Kickstarter Projects

1.Data preparation and cleaning

Import Python Libraries

In [150]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from IPython.display import display
import seaborn as sns

# need to install
#conda install -c konstantinstadler country_converter
import country_converter as coco # a country converter

# conda install -c anaconda nltk
import nltk # for NLP
#ltk.download('stopwords')
```

Data preperation

In [151]:
```
df = pd.read_csv("ks-projects-201801.csv")
df.head(5)
```

Out[151]:

	ID	name	category	main_category	currency	deadline	goal	launched	p
0	1000002330	The Songs of Adelaide & Abullah	Poetry	Publishing	GBP	2015-10-09	1000.0	2015-08-11 12:12:28	
1	1000003930	Greeting From Earth: ZGAC Arts Capsule For ET	Narrative Film	Film & Video	USD	2017-11-01	30000.0	2017-09-02 04:43:57	
2	1000004038	Where is Hank?	Narrative Film	Film & Video	USD	2013-02-26	45000.0	2013-01-12 00:20:50	
3	1000007540	ToshiCapital Rekordz Needs Help to Complete Album	Music	Music	USD	2012-04-16	5000.0	2012-03-17 03:24:11	
4	1000011046	Community Film Project: The Art of Neighborhoo...	Film & Video	Film & Video	USD	2015-08-29	19500.0	2015-07-04 08:35:03	

In [152]:
```
df.columns #let's see which columns ther are
```

Out[152]:
```
Index(['ID', 'name', 'category', 'main_category', 'currency', 'deadline',
       'goal', 'launched', 'pledged', 'state', 'backers', 'country',
       'usd pledged', 'usd_pledged_real', 'usd_goal_real'],
      dtype='object')
```

Drop Unnecessary Columns

TODO: explain why we dropped this...

In [153]:
```
df = df.drop('backers', axis = 1) #TODO: explain
df = df.drop('usd pledged', axis = 1) #there is usd_pledged_real
df = df.drop('currency', axis = 1)    # TODO: explain
df = df.drop('goal', axis = 1)    # TODO: explain
df = df.drop('pledged', axis = 1)    # TODO: explain
df = df.drop('ID', axis = 1)    # TODO: explain
```

In [154]:
```
df.head(3)
```

Out[154]:

	name	category	main_category	deadline	launched	state	country	usd_pledged_real	usd
0	The Songs of Adelaide & Abullah	Poetry	Publishing	2015-10-09	2015-08-11 12:12:28	failed	GB	0.0	
1	Greeting From Earth: ZGAC Arts Capsule For ET	Narrative Film	Film & Video	2017-11-01	2017-09-02 04:43:57	failed	US	2421.0	
2	Where is Hank?	Narrative Film	Film & Video	2013-02-26	2013-01-12 00:20:50	failed	US	220.0	

Drop Unnecessary rows

TODO: explain...

In [155]:
```
# Drop live projects
df = df.query('state != "live"')

# Drop project with ' N,0" ' country
df = df.query("country != 'N,0\"' ")
```

TODO: change it... When examine the dataset, we paid attention that there are few rows that their launchdate was wrong.

In [156]:
```
df['deadline'] = pd.to_datetime(df['deadline'])
df['launched'] = pd.to_datetime(df['launched']).dt.normalize()

df[['name','deadline','launched']].nsmallest(10, 'launched')
```

Out[156]:

	name	deadline	launched
2842	Salt of the Earth: A Dead Sea Movie (Canceled)	2010-09-15	1970-01-01
48147	1st Super-Size Painting - Social Network Owned...	2010-08-14	1970-01-01
75397	"ICHOR" (Canceled)	2010-05-21	1970-01-01
94579	Support Solo Theater! Help "Ungrateful Daughte...	2010-06-01	1970-01-01
247913	Help RIZ Make A Charity Album: 8 Songs, 8 Caus...	2010-05-04	1970-01-01
273779	Identity Communications Infographic (Canceled)	2010-04-10	1970-01-01
319002	Student Auditions Music 2015	2015-10-31	1970-01-01
169268	Grace Jones Does Not Give A F$#% T-Shirt (limi...	2009-05-31	2009-04-21
322000	CRYSTAL ANTLERS UNTITLED MOVIE	2009-07-20	2009-04-23
138572	drawing for dollars	2009-05-03	2009-04-24

Let's remove them.

In [157]:
```
df = df.query('launched > "2008-01-01"')
```

Impute missing values

We want to see how many missing values we have - complete them, or ignore this rows. We found we have only 4 rows with missing values so we remove them.

In [158]:
```
# get the number of missing data points per column
missing_values_count = df.isnull().sum()
# look at the # of missing points in the first ten columns
print(missing_values_count[0:23])
# how many total missing values do we have?
total_cells = np.product(df.shape)
total_missing = missing_values_count.sum()
print(total_missing)
```

```
name                4
category            0
main_category       0
deadline            0
launched            0
state               0
country             0
usd_pledged_real    0
usd_goal_real       0
dtype: int64
4
```

In [159]:
```
# remove all columns with at least one missing value
df = df.dropna()
```

Insert New Columns

First, we want to add a 'Duration' column

In [160]:
```
df['duration'] = pd.to_datetime(df['deadline'], )-pd.to_datetime(df['launched'
]).dt.normalize()
```

Convert Columns #TODO: happened before...

In [161]:
```
df['deadline'] = pd.to_datetime(df['deadline'])
df['launched'] = pd.to_datetime(df['launched']).dt.normalize()
df.head(5)
```

Out[161]:

	name	category	main_category	deadline	launched	state	country	usd_pledged_r
0	The Songs of Adelaide & Abullah	Poetry	Publishing	2015-10-09	2015-08-11	failed	GB	
1	Greeting From Earth: ZGAC Arts Capsule For ET	Narrative Film	Film & Video	2017-11-01	2017-09-02	failed	US	242
2	Where is Hank?	Narrative Film	Film & Video	2013-02-26	2013-01-12	failed	US	22
3	ToshiCapital Rekordz Needs Help to Complete Album	Music	Music	2012-04-16	2012-03-17	failed	US	
4	Community Film Project: The Art of Neighborhoo...	Film & Video	Film & Video	2015-08-29	2015-07-04	canceled	US	128

Integrate with outsource DataSets

TODO: explain about the dataset

countries translation

In [162]:
```
countries = pd.unique(df.country)
countries_list = list(countries)
print(countries_list)
countries_names = coco.convert(names=countries_list, to='name_short')
l = sorted(countries_names, key=lambda L: (L.lower(), L))
print(l)
```

```
['GB', 'US', 'CA', 'AU', 'NO', 'IT', 'DE', 'IE', 'MX', 'ES', 'SE', 'FR', 'N
L', 'NZ', 'CH', 'AT', 'DK', 'BE', 'HK', 'LU', 'SG', 'JP']
['Australia', 'Austria', 'Belgium', 'Canada', 'Denmark', 'France', 'Germany',
'Hong Kong', 'Ireland', 'Italy', 'Japan', 'Luxembourg', 'Mexico', 'Netherland
s', 'New Zealand', 'Norway', 'Singapore', 'Spain', 'Sweden', 'Switzerland',
'United Kingdom', 'United States']
```

TODO: explain add the dataset...

Warning: heavy function

In [163]:
```
countries_GDP = pd.read_csv("ks_countries_gdp.csv")
countries_GDP.columns
countries_GDP_dict = pd.Series(countries_GDP['GDP ($ per capita)'].values,coun
tries_GDP.Country).to_dict()
#print(countries_GDP_dict)

def label_GDP(row):
    l = []
    l.append(row['country'])
    country = coco.convert(names=l,to='name_short')
    return countries_GDP_dict[country+" "]


#df['country_GDP'] = df.apply(lambda row: label_GDP(row), axis=1)
df.head(5)
```

Out[163]:

	name	category	main_category	deadline	launched	state	country	usd_pledged_r
0	The Songs of Adelaide & Abullah	Poetry	Publishing	2015-10-09	2015-08-11	failed	GB	
1	Greeting From Earth: ZGAC Arts Capsule For ET	Narrative Film	Film & Video	2017-11-01	2017-09-02	failed	US	242
2	Where is Hank?	Narrative Film	Film & Video	2013-02-26	2013-01-12	failed	US	22
3	ToshiCapital Rekordz Needs Help to Complete Album	Music	Music	2012-04-16	2012-03-17	failed	US	
4	Community Film Project: The Art of Neighborhoo...	Film & Video	Film & Video	2015-08-29	2015-07-04	canceled	US	128

Specifying Data Types

In [164]:
```
#binary_variables = ['class']
categorical_variables = ['category', 'main_category', 'state', 'country']
numeric_variables = ['usd_pledged_real','usd_goal_real']
date_time_variables = ['deadline','launched','duration']
```

Type Conversion

In [165]:
```
#TODO: Specifying Data Types, Type Conversion, Categorical and Binary Variable
s to String
```

In [166]:
```
df[categorical_variables].dtypes
```

Out[166]:
```
category         object
main_category    object
state            object
country          object
dtype: object
```

In [167]:
```
df[numeric_variables].dtypes
```

Out[167]:
```
usd_pledged_real    float64
usd_goal_real       float64
dtype: object
```

In [168]:
```
df[date_time_variables].dtypes
```

Out[168]:
```
deadline     datetime64[ns]
launched     datetime64[ns]
duration    timedelta64[ns]
dtype: object
```

Remove Whitespaces

In [169]:
```
# Map(func,sequence) -  operates a function on a sequence
# Lambda var1,var2.. : Expression -  Creates an inline function
for variable in categorical_variables:
    df[variable] = df[variable].map(lambda x : x.strip())
```

Binarize State label

In [170]:
```
df['state'] = df['state'].map(lambda x : '1' if x == 'successful' else '0')
```

Data Statistics

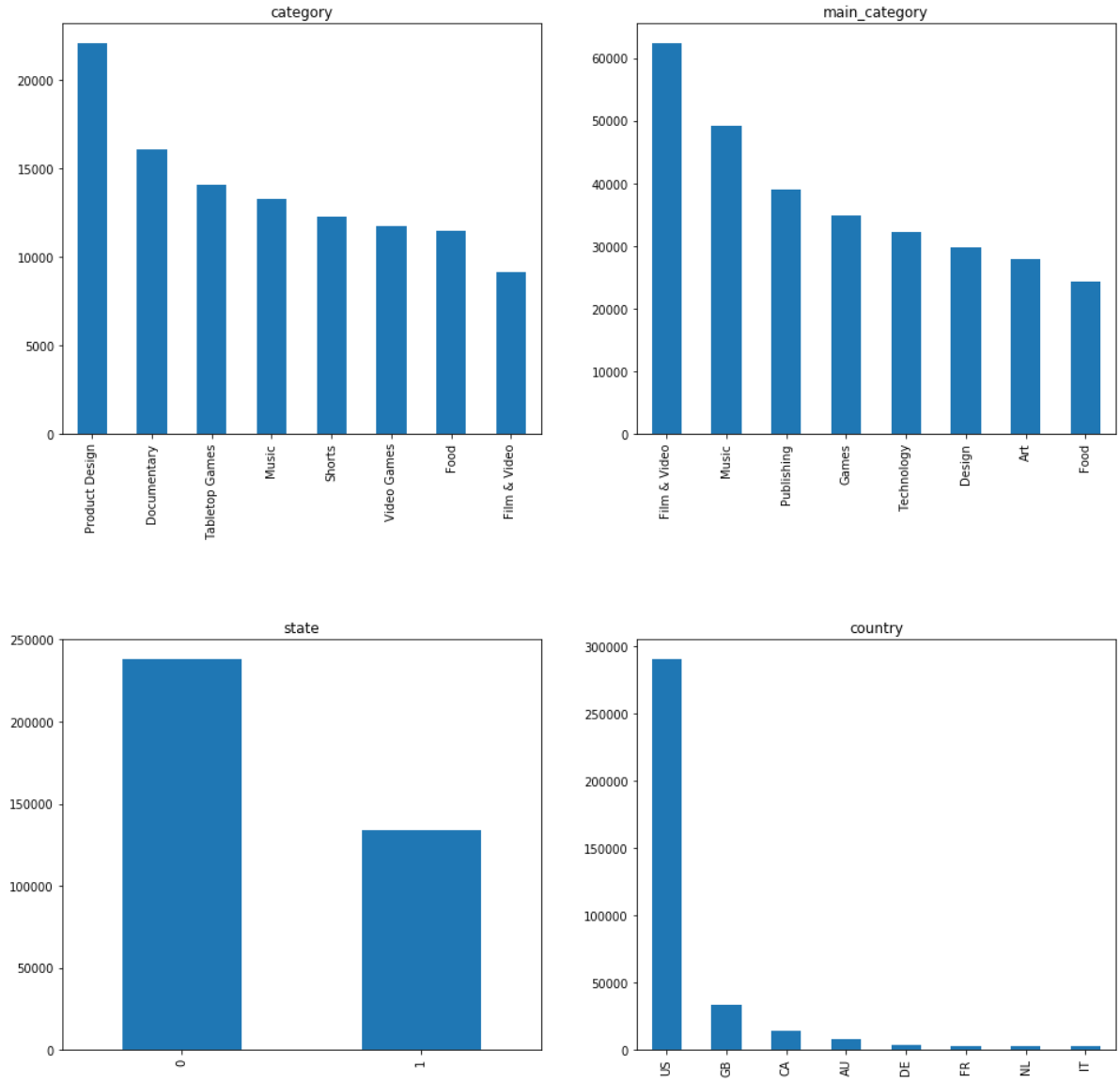
In [171]:
```
df.describe()

##TODO: need to remove the huge duration...
```

Out[171]:

	usd_pledged_real	usd_goal_real	duration
count	3.720550e+05	3.720550e+05	372055
mean	9.145509e+03	4.573831e+04	34 days 04:12:09.840480
std	9.162231e+04	1.151699e+06	12 days 19:02:33.006067
min	0.000000e+00	1.000000e-02	1 days 00:00:00
25%	3.125000e+01	2.000000e+03	30 days 00:00:00
50%	6.279700e+02	5.500000e+03	30 days 00:00:00
75%	4.066000e+03	1.600000e+04	37 days 00:00:00
max	2.033899e+07	1.663614e+08	92 days 00:00:00

In [172]:
```
fig, axes = plt.subplots(2,2,figsize=(16,16))
fig.subplots_adjust(hspace=0.5)
i=0
n=len(categorical_variables)
for variable in categorical_variables:
    r=int(i/2)
    c=i%2
    i+=1
    u=min(len(df[variable].unique()),8)
    df[variable].value_counts()[:u].plot(kind='bar',ax=axes[r,c],title=variabl
e)
```

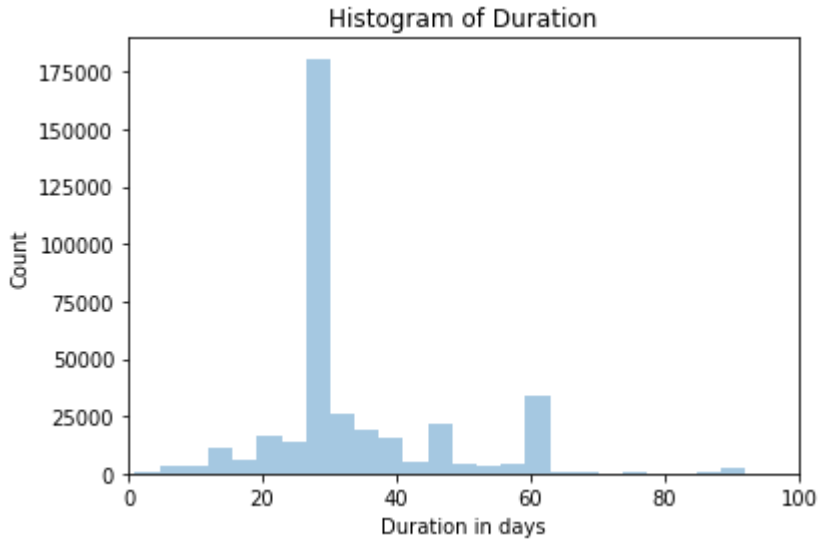


Class Distribution

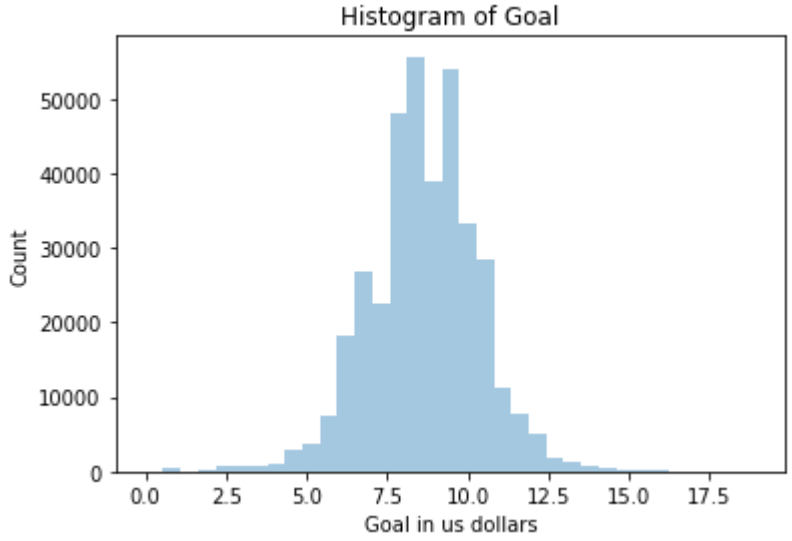
In [173]:
```
print (df['state'].value_counts())
print (df['state'].value_counts(normalize='True'))
```

```
0    238204
1    133851
Name: state, dtype: int64
0    0.640239
1    0.359761
Name: state, dtype: float64
```

In [174]:
```
%matplotlib inline
sns.distplot(df['duration'].dt.days, bins = 25, kde = False).set(xlim=(0, 100
))
plt.title('Histogram of Duration')
plt.xlabel('Duration in days')
plt.ylabel('Count')
plt.show()
```



In [175]:
```
%matplotlib inline
sns.distplot(np.log1p(df['usd_goal_real']), bins = 35, kde = False)
plt.title('Histogram of Goal')
plt.xlabel('Goal in us dollars')
plt.ylabel('Count')
plt.show()
```



Analyzing 'name' column - DRAFT!!!

We noticed more then 20k rows contains '(Canceled)' in their name. Probably was changed by the owners after cancelling the project and opening a new one. TODO: explain...

In [176]:
```
freq = pd.Series(' '.join(df['name']).split()).value_counts()[:10]
freq
```

Out[176]:
```
The           61774
-             53415
the           33698
of            32988
A             28526
and           23428
(Canceled)    23093
a             20532
for           19618
&             17578
dtype: int64
```

Let's remove this "clue".

In [177]:
```
df['name']= df['name'].str.replace("\(Canceled\)","")
freq = pd.Series(' '.join(df['name']).split()).value_counts()[:10]
freq
```

Out[177]:
```
The    61774
-      53415
the    33698
of     32988
A      28526
and    23428
a      20532
for    19618
&      17578
to     16640
dtype: int64
```

In [178]:
```
sub_df = df
sub_df = sub_df.drop('category', axis = 1)
sub_df = sub_df.drop('main_category', axis = 1)
sub_df = sub_df.drop('deadline', axis = 1)
sub_df = sub_df.drop('launched', axis = 1)
sub_df = sub_df.drop('state', axis = 1)
sub_df = sub_df.drop('usd_pledged_real', axis = 1)
sub_df = sub_df.drop('usd_goal_real', axis = 1)
sub_df = sub_df.drop('duration', axis = 1)
sub_df = sub_df.drop('country', axis = 1)
```

In [179]:
```
sub_df.sample(10)
sub_df.columns
```

Out[179]:
```
Index(['name'], dtype='object')
```

In [180]:
```
sub_df['char_count'] = sub_df['name'].str.len() ## this also includes spaces
#sub_df[['name','char_count']].head()
```

In [182]:
```
def avg_word(sentence):
  words = sentence.split()
  if (len(words)==0):
        return 0
  return (sum(len(word) for word in words)/len(words))

sub_df['avg_word'] = sub_df['name'].apply(lambda x: avg_word(x))
sub_df[['name','char_count','avg_word']].head()
```

Out[182]:

	name	char_count	avg_word
0	The Songs of Adelaide & Abullah	31	4.333333
1	Greeting From Earth: ZGAC Arts Capsule For ET	45	4.750000
2	Where is Hank?	14	4.000000
3	ToshiCapital Rekordz Needs Help to Complete Album	49	6.142857
4	Community Film Project: The Art of Neighborhoo...	58	6.375000

In [183]:
```
#from nltk.corpus import stopwords
stop = stopwords.words('english')

sub_df['stopwords'] = sub_df['name'].apply(lambda x: len([x for x in x.split()
if x in stop]))
sub_df[['name','stopwords']].head()
```

Out[183]:

	name	stopwords
0	The Songs of Adelaide & Abullah	1
1	Greeting From Earth: ZGAC Arts Capsule For ET	0
2	Where is Hank?	1
3	ToshiCapital Rekordz Needs Help to Complete Album	1
4	Community Film Project: The Art of Neighborhoo...	1

In [184]:
```
sub_df.head()
```

Out[184]:

	name	char_count	avg_word	stopwords
0	The Songs of Adelaide & Abullah	31	4.333333	1
1	Greeting From Earth: ZGAC Arts Capsule For ET	45	4.750000	0
2	Where is Hank?	14	4.000000	1
3	ToshiCapital Rekordz Needs Help to Complete Album	49	6.142857	1
4	Community Film Project: The Art of Neighborhoo...	58	6.375000	1

In [185]:
```
sub_df['name'] = sub_df['name'].apply(lambda x: " ".join(x.lower() for x in x.
split()))
```

In [186]:
```
sub_df['name'] = sub_df['name'].str.replace('[^\w\s]','')
```

In [187]:
```
stop = stopwords.words('english')
sub_df['name'] = sub_df['name'].apply(lambda x: " ".join(x for x in x.split()
if x not in stop))
```

In [188]:
```
current_df = df
current_df = current_df.query('state != "0"')
#df = df.query('state != "live"')
freq = pd.Series(' '.join(current_df['name']).split()).value_counts()[:10]
```