN              angel  2008-04-18           500000.0
```

[13]:
```
# Analyzing unique value counts
unique_values = {}

chunk_iter = pd.read_csv('crunchbase-investments.csv', chunksize=5000,␣
 ↪encoding='Latin-1', usecols=keep_cols)
for chunk in chunk_iter:
    for col in chunk.columns:
        if col not in unique_values:
            unique_values[col] = set()
        unique_values[col].update(chunk[col].unique())

for col, unique_vals in unique_values.items():
    print(f"Column: {col}, Unique Values: {len(unique_vals)}")
```

```
Column: company_name, Unique Values: 11574
Column: company_category_code, Unique Values: 44
Column: company_country_code, Unique Values: 3
Column: company_state_code, Unique Values: 51
Column: company_region, Unique Values: 547
Column: company_city, Unique Values: 1230
Column: investor_name, Unique Values: 10466
Column: investor_country_code, Unique Values: 75
Column: investor_state_code, Unique Values: 53
Column: investor_region, Unique Values: 586
Column: investor_city, Unique Values: 993
Column: funding_round_type, Unique Values: 10
Column: funded_at, Unique Values: 2809
Column: raised_amount_usd, Unique Values: 1469
```

[14]:
```
col_types = {
    'company_category_code': 'category',
    'funding_round_type': 'category',
    'investor_state_code': 'category',
    'investor_country_code': 'category'
}

chunk_iter = pd.read_csv('crunchbase-investments.csv',
                         chunksize=5000,
                         encoding='Latin-1',
                         usecols=keep_cols,
                         dtype=col_types,
                         parse_dates=['funded_at']
                        )

counter = 0
series_memory_fp = pd.Series(dtype='float64')
for chunk in chunk_iter:
    if counter == 0:
        series_memory_fp = chunk.memory_usage(deep=True)
    else:
        series_memory_fp += chunk.memory_usage(deep=True)
    counter += 1

# Drop memory footprint calculation for the index.
series_memory_fp_after = series_memory_fp.drop('Index').sort_values()
print(series_memory_fp_after)

# Total memory footprint of the data (in megabytes)
series_memory_fp_after.sum() / (1024 * 1024)
```

```
funding_round_type        61906
investor_country_code     81118
investor_state_code       81811
company_category_code     94160
funded_at                422960
raised_amount_usd        422960
investor_city           2885083
company_state_code      3106051
company_country_code    3172176
investor_region         3396281
company_region          3411545
company_city            3505886
company_name            3591326
investor_name           3915666
dtype: int64
```

[14]:
```
np.float64(26.844910621643066)
```

[15]:
```
df = pd.DataFrame({
    'Before': series_memory_fp_before,
    'After': series_memory_fp_after,
    'Difference': series_memory_fp_after - series_memory_fp_before
})

df.sort_values('Difference')
```

[15]:
```
                          Before      After   Difference
funding_round_type       3410707    61906.0   -3348801.0
company_category_code    3421104    94160.0   -3326944.0
funded_at                3542185   422960.0   -3119225.0
investor_country_code    2647292    81118.0   -2566174.0
investor_state_code      2476607    81811.0   -2394796.0
company_country_code     3172176  3172176.0          0.0
company_name             3591326  3591326.0          0.0
company_city             3505886  3505886.0          0.0
company_region           3411545  3411545.0          0.0
company_state_code       3106051  3106051.0          0.0
investor_name            3915666  3915666.0          0.0
investor_city            2885083  2885083.0          0.0
investor_region          3396281  3396281.0          0.0
raised_amount_usd         422960   422960.0          0.0
company_permalink        4057788        NaN          NaN
funded_month             3383584        NaN          NaN
funded_quarter           3383584        NaN          NaN
funded_year               422960        NaN          NaN
investor_category_code    622424        NaN          NaN
investor_permalink       4980548        NaN          NaN
```

[16]:
```
print(f'Before total memory: {series_memory_fp_before.sum() / (1024 * 1024)}')
print(f'After total memory: {series_memory_fp_after.sum() / (1024 * 1024)}')
```

```
Before total memory: 56.98753070831299
After total memory: 26.844910621643066
```

0.0.4 Loading Chunks into SQLite

[19]:
```
#import SQLite3
import sqlite3
#this creates a db in jyp env
conn = sqlite3.connect('crunchbase.db')
cursor = conn.cursor()
```

[20]:
```
chunk_iter = pd.read_csv('crunchbase-investments.csv',
                         chunksize=5000,
                         encoding='Latin-1',
                         usecols=keep_cols,
                         dtype=col_types,
                         parse_dates=['funded_at']
```

```
                          )
for chunk in chunk_iter:
    chunk.to_sql("investments", conn, if_exists='append', index=False)

cursor.execute("SELECT name FROM sqlite_master WHERE type='table';")
tables = cursor.fetchall()

if tables:
    print("Tables found in the database:", [t[0] for t in tables])
else:
    print("No tables found in the database.")
```

```
Tables found in the database: ['investments']
```

[21]:
```
cursor.execute("SELECT * FROM investments LIMIT 5;")
print(cursor.fetchall())
```

```
[('AdverCar', 'advertising', 'USA', 'CA', 'SF Bay', 'San Francisco',
'1-800-FLOWERS.COM', 'USA', 'NY', 'New York', 'New York', 'series-a',
'2012-10-30 00:00:00', 2000000.0), ('LaunchGram', 'news', 'USA', 'CA', 'SF Bay',
'Mountain View', '10Xelerator', 'USA', 'OH', 'Columbus', 'Columbus', 'other',
'2012-01-23 00:00:00', 20000.0), ('uTaP', 'messaging', 'USA', None, 'United
States - Other', None, '10Xelerator', 'USA', 'OH', 'Columbus', 'Columbus',
'other', '2012-01-01 00:00:00', 20000.0), ('ZoopShop', 'software', 'USA', 'OH',
'Columbus', 'columbus', '10Xelerator', 'USA', 'OH', 'Columbus', 'Columbus',
'angel', '2012-02-15 00:00:00', 20000.0), ('eFuneral', 'web', 'USA', 'OH',
'Cleveland', 'Cleveland', '10Xelerator', 'USA', 'OH', 'Columbus', 'Columbus',
'other', '2011-09-08 00:00:00', 20000.0)]
```

0.0.5 A gist with visualization of our data

[23]:
```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd

pd.set_option('display.float_format', '{:.2f}'.format)

# Query and prepare data
df = pd.read_sql("""
                SELECT company_category_code, AVG(raised_amount_usd)
                FROM investments
                GROUP BY company_category_code
                ORDER BY AVG(raised_amount_usd) DESC;
                """, conn)

df = df.set_index('company_category_code')
```

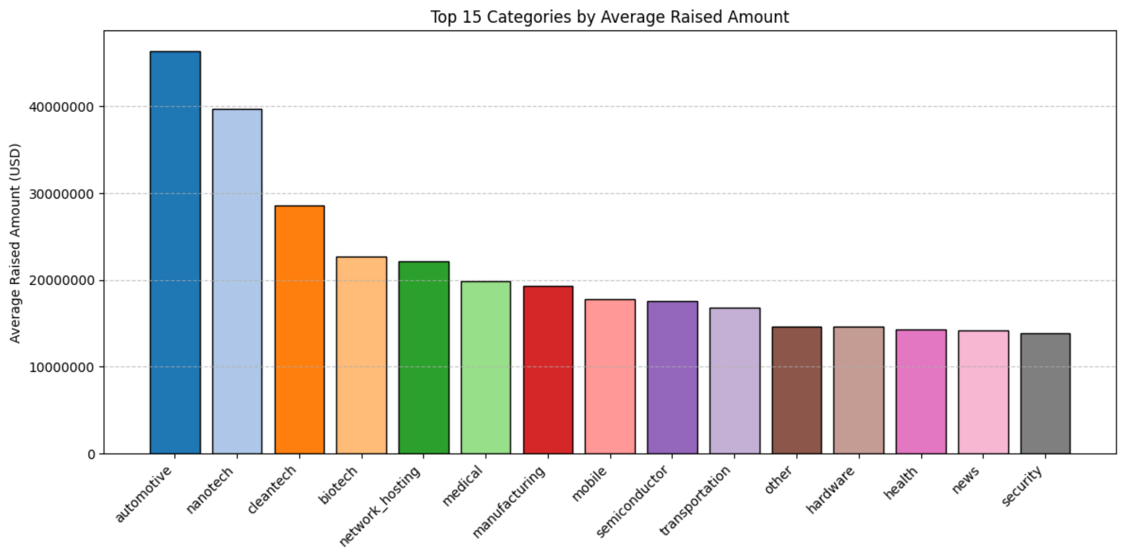
```
# Select top N categories
top_n = 15
top_df = df.head(top_n)

# Generate distinct colors for each bar
colors = sns.color_palette('tab20', n_colors=top_n)

# Plot with unique colors for each bar
fig, ax = plt.subplots(figsize=(12, 6))
bars = ax.bar(top_df.index, top_df['AVG(raised_amount_usd)'], color=colors,␣
  ↪edgecolor='black')

# Customize the plot
ax.set_ylabel('Average Raised Amount (USD)')
ax.set_title(f'Top {top_n} Categories by Average Raised Amount')
ax.ticklabel_format(style='plain', axis='y')
plt.xticks(rotation=45, ha='right')
ax.grid(True, axis='y', linestyle='--', alpha=0.7)

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



```
[ ]:
```