Investment Assignment

Objectives

Project Brief

You work for Spark Funds, an asset management company. Spark Funds wants to make investments in a few companies. The CEO of Spark Funds **wants to understand the global trends** in investments so that she can take the investment decisions effectively.

Business and Data Understanding

Spark Funds has two minor constraints for investments:

1. **It wants to invest between 5 to 15 million USD per round of investment**
2. **It wants to invest only in English-speaking countries because of the ease of communication with the companies it would invest in**

For your analysis, consider a country to be English speaking only if English is one of the official languages in that country

You may use this list: Click here (https://en.wikipedia.org/wiki/List_of_territorial_entities_where_English_is_an_official_language) for a list of countries where English is an official language.

These conditions will give you sufficient information for your initial analysis. Before getting to specific questions, let's understand the problem and the data first.

1. What is the strategy?

Spark Funds **wants to invest where most other investors are investing.** `This pattern is often observed among early stage startup investors.`

2. Where did we get the data from?

We have taken real investment data from crunchbase.com, so the insights you get may be incredibly useful. For this assignment, we have divided the data into the following files:

You have to use three main data tables for the entire analysis (available for download on the next page):

3. What is Spark Funds' business objective?

The business objectives and goals of data analysis are pretty straightforward.

1. Business objective: The objective is to identify the best sectors, countries, and a suitable investment type for making investments. The overall strategy is to invest where others are investing, implying that the 'best' sectors and countries are the ones 'where most investors are investing'.
2. Goals of data analysis: Your goals are divided into three sub-goals:

- **Investment type analysis:** Comparing the typical investment amounts in the venture, seed, angel, private equity etc. so that Spark Funds can choose the type that is best suited for their strategy.

- **Country analysis:** Identifying the countries which have been the most heavily invested in the past. These will be Spark Funds' favourites as well.
- **Sector analysis:** Understanding the distribution of investments across the eight main sectors. (Note that we are interested in the eight 'main sectors' provided in the mapping file. The two files — companies and rounds2 — have numerous sub-sector names; hence, you will need to map each sub-sector to its main sector.)

Data sets

1. Company details

companies: A table with basic data of companies

Description of Companies Table

Attribute	Description
Permalink	Unique ID of company
name	Company name
homepage_url	Website URL
category_list	Category/categories to which a company belongs
status	Operational status
country_code	Country Code
state_code	State

2. Funding round details:

rounds2: The most important parameters are explained below:

Description of rounds2 Table

Attributes	Description
company_permalink	Unique ID of company
funding_round_permalink	Unique ID of funding round
funding_round_type	Type of funding – venture, angel, private equity etc.
funding_round_code	Round of venture funding (round A, B etc.)
funded_at	Date of funding
raised_amount_usd	Money raised in funding (USD)

3. Sector Classification:

mapping.csv: This file maps the numerous **category names** in the companies table (such 3D printing, aerospace, agriculture, etc.) to eight broad **sector names.** The purpose is to simplify the analysis into eight sector buckets, rather than trying to analyse hundreds of them.

Checkpoint 1: Data Cleaning 1

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```
companies = pd.read_csv("companies.csv", encoding = 'latin1')
rounds2 = pd.read_csv("rounds2.csv", encoding='latin1')
```

1. How many unique companies are present in rounds2?

In [3]:
```
rounds2.head()
```

Out[3]:

	company_permalink	funding_round_permalink	funding_round_type	funding_
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	
1	/ORGANIZATION/-QOUNTER	/funding-round/22dacff496eb7acb2b901dec1dfe5633	venture	
2	/organization/-qounter	/funding-round/b44fbb94153f6cdef13083530bb48030	seed	
3	/ORGANIZATION/-THE-ONE-OF-THEM-INC-	/funding-round/650b8f704416801069bb178a1418776b	venture	
4	/organization/0-6-com	/funding-round/5727accaeaa57461bd22a9bdd945382d	venture	

In [4]:
```
# From the details of the dataset cmopany_permalink are the unique ids of th
e companies.
# So, we need to count all those using pivote table. we can take any col as
 values to count
rd_uniq = pd.pivot_table(rounds2 , index='company_permalink' , values='fundi
ng_round_permalink' , aggfunc='count')
rd_uniq.shape
# The index are the unique companies.
```

Out[4]: (90247, 1)

2. How many unique companies are present in the companies file?

In [5]:
```
companies.head()
```

Out[5]:

	permalink	name	homepage_url	category_list	status	countr
0	/Organization/-Fame	#fame	http://livfame.com	Media	operating	
1	/Organization/-Qounter	:Qounter	http://www.qounter.com	Application Platforms|Real Time|Social Network...	operating	
2	/Organization/-The-One-Of-Them-Inc-	(THE) ONE of THEM,Inc.	http://oneofthem.jp	Apps|Games|Mobile	operating	
3	/Organization/0-6-Com	0-6.com	http://www.0-6.com	Curated Web	operating	
4	/Organization/004-Technologies	004 Technologies	http://004gmbh.de/en/004-interact	Software	operating	

In [6]:
```
# Creating a pivote table same as before.
# Here permalink is the company unique id
com_uniq = pd.pivot_table(companies , index='permalink' , values='status' ,
aggfunc='count')
com_uniq.shape
```

Out[6]:
```
(66368, 1)
```

4. Are there any companies in the rounds2 file which are not present in companies ? Answer Y/N.

In [7]:
```
# Use the previous 2 variables rd_uniq and com_uniq for finding the companie
s
# convert the index vallues to sets
# perform intersection operation
# [if output < cols in compaines]  == Yes
# [if output = cols in compaines]  == No
rd_uniq.reset_index(inplace=True)
com_uniq.reset_index(inplace=True)

rd_set = set(rd_uniq.company_permalink.apply(lambda x: x.lower()))
com_set = set(com_uniq.permalink.apply(lambda x: x.lower()))
print(len(rd_set & com_set))
```

```
66363
```

--There are some companies in rounds2-df that are not present in companies-df
Ans: Yes

5. Merge the two data frames so that all variables (columns) in the companies frame are added to the rounds2 data frame. Name the merged frame master_frame. How many observations are present in master_frame ?

In [8]:
```
# For this we need to use merge() method and then compare the shape of the n
ew df with old
# For using the merge method we need to have same colums name in both the da
taframes
# So we need to change the col name company_permalink in rounds2 to permalin
k
## And also the case of the values--- change all values to the lower case
rounds2.rename(columns={'company_permalink':'permalink'}, inplace=True)
```

In [9]:
```
# NOw we have changed the col name of the rounds2
# we need to convert all the values in the rounds and the companies to their
lower case to merge them into one df
companies.permalink = companies.permalink.apply(lambda x: x.lower())
rounds2.permalink = rounds2.permalink.apply(lambda x: x.lower())
```

In [10]:
```
# Create a variable named master_frame and assign it with the pivote table
# We use the 'outer' because we need all companies in companies-df into roun
ds2..so the rounds size increases
master_frame= pd.merge(rounds2, companies, how='inner', on='permalink')
master_frame.shape
```

Out[10]:
```
(114942, 15)
```

In [11]:
```
print(companies.shape, rounds2.shape)
```

```
(66368, 10) (114949, 6)
```

Handiling the Missing data

In [12]:
```
len(master_frame.columns)
```

Out[12]:
```
15
```

In [13]:
```
(master_frame.isnull().sum()/len(master_frame.index))*100
```

Out[13]:
```
permalink                 0.000000
funding_round_permalink   0.000000
funding_round_type        0.000000
funding_round_code       72.908945
funded_at                 0.000000
raised_amount_usd        17.386160
name                      0.000870
homepage_url              5.334865
category_list             2.964104
status                    0.000000
country_code              7.543805
state_code                9.516974
region                    8.839241
city                      8.836631
founded_at               17.852482
dtype: float64
```

Here we can remove somr columns since they does not make importance to the data we require. They are funding_round_code, funded_at , homepage_url, state_code , region , city .

In [14]:
```
master_frame = master_frame.drop(['funding_round_code', 'funded_at' , 'homep
age_url', 'state_code' , 'region' , 'city'], axis=1)
master_frame.head()
print(master_frame.shape)
```

```
(114942, 9)
```

In [15]:
```
(master_frame.isnull().sum()/len(master_frame.index))*100
```

Out[15]:
```
permalink                   0.000000
funding_round_permalink     0.000000
funding_round_type          0.000000
raised_amount_usd          17.386160
name                        0.000870
category_list               2.964104
status                      0.000000
country_code                7.543805
founded_at                 17.852482
dtype: float64
```

In [16]:
```
master_frame = master_frame.dropna(subset=['raised_amount_usd', 'country_cod
e','category_list'])
```

In [17]:
```
master_frame.shape
```

Out[17]:
```
(88529, 9)
```

In [18]:
```
master_frame.isnull().sum()
```

Out[18]:
```
permalink                      0
funding_round_permalink        0
funding_round_type             0
raised_amount_usd              0
name                           1
category_list                  0
status                         0
country_code                   0
founded_at                 13369
dtype: int64
```

Checkpoint 2: Funding Type Analysis

> From now we need to work ony with the "master_frame"

Considering the constraints of Spark Funds, you have to decide one funding type which is most suitable for them.

1. Calculate the most representative value of the investment amount for each of the four funding types (venture, angel, seed, and private equity) and report the answers in Table 2.1

> **Most representative value will be the median of each funding types.**

2. Based on the most representative investment amount calculated above, which investment type do you think is the most suitable for Spark Funds?

In [19]:
```
master_frame.shape
```
Out[19]:
```
(88529, 9)
```

In [20]:
```
# Considering the fist costraint: We need to find the mean of each investmen
t type
# Create a pivot table to form a table using funding type...'funding_round_t
ype' is the col

represent_value = pd.pivot_table(master_frame, index='funding_round_type' ,
values= 'raised_amount_usd', aggfunc='median' )

represent_value.loc[['venture', 'angel', 'seed','private_equity']].sort_valu
es(by='raised_amount_usd', ascending=False)
```
Out[20]:

	raised_amount_usd
funding_round_type	
private_equity	20000000.0
venture	5000000.0
angel	414906.0
seed	300000.0

Since the value of the private equity is too high for the Spark Funds since it is out of the range of the investment amount, we neglect it and go for the next one (Venture).

Checkpoint 3: Country Analysis

Spark Funds wants to invest in countries with the highest amount of funding for the chosen investment type. This is a part of its broader strategy to invest where most investments are occurring.

1. Spark Funds wants to see the top nine countries which have received the highest total funding (across ALL sectors for the chosen investment type)
2. For the chosen investment type, make a data frame named top9 with the top nine countries (based on the total investment amount each country has received)

In [21]:
```
type_country = pd.pivot_table(master_frame, index=['funding_round_type','country_code'] ,  values='raised_amount_usd', aggfunc='sum')

ven_countries = type_country.loc[['venture']].sort_values(by='raised_amount_usd', ascending=False)

top9 = ven_countries.head(9)
top9
```

Out[21]:

		raised_amount_usd
funding_round_type	**country_code**	
venture	**USA**	4.200680e+11
	CHN	3.933892e+10
	GBR	2.007281e+10
	IND	1.426151e+10
	CAN	9.482218e+09
	FRA	7.226851e+09
	ISR	6.854350e+09
	DEU	6.306922e+09
	JPN	3.167647e+09

Identify the top three English-speaking countries in the data frame top9.

Sl.No	Questions	Answers
1	Top English speaking country	USA
2	Second English speaking country	GBR
3	Third English speaking country	IND

Checkpoint 4: Sector Analysis 1

In [22]:
```python
import pandas as pd
maping = pd.read_csv('mapping.csv')
maping
```

Out[22]:

	category_list	Automotive & Sports	Blanks	Cleantech / Semiconductors	Entertainment	Health	Manufacturing
0	NaN	0	1	0	0	0	0
1	3D	0	0	0	0	0	1
2	3D Printing	0	0	0	0	0	1
3	3D Technology	0	0	0	0	0	1
4	Accounting	0	0	0	0	0	0
...	...	...	...	...	...	...	...
683	Wholesale	0	0	0	0	0	0
684	Wine And Spirits	0	0	0	1	0	0
685	Wireless	0	0	0	1	0	0
686	Women	0	0	0	0	0	0
687	Young Adults	0	0	0	0	0	0

688 rows × 10 columns

In [23]:
```python
master_frame.category_list = master_frame.category_list.astype('str')
```

In [24]:
```python
master_frame.category_list = master_frame.category_list.apply(lambda x: x.sp
lit("|")[0] )
```

In [25]:
```
master_frame.rename(columns={'category_list':'primary_sector'}, inplace=True
)
master_frame
```

Out[25]:

	permalink	funding_round_permalink	funding_round_type	r
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	
2	/organization/-qounter	/funding-round/b44fbb94153f6cdef13083530bb48030	seed	
4	/organization/0-6-com	/funding-round/5727accaeaa57461bd22a9bdd945382d	venture	
6	/organization/01games-technology	/funding-round/7d53696f2b4f607a2f2a8cbb83d01839	undisclosed	
7	/organization/0ndine-biomedical-inc	/funding-round/2b9d3ac293d5cdccbecff5c8cb0f327d	seed	
...	...	...	...	
114935	/organization/zzzzapp-com	/funding-round/22ef2fafb4d20ac3aa4b86143dbf6c8e	seed	
114936	/organization/zzzzapp-com	/funding-round/6ba41360588bc6e3f77e9b50a0ebfafa	seed	
114937	/organization/zzzzapp-com	/funding-round/8f6d25b8ee4199e586484d817bceda05	convertible_note	
114938	/organization/zzzzapp-com	/funding-round/ff1aa06ed5da186c84f101549035d4ae	seed	
114940	/organization/ã□asys-2	/funding-round/35f09d0794651719b02bbfd859ba9ff5	seed	

88529 rows × 9 columns

In [ ]:

In [26]:
```python
melt = pd.melt(maping, id_vars='category_list', value_vars=['Automotive & Sports', 'Blanks',
       'Cleantech / Semiconductors', 'Entertainment', 'Health',
       'Manufacturing', 'News, Search and Messaging', 'Others',
       'Social, Finance, Analytics, Advertising'])

melt = melt[melt.value == 1]

melt.rename(columns={'category_list':'primary_sector', 'variable':'main_sector'}, inplace=True)
# pd.pivot_table(melt, index=['variable','category_list'])
melt.drop(columns='value', inplace=True)
melt
```

Out[26]:

	primary_sector	main_sector
8	Adventure Travel	Automotive & Sports
14	Aerospace	Automotive & Sports
45	Auto	Automotive & Sports
46	Automated Kiosk	Automotive & Sports
47	Automotive	Automotive & Sports
...	...	...
6121	Social Recruiting	Social, Finance, Analytics, Advertising
6122	Social Television	Social, Finance, Analytics, Advertising
6123	Social Travel	Social, Finance, Analytics, Advertising
6134	Stock Exchanges	Social, Finance, Analytics, Advertising
6167	Venture Capital	Social, Finance, Analytics, Advertising

688 rows × 2 columns

In [27]:
```python
master_frame.shape
```

Out[27]:
```
(88529, 9)
```

In [28]:
```
master_frame = pd.merge(master_frame, melt, how='inner', on='primary_sector'
)
master_frame
# Master_frame merged with mapping
```

Out[28]:

	permalink	funding_round_permalink	funding_round_type	raise
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	
1	/organization/90min	/funding-round/21a2cbf6f2fb2a1c2a61e04bf930dfe6	venture	
2	/organization/90min	/funding-round/bd626ed022f5c66574b1afe234f3c90d	venture	
3	/organization/90min	/funding-round/fd4b15e8c97ee2ffc0acccdbe1a98810	venture	
4	/organization/a-dance-for-me	/funding-round/9ab9dbd17bf010c79d8415b2c22be6fa	equity_crowdfunding	
...	...	...	...	
82123	/organization/wing-ma-am	/funding-round/13d72bd46f529ee00ff699254d9d1c16	seed	
82124	/organization/wiselike	/funding-round/e313727defb87ca1dcb8ec9f6d091e47	seed	
82125	/organization/yes-no	/funding-round/e51932c2afebd10c5e8c08b94b57bcb7	seed	
82126	/organization/youcruit	/funding-round/31fe44e42294821ad500ab67cb62e8c3	angel	
82127	/organization/yunnan-landsun-green-industry-gr...	/funding-round/83783f2b5911f41827bd6c72c1eee7fc	venture	

82128 rows × 10 columns

In [29]:
```
master_frame.shape
```

Out[29]: (82128, 10)

Checkpoint 5: Sector Analysis 2

In [30]:
```
import warnings
warnings.filterwarnings('ignore')
```

In [31]:
```python
master_frame = master_frame[~(master_frame.raised_amount_usd<1)]
master_frame
```

Out[31]:

	permalink	funding_round_permalink	funding_round_type	raise
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	
1	/organization/90min	/funding-round/21a2cbf6f2fb2a1c2a61e04bf930dfe6	venture	
2	/organization/90min	/funding-round/bd626ed022f5c66574b1afe234f3c90d	venture	
3	/organization/90min	/funding-round/fd4b15e8c97ee2ffc0acccdbe1a98810	venture	
4	/organization/a-dance-for-me	/funding-round/9ab9dbd17bf010c79d8415b2c22be6fa	equity_crowdfunding	
...	...	...	...	
82123	/organization/wing-ma-am	/funding-round/13d72bd46f529ee00ff699254d9d1c16	seed	
82124	/organization/wiselike	/funding-round/e313727defb87ca1dcb8ec9f6d091e47	seed	
82125	/organization/yes-no	/funding-round/e51932c2afebd10c5e8c08b94b57bcb7	seed	
82126	/organization/youcruit	/funding-round/31fe44e42294821ad500ab67cb62e8c3	angel	
82127	/organization/yunnan-landsun-green-industry-gr...	/funding-round/83783f2b5911f41827bd6c72c1eee7fc	venture	

81811 rows × 10 columns

In [32]:
```python
# DF with only companies from USA
D1 = master_frame[master_frame.country_code == 'USA']
D1.shape
```

Out[32]: (56915, 10)

In [33]:
```
# Create a pivot table and merge it with the actual table on main_sector variable
# This pivot table is used for counting and summing of the total noof investments in a perticulat sector
d1_merge = pd.pivot_table(D1, index='main_sector', values = 'raised_amount_usd', aggfunc=['count','sum'])
d1_merge.reset_index(inplace=True)
d1_merge.columns=['main_sector','count', 'sum']
d1_merge
```

Out[33]:

	main_sector	count	sum
0	Automotive & Sports	1087	1.892177e+10
1	Cleantech / Semiconductors	11421	1.697839e+11
2	Entertainment	3525	2.828393e+10
3	Health	5351	5.083625e+10
4	Manufacturing	4036	6.984102e+10
5	News, Search and Messaging	7986	7.297069e+10
6	Others	13706	1.264510e+11
7	Social, Finance, Analytics, Advertising	9803	8.601354e+10

In [34]:
```
D1 = pd.merge(D1, d1_merge, how='inner', on='main_sector')
D1.shape
```

Out[34]: (56915, 12)

In [ ]:

In [35]:
```
# DF with only companies from IND
D2 = master_frame[master_frame.country_code == 'IND']
D2.shape
```

Out[35]: (1498, 10)

In [36]:
```
# Create a pivot table and merge it with the actual table on main_sector var
iable
# This pivot table is used for counting and summing of the total noof invest
ments in a perticulat sector
d2_merge = pd.pivot_table(D2, index='main_sector', values = 'raised_amount_u
sd', aggfunc=['count','sum'])
d2_merge.reset_index(inplace=True)
d2_merge.columns=['main_sector','count', 'sum']
d2_merge
```

Out[36]:

	main_sector	count	sum
0	Automotive & Sports	60	1.678812e+09
1	Cleantech / Semiconductors	93	3.330406e+09
2	Entertainment	150	1.424280e+09
3	Health	83	6.608588e+08
4	Manufacturing	95	1.058886e+09
5	News, Search and Messaging	275	3.295819e+09
6	Others	526	1.031486e+10
7	Social, Finance, Analytics, Advertising	216	4.566158e+09

In [37]:
```
D2 = pd.merge(D2, d2_merge, how='inner', on='main_sector')
D2.head()
```

Out[37]:

	permalink	funding_round_permalink	funding_round_type	raised_
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	
1	/organization/manas-informatics	/funding-round/719e50301803d3918ffa558fc877e41c	venture	
2	/organization/crispy-games-private-limited	/funding-round/1cfde8b86d777fe401eed35e0531c8e4	seed	
3	/organization/dhruva	/funding-round/6035248811c9530b11bd442d9239a0b1	venture	
4	/organization/fictiontree	/funding-round/22de2c581da09f4efd98b2eb698feab1	undisclosed	

In [38]:
```
# DF with only companies from GBR
D3 = master_frame[master_frame.country_code == 'GBR']
D3.shape
```

Out[38]: (4598, 10)

In [39]:
```
# Create a pivot table and merge it with the actual table on main_sector variable
# This pivot table is used for counting and summing of the total noof investments in a perticulat sector
d3_merge = pd.pivot_table(D3, index='main_sector', values = 'raised_amount_usd', aggfunc=['count','sum'])
d3_merge.reset_index(inplace=True)
d3_merge.columns=['main_sector','count', 'sum']
d3_merge
```

Out[39]:

	main_sector	count	sum
0	Automotive & Sports	121	5.806745e+08
1	Cleantech / Semiconductors	677	7.665880e+09
2	Entertainment	423	1.765772e+09
3	Health	253	1.809921e+09
4	Manufacturing	290	1.616510e+09
5	News, Search and Messaging	733	4.958121e+09
6	Others	1143	7.706658e+09
7	Social, Finance, Analytics, Advertising	958	3.879432e+09

In [40]:
```
D3 = pd.merge(D3, d3_merge, how='inner', on='main_sector')
D3.head()
```

Out[40]:

	permalink	funding_round_permalink	funding_round_type	raised_
0	/organization/90min	/funding-round/21a2cbf6f2fb2a1c2a61e04bf930dfe6	venture	
1	/organization/90min	/funding-round/bd626ed022f5c66574b1afe234f3c90d	venture	
2	/organization/90min	/funding-round/fd4b15e8c97ee2ffc0acccdbe1a98810	venture	
3	/organization/bundll	/funding-round/f6add367ab93afbf0a4bef81761dc06a	seed	
4	/organization/campaign	/funding-round/259e163cb2b3fc5d407da16be91c3e6e	debt_financing	

Table 5.1

Sl.no	Questions	C1	C2	C3
1	Total number of Investments (count)			
2	Total amount of investment (USD)			
3	Top Sector name (no. of investment-wise)			
4	Second Sector name (no. of investment-wise)			
5	Third Sector name (no. of investment-wise)			
6	Number of investments in top sector (3)			
7	Number of investments in second sector (4)			
8	Number of investments in third sector (5)			
9	For point 3 (top sector count-wise), which company received the highest investment?			
10	For point 4 (second best sector count-wise), which company received the highest investment?			

In [41]:

```
# 1. no of investments , 2. Amount of investment
print(f'D1 = { D1.raised_amount_usd.count()}, {D1.raised_amount_usd.sum()}')
print(f'D2 = { D2.raised_amount_usd.count()}, {D2.raised_amount_usd.sum()}')
print(f'D3 = { D3.raised_amount_usd.count()}, {D3.raised_amount_usd.sum()}')
```

```
D1 = 56915, 623102069851.0
D2 = 1498, 26330076077.0
D3 = 4598, 29982967015.0
```

In [42]:

```
# Top sectors based on no of investments
# this can be calculated from the d1_merge table
d1_merge.sort_values(by='count', ascending=False)
```

Out[42]:

	main_sector	count	sum
6	Others	13706	1.264510e+11
1	Cleantech / Semiconductors	11421	1.697839e+11
7	Social, Finance, Analytics, Advertising	9803	8.601354e+10
5	News, Search and Messaging	7986	7.297069e+10
3	Health	5351	5.083625e+10
4	Manufacturing	4036	6.984102e+10
2	Entertainment	3525	2.828393e+10
0	Automotive & Sports	1087	1.892177e+10

In [43]:
```
d2_merge.sort_values(by='count', ascending=False)
```
Out[43]:

	main_sector	count	sum
6	Others	526	1.031486e+10
5	News, Search and Messaging	275	3.295819e+09
7	Social, Finance, Analytics, Advertising	216	4.566158e+09
2	Entertainment	150	1.424280e+09
4	Manufacturing	95	1.058886e+09
1	Cleantech / Semiconductors	93	3.330406e+09
3	Health	83	6.608588e+08
0	Automotive & Sports	60	1.678812e+09

In [44]:
```
d3_merge.sort_values(by='count', ascending=False)
```
Out[44]:

	main_sector	count	sum
6	Others	1143	7.706658e+09
7	Social, Finance, Analytics, Advertising	958	3.879432e+09
5	News, Search and Messaging	733	4.958121e+09
1	Cleantech / Semiconductors	677	7.665880e+09
2	Entertainment	423	1.765772e+09
4	Manufacturing	290	1.616510e+09
3	Health	253	1.809921e+09
0	Automotive & Sports	121	5.806745e+08

In [45]:
```
top_comp_name_d1 = D1[D1.main_sector == 'Others' ]
pd.pivot_table(top_comp_name_d1, index=['main_sector','name'], values='raise
d_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=
False)
```

Out[45]:

main_sector	name	raised_amount_usd
Others	**Facebook**	2.425700e+09
	Zebra Technologies	2.000000e+09
	Quad/Graphics	1.900000e+09
	SoFi	1.766200e+09
	Venari Resources	1.498515e+09
	...	...
	Infinity Home Investments	6.000000e+02
	Bella Professional Services	5.000000e+02
	Cmilligan Investments	3.000000e+02
	SkyTechnica Framework	2.320000e+02
	Snapstream	5.000000e+01

7482 rows × 1 columns

In [46]:
```
sec_comp_name_d1 = D1[D1.main_sector == 'Cleantech / Semiconductors']
pd.pivot_table(sec_comp_name_d1, index=['main_sector','name'], values='raise
d_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=
False)
```

Out[46]:

main_sector	name	raised_amount_usd
Cleantech / Semiconductors	**Freescale Semiconductor**	1.760000e+10
	Carestream	2.400000e+09
	Terra-Gen Power	1.200000e+09
	Cape Wind	1.200000e+09
	Juno Therapeutics	1.159803e+09
	...	...
	Bradshaw Propulsion	3.000000e+03
	Gigawatt Farms	3.000000e+03
	Canfield Medical Supply	2.750000e+03
	Uranium Recovery Corporation	2.000000e+03
	PROTEIN LOUNGE	1.000000e+03

4741 rows × 1 columns

In [47]:
```
top_comp_name_d2 = D2[D2.main_sector == 'Others']
pd.pivot_table(top_comp_name_d2, index=['main_sector','name'], values='raised_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=False)
```

Out[47]:

main_sector	name	raised_amount_usd
Others	**Flipkart**	3.151140e+09
	Snapdeal	1.897700e+09
	Paytm	7.000000e+08
	Piramal Realty	4.340000e+08
	Tata Teleservices	2.120000e+08
	...	...
	Sky Level Enterprieses	5.000000e+03
	barter.li	2.500000e+03
	regrob.com	2.000000e+03
	BookingArena.com	1.883000e+03
	koshimbir.com - an online and in-store marketplace that connects retail and consumer merchandise	1.669000e+03

369 rows × 1 columns

In [48]:
```
sec_comp_name_d2 = D2[D2.main_sector == 'News, Search and Messaging']
pd.pivot_table(sec_comp_name_d2, index=['main_sector','name'], values='raised_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=False)
```

Out[48]:

main_sector	name	raised_amount_usd
News, Search and Messaging	**One97 Communications**	585000000.0
	ACT (Atria Convergence Technologies Pvt. Ltd.)	500000000.0
	Quikr	346000000.0
	Tower Vision	300000000.0
	FreeCharge	113000000.0
	...	...
	Adhysteria	10000.0
	MobileVeda	9000.0
	Blue Box Media Private Limited	8217.0
	Techieweb Solutions	5000.0
	RuralServer	569.0

195 rows × 1 columns

In [49]:
```
top_comp_name_d3 = D3[D3.main_sector == 'Others']
pd.pivot_table(top_comp_name_d3, index=['main_sector','name'], values='raised_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=False)
```

Out[49]:

		raised_amount_usd
main_sector	**name**	
Others	**Helios Towers Africa**	630000000.0
	G4S	541000000.0
	OneWeb	500000000.0
	University of Ulster	477475356.0
	Seven Energy	255000000.0
	...	...
	WestBridge	13000.0
	Communication Specialist Limited	10500.0
	Enterprise Data Safe Ltd.	9542.0
	Naturebytes	9370.0
	Posh Eyes	3620.0

732 rows × 1 columns

In [50]:
```
sec_comp_name_d3 = D3[D3.main_sector == 'Social, Finance, Analytics, Advertising']
pd.pivot_table(sec_comp_name_d3, index=['main_sector','name'], values='raised_amount_usd', aggfunc='sum').sort_values(by='raised_amount_usd', ascending=False)
```

Out[50]:

		raised_amount_usd
main_sector	**name**	
Social, Finance, Analytics, Advertising	**Powa Technologies**	176700000.0
	WorldRemit	147655000.0
	Wonga	145393366.0
	Shire Leasing	129104098.0
	Mereo	119000000.0
	...	...
	WARSTUFF	3600.0
	Maplace.co	1553.0
	twenty5media	1506.0
	Saunders Solutions	100.0
	BeMySpot LTD	100.0

566 rows × 1 columns

Checkpoint 6: Plots

1. A plot showing the fraction of total investments (globally) in angel, venture, seed, and private equity, and the average amount of investment in each funding type. This chart should make it clear that a certain funding type (FT) is best suited for Spark Funds.
2. A plot showing the top 9 countries against the total amount of investments of funding type FT. This should make the top 3 countries (Country 1, Country 2, and Country 3) very clear.
3. A plot showing the number of investments in the top 3 sectors of the top 3 countries on one chart (for the chosen investment type FT).

In [51]:
```
# A plot showing total investments (globally) in angel, venture, seed, and p
rivate equity, and the average amount of investment in each funding type.
master_frame.head()
```

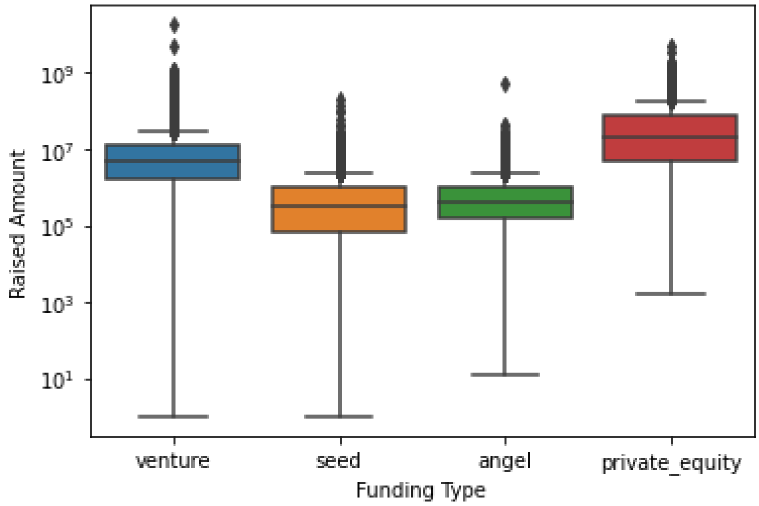
Out[51]:

	permalink	funding_round_permalink	funding_round_type	raised_amo
0	/organization/-fame	/funding-round/9a01d05418af9f794eebff7ace91f638	venture	10(
1	/organization/90min	/funding-round/21a2cbf6f2fb2a1c2a61e04bf930dfe6	venture	15(
2	/organization/90min	/funding-round/bd626ed022f5c66574b1afe234f3c90d	venture	5{
3	/organization/90min	/funding-round/fd4b15e8c97ee2ffc0acccdbe1a98810	venture	18(
4	/organization/a-dance-for-me	/funding-round/9ab9dbd17bf010c79d8415b2c22be6fa	equity_crowdfunding	1(

In [52]:
```
# import seaborn as sns
# import matplotlib.pyplot as plt
plot_1 = master_frame[master_frame.funding_round_type.isin(['venture', 'ange
l','seed', 'private_equity'])]
plot_1.shape
```

Out[52]: (69509, 10)

In [53]:
```
sns.boxplot(data=plot_1, x='funding_round_type', y='raised_amount_usd')
plt.xlabel("Funding Type")
plt.ylabel("Raised Amount")
plt.yscale('log')
plt.show()
```

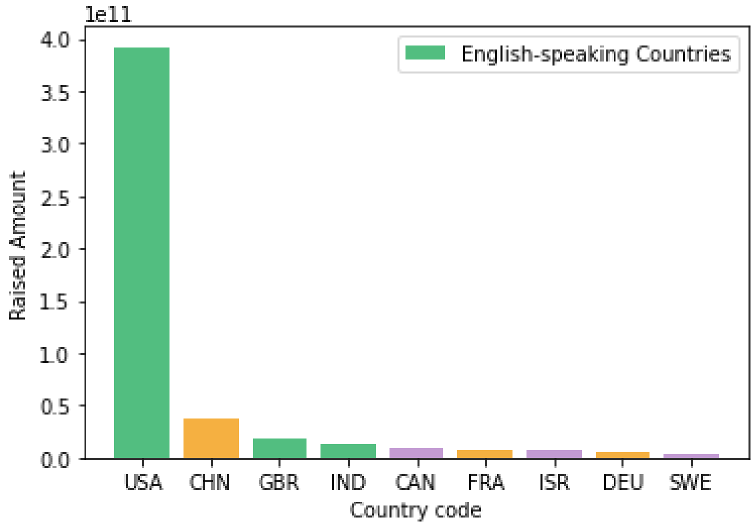


In [54]:
```
tmp2 = master_frame[master_frame.funding_round_type == 'venture']
tmp2 = pd.pivot_table(tmp2, index='country_code' , values= 'raised_amount_usd', aggfunc='sum')
tmp2 = tmp2.sort_values(by='raised_amount_usd', ascending=False).head(9).reset_index()
tmp2
```

Out[54]:

	country_code	raised_amount_usd
0	USA	3.922376e+11
1	CHN	3.703144e+10
2	GBR	1.892439e+10
3	IND	1.353798e+10
4	CAN	8.715621e+09
5	FRA	7.033840e+09
6	ISR	6.520700e+09
7	DEU	5.751654e+09
8	SWE	3.029608e+09

In [55]:
```
plt.bar(data=tmp2, x='country_code' , height='raised_amount_usd',color=["#52BE80","#F5B041","#52BE80","#52BE80","#C39BD3","#F5B041","#C39BD3","#F5B041","#C39BD3" ], label="English-speaking Countries" )
plt.legend()
plt.xlabel("Country code")
plt.ylabel("Raised Amount")
plt.show()
```



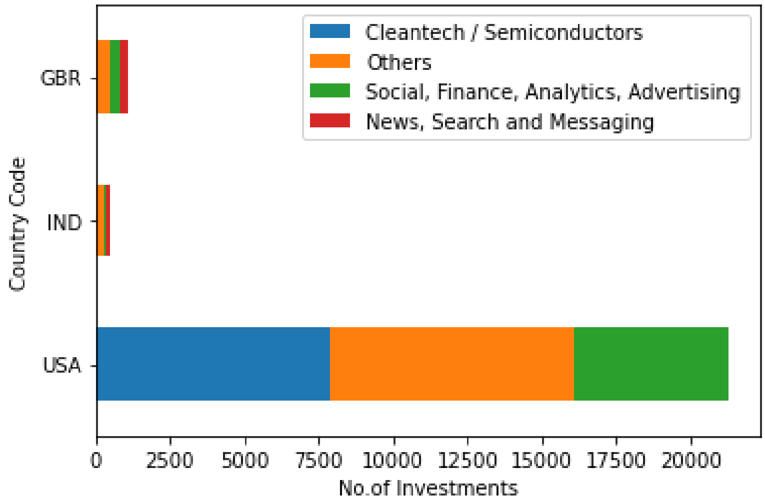
In [56]:
```
# The other way for PLot3 New concept "subplots"

tmp1 = master_frame[master_frame.funding_round_type == 'venture']
usa = tmp1[(tmp1.country_code == 'USA') & (tmp1.main_sector.isin(['Others','Cleantech / Semiconductors'
                                                                  ,'Social, Finance, Analytics, Advertising']))]
gbr = tmp1[(tmp1.country_code == 'GBR') & (tmp1.main_sector.isin(['Others','News, Search and Messaging',
                                                                  'Social, Finance, Analytics, Advertising']))]
ind= tmp1[(tmp1.country_code == 'IND') & (tmp1.main_sector.isin(['Others','News, Search and Messaging'
                                                                  ,'Social, Finance, Analytics, Advertising']))]
```

In [57]:
```
usa3= pd.pivot_table(usa, index='country_code', columns='main_sector', values='raised_amount_usd', aggfunc='count')
ind3 = pd.pivot_table(ind, index='country_code', columns='main_sector', values='raised_amount_usd', aggfunc='count')
gbr3 = pd.pivot_table(gbr, index='country_code', columns='main_sector', values='raised_amount_usd', aggfunc='count')
tmp2 = pd.concat([usa3,ind3,gbr3])
tmp2
```

Out[57]:

	Cleantech / Semiconductors	Others	Social, Finance, Analytics, Advertising	News, Search and Messaging
country_code				
USA	7847.0	8239	5153	NaN
IND	NaN	280	77	130.0
GBR	NaN	507	317	241.0

In [58]:
```python
# plt.figure(figsize=(15.0,7.0))
tmp2.plot.barh(stacked=True)
plt.xlabel("No.of Investments")
plt.ylabel("Country Code")
plt.show()
```



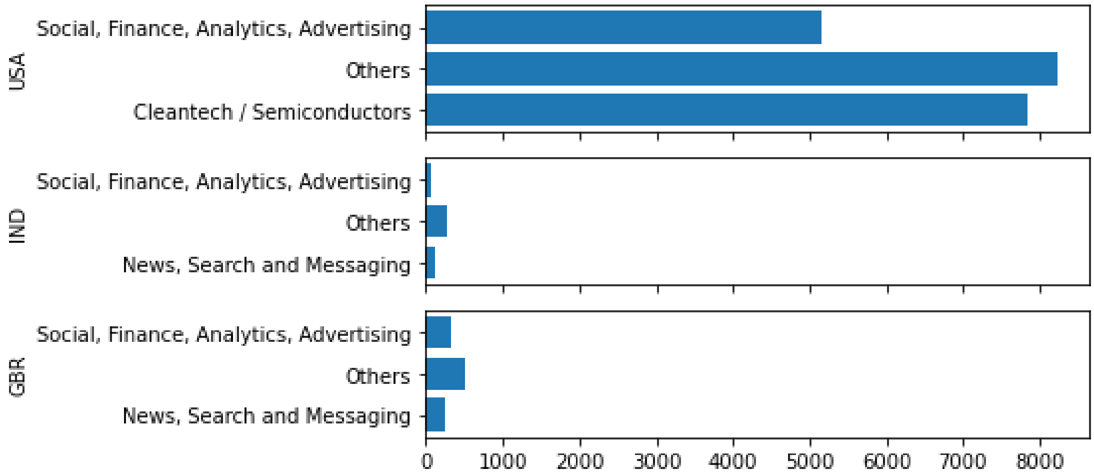
In [59]:
```python
usa2 = pd.pivot_table(usa, index=['country_code','main_sector'], values = 'raised_amount_usd', aggfunc='count')
ind2 = pd.pivot_table(ind, index=['country_code','main_sector'], values = 'raised_amount_usd', aggfunc='count')
gbr2 = pd.pivot_table(gbr, index=['country_code','main_sector'], values = 'raised_amount_usd', aggfunc='count')

tmp = pd.concat([usa2,ind2,gbr2], axis=0)
tmp = tmp.reset_index()
tmp
```

Out[59]:

	country_code	main_sector	raised_amount_usd
0	USA	Cleantech / Semiconductors	7847
1	USA	Others	8239
2	USA	Social, Finance, Analytics, Advertising	5153
3	IND	News, Search and Messaging	130
4	IND	Others	280
5	IND	Social, Finance, Analytics, Advertising	77
6	GBR	News, Search and Messaging	241
7	GBR	Others	507
8	GBR	Social, Finance, Analytics, Advertising	317

In [60]:

```
# from matplotlib import pyplot as plt

fig,(ax1,ax2,ax3) = plt.subplots(nrows=3,ncols=1 , sharex=True)
# print(ax1,ax2)
ax1.barh(data=tmp, y=tmp.main_sector.loc[:2], width=tmp.raised_amount_usd.lo
c[:2])
ax2.barh(data=tmp, y=tmp.main_sector.loc[3:5], width=tmp.raised_amount_usd.l
oc[3:5])
ax3.barh(data=tmp, y=tmp.main_sector.loc[6:], width=tmp.raised_amount_usd.lo
c[6:])

ax1.set_ylabel('USA')
ax2.set_ylabel('IND')
ax3.set_ylabel('GBR')
# ax1.legend()
plt.show()
```



In [ ]: