Introduction to Data Science

Practical Exam

Your brief is to create Jupyter Notebook that provides some insightful summary of the contents of the data set using the methods covered in the unit including (but not necessarily all of)

• Loading, formatting and scaling data

• Making new features (combining / aggregating variables)

• Summarising variables (means, distributions, data types)

• Plotting data

• Segregating/Filtering data

• Investigating the relationships between variables

• Building predictive models

Including a summary of the data, you could then consider one or more of the following (provided as guide, investigate anything you think may be interesting!)

Dataset: nft_items.csv, nft_users.csv

Dataset source:https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Practical%20Exam%202022.ipynb

Summary of Dataset:

The dataset includes information about

- Users
- Name
- Items added to platform (minted), items sold on primary and secondary market, items still up for sale (available). Secondary market means they have sold items that they did not originally mint themselves (e.g. they bought from someone else it, then sold it on).
- Total money sent and received
- Date joined
- Tokens (items sold). Contains information about
- Seller
- Item (filesize, dimensions, file type, tags etc...)
- Auction stats for primary and secondary market (number of times sold, average price sold). Secondary market in this context is how many times the particular item has been resold.
- Date

1.1 Loading, formatting and scaling data

In [50]:
```
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Practical%20Exam%202022.ipynb

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
#Show max 100 columns or rows
pd.set_option('display.max_rows', 100)
pd.set_option('display.max_columns', 100)
#Dont use scientific notation for numbers (e.g 1.003767687e-12)
pd.set_option('display.float_format','{:.5f}'.format)
np.set_printoptions(suppress=True)

import warnings
warnings.filterwarnings('ignore')
```

Load in the data:

In [51]:
```
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Practical%20Exam%202022.ipynb
artworks = pd.read_csv("data/nft_items.csv", parse_dates=["mint_iso_date"])
users = pd.read_csv("data/nft_users.csv", parse_dates=["first_action_iso_date"])
```

In [52]:
```
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Practical%20Exam%202022.ipynb
#Lets see what our artworks dataset looks like
users.head()
```

Out[52]:

	address	first_action_iso_date	tzkt_info_name	mint_count	bought_count	bought_prices_
0	tz1S5WxdZR5f9NzsPXhr7L9L1vrEb5spZFur	2021-02-28 14:42:45+00:00	Baking Benjamins	0	0	0.00
1	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.92
2	KT1RJ6PbjHpwc3M5rw5s2Nbmefwbuwbdxton	2021-03-01 01:59:41+00:00	Hic et nunc NFTs	0	0	0.00
3	KT1AFA2mwNUMNd4SsujE1YYp29vd8BZejyKW	2021-03-01 02:00:41+00:00	hDAO	0	0	0.00
4	KT1TybhR7XraG75JFYKSrh7KnxukMBT5dor6	2021-03-01 02:01:41+00:00	OBJKT-hDAO Curation	0	0	0.00

Tokens = items sold

1.2 Making new features (combining / aggregating variables)

In [54]:
```
#https://jakevdp.github.io/PythonDataScienceHandbook/03.08-aggregation-and-grouping.html
#checking the features to see what we can combine
df = pd.read_csv('data/nft_users.csv',parse_dates=["first_action_iso_date"])
df.head()
```

Out[54]:

	address	first_action_iso_date	tzkt_info_name	mint_count	bought_count	bought_prices_
0	tz1S5WxdZR5f9NzsPXhr7L9L1vrEb5spZFur	2021-02-28 14:42:45+00:00	Baking Benjamins	0	0	0.00
1	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.92
2	KT1RJ6PbjHpwc3M5rw5s2Nbmefwbuwbdxton	2021-03-01 01:59:41+00:00	Hic et nunc NFTs	0	0	0.00
3	KT1AFA2mwNUMNd4SsujE1YYp29vd8BZejyKW	2021-03-01 02:00:41+00:00	hDAO	0	0	0.00
4	KT1TybhR7XraG75JFYKSrh7KnxukMBT5dor6	2021-03-01 02:01:41+00:00	OBJKT-hDAO Curation	0	0	0.00

In [55]:
```
#checking the features to see what we can combine
#https://jakevdp.github.io/PythonDataScienceHandbook/03.08-aggregation-and-grouping.html
idf = pd.read_csv('data/nft_items.csv', parse_dates=["mint_iso_date"])
idf.head()
```

Out[55]:

	token_id	issuer	mint_iso_date	artifact_mime	artifact_file_size	artifact_preview_width
0	152	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-03-01 03:39:21+00:00	image/gif	2043418	1024
1	153	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-03-01 07:27:27+00:00	image/png	2322664	532
2	154	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-03-01 07:32:27+00:00	image/png	779408	599
3	155	tz2G5SBeAJVbiE1icji3P59Lx8EvcwMLEHp3	2021-03-01 10:37:07+00:00	video/mp4	5990791	1024
4	156	tz2G5SBeAJVbiE1icji3P59Lx8EvcwMLEHp3	2021-03-01 11:03:07+00:00	image/png	5022281	1024

In [56]:
```
#https://jakevdp.github.io/PythonDataScienceHandbook/03.08-aggregation-and-grouping.html
#https://pandas.pydata.org/pandas-docs/stable/user_guide/merging.html
#merging
fdf = pd.merge(df, idf,left_on='address', right_on='issuer')
fdf.head()
```

Out[56]:

	address	first_action_iso_date	tzkt_info_name	mint_count	bought_count	bought_prices_a
0	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.928
1	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.928
2	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.928
3	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.928
4	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28 14:42:45+00:00	NaN	13	111	7.928

In [57]:
```
#https://jakevdp.github.io/PythonDataScienceHandbook/03.08-aggregation-and-grouping.html
#https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.drop.html

#We checked for Nan values and columns that need to be dropped
dff = fdf.drop(['artifact_preview_width','artifact_preview_height','author_sold_prices_avg_
y',
       'author_sold_count_y', 'secondary_sold_count_y',
       'secondary_sold_prices_avg_y', 'info_title', 'info_description','ban_status','ratio',
'tzkt_info_name'], axis = 1)
dff.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 37420 entries, 0 to 37419
Data columns (total 19 columns):
 #   Column                     Non-Null Count  Dtype
---  ------                     --------------  -----
 0   address                    37420 non-null  object
 1   first_action_iso_date      37420 non-null  datetime64[ns, UTC]
 2   mint_count                 37420 non-null  int64
 3   bought_count               37420 non-null  int64
 4   bought_prices_avg          37420 non-null  float64
 5   author_sold_count_x        37420 non-null  int64
 6   author_sold_prices_avg_x   37420 non-null  float64
 7   secondary_sold_count_x     37420 non-null  int64
 8   secondary_sold_prices_avg_x  37420 non-null  float64
 9   available_count            37420 non-null  int64
 10  available_prices_avg       37420 non-null  float64
 11  money_received             37420 non-null  float64
 12  money_sent                 37420 non-null  float64
 13  token_id                   37420 non-null  int64
 14  issuer                     37420 non-null  object
 15  mint_iso_date              37420 non-null  datetime64[ns, UTC]
 16  artifact_mime              37408 non-null  object
 17  artifact_file_size         37420 non-null  int64
 18  info_tags                  33592 non-null  object
dtypes: datetime64[ns, UTC](2), float64(6), int64(7), object(4)
memory usage: 5.7+ MB
```

1.3 Summarising variables (means, distributions, data types)

In [58]:
```
#https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.describe.html
users.describe()
```

Out[58]:

	mint_count	bought_count	bought_prices_avg	author_sold_count	author_sold_prices_avg	secondary_sold_count	secc
count	6726.00000	6726.00000	6726.00000	6726.00000	6726.00000	6726.00000	
mean	300.14020	17.37169	4.96384	17.26777	5.60140	0.40946	
std	1867.99847	82.52887	147.94554	72.32401	140.76978	3.49909	
min	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
25%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
50%	10.00000	1.00000	0.20442	0.00000	0.00000	0.00000	
75%	97.75000	8.00000	2.00000	4.00000	1.00000	0.00000	
max	78480.00000	4199.00000	11500.00000	2348.00000	10000.00000	175.00000	

In [59]:
```
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
#https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.set_index.html
dff['first_action_iso_date']= dff['first_action_iso_date'].dt.date
dff['mint_iso_date']= dff['mint_iso_date'].dt.date
dff['transaction'] = 1
dff
```

Out[59]:

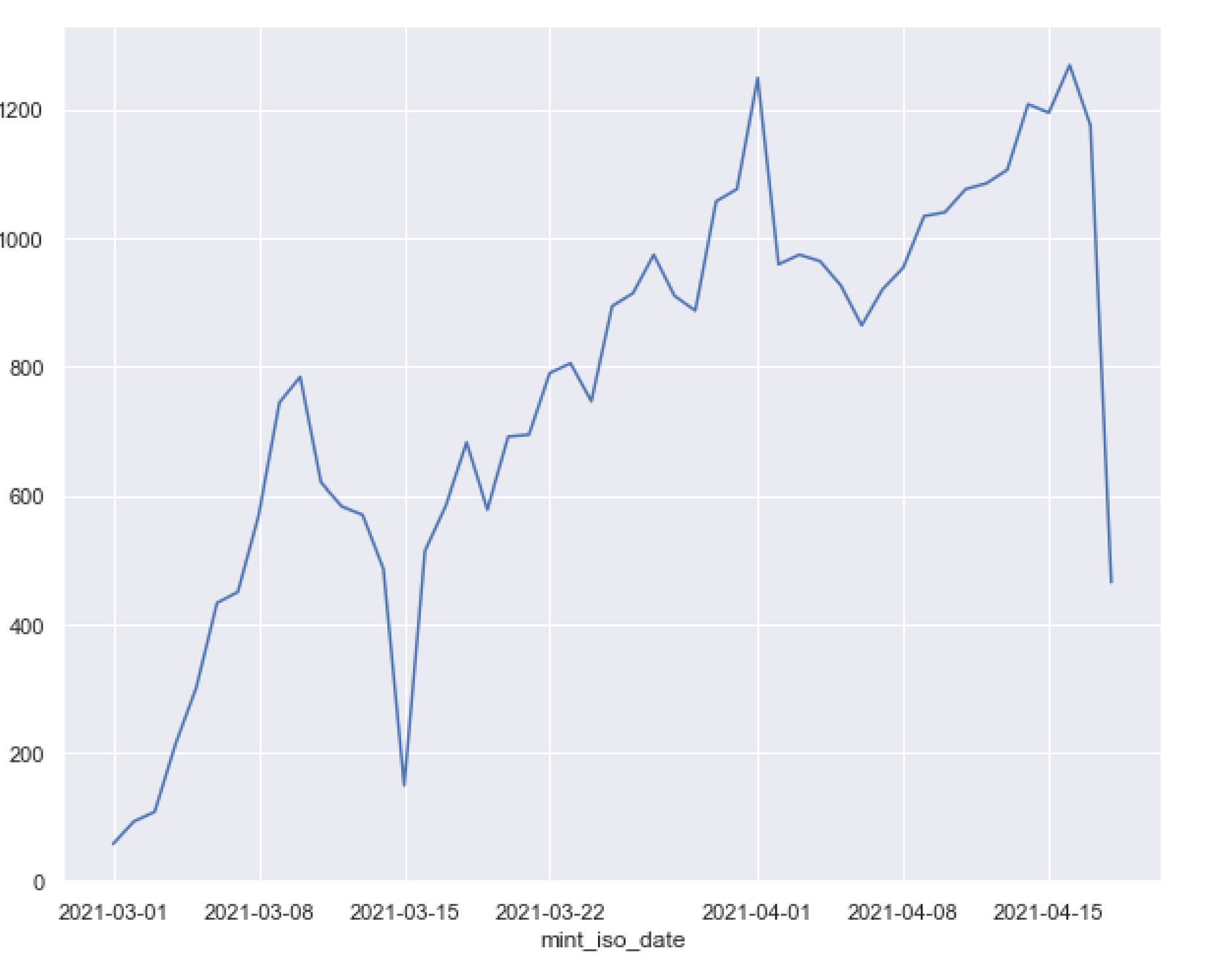
	address	first_action_iso_date	mint_count	bought_count	bought_prices_avg	author_
0	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28	13	111	7.92839	
1	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28	13	111	7.92839	
2	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28	13	111	7.92839	
3	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28	13	111	7.92839	
4	tz1UBZUkXpKGhYsP5KtzDNqLLchwF4uHrGjw	2021-02-28	13	111	7.92839	
...	...	...	...	...	...	
37415	tz1NDaRsyv7BkRTMxipcWc4mtbxii62XsxZE	2021-04-18	1332	0	0.00000	
37416	tz1NDaRsyv7BkRTMxipcWc4mtbxii62XsxZE	2021-04-18	1332	0	0.00000	
37417	tz1NYaeFFKgGMRpYPQRXn1g1Syu1rTcgBt7N	2021-04-18	10	0	0.00000	
37418	tz1bDg42KCNNZmmSa11LkdnzH8QKj95fJ1py	2021-04-18	10	0	0.00000	
37419	tz1PKA44aKv1G9pXfH8PQxgMQT8XApEs5FNo	2021-04-18	2	0	0.00000	

37420 rows × 20 columns

1.4 Plotting data

In [60]:
```
#https://datatofish.com/line-chart-python-matplotlib/
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
plt.figure(figsize = (10,8))
dff.groupby('mint_iso_date')['transaction'].sum().plot()
```

Out[60]: <AxesSubplot:xlabel='mint_iso_date'>



1.5 Segregating/Filtering data

In [61]:
```
#https://pandas.pydata.org/docs/reference/api/pandas.Series.value_counts.html
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
# taking one user with most transactions
dff['address'].value_counts()
```

Out[61]:
```
tz1PTiGJ674i1feGXvmH3a61uXjf8z8Tp3Et    1024
tz1f94uZ7SF2fLKnMjFzGQTbznd8qpAZ12is     341
tz1KyMb5TpWm3ED8WUbt5xDHVBkDhiQbKk1W     220
tz1ZzZmioy5Ej3kpsec2rMz1temewbt1UcSz     177
tz1ZWbokP5pGwT3tTtLPP2KhXX5ssg1EtDPs     160
                                        ...
tz1RJCAjVDbwMim2odB67decdYqQ6Ghvpg6w       1
tz1agJoUSaKxZBUTuF5N9uV3piu9MoebA1nS       1
tz1hHi53PmPJ6p8FC4XyhsJ9cnnzvnqtCZTN       1
tz1RD7tYHYTB1ydqvg2jtewzZbzfbtikxv9D       1
tz1csz9Arwy2pYBGNBTmee9XmSFjtJ3Z4HjD       1
Name: address, Length: 4743, dtype: int64
```

In [62]:
```
#https://pandas.pydata.org/docs/reference/api/pandas.Series.value_counts.html
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
dff['info_tags'].value_counts()
```

Out[62]:
```
ai art collectible controlthesoul
985
vaporwave aesthetics abstract stylegan artwork bandcamp reddit neuralnetwork machinelearning
179
CryptoBeeple
130
J.S.
101
xerox papercollage dark
99

...
painting purple boho deer
1
animals photography photo nature blackandwhite photographer brazil brasil cryptoart art
1
#mutant#dna#natural#moth#supportsmallminters#photo#life
1
subway metro photography lomography
1
generative cellularautomata 3D
1
Name: info_tags, Length: 22966, dtype: int64
```

Based on the NFT's sold during 2021 - 02 - 28 to 2021 - 04- 18 the most popular categories of NFT's sold were "AI art collectables', Vaporwave, Cryptobeeple and J.S.

In [63]:
```
##https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%204/intro-to-ds-week-4.
ipynb
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
sns.set()
from sklearn import preprocessing, linear_model, model_selection, metrics
import warnings
warnings.filterwarnings('ignore')
```

In [64]:
```
#https://sparkbyexamples.com/pandas/pandas-isin-explained-with-examples/#:~:text=isin()%20fu
nction%20is%20used,DataFrame%20to%20filter%20the%20rows.
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
popularlist = ['ai art collectible controlthesoul','vaporwave aesthetics abstract stylegan a
rtwork bandcamp reddit neuralnetwork machinelearning',
               'CryptoBeeple','J.S.']
pdf = dff[dff['info_tags'].isin(popularlist)]
```

In [65]:
```
#https://git.arts.ac.uk/lmccallum/Intro-to-DS-2022/blob/master/Week%203/intro-to-ds-week-3-s
olutions.ipynb
pdf.groupby('info_tags')['money_received','money_sent','bought_prices_avg','transaction'].su
m()
```

Out[65]:

info_tags	money_received	money_sent	bought_prices_avg	transaction
CryptoBeeple	26950.88500	42.90000	42.90000	130
J.S.	8862.75000	101.00000	101.00000	101
ai art collectible controlthesoul	401052.60000	0.00000	0.00000	985
vaporwave aesthetics abstract stylegan artwork bandcamp reddit neuralnetwork machinelearning	93974.50310	60113.56373	181.10416	179

Reference:

Creating a predictive model around NFT's:

https://www.techdreams.org/crypto-currency/art-blocks-nfts-resale-propensity/10627-20210908

In [ ]: