DS_Hw05

October 21, 2019

[8]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from scipy import stats

import plotly.tools as tls
import plotly
import plotly.offline as py
from plotly.offline import init_notebook_mode, iplot, plot
import plotly.graph_objs as go
init_notebook_mode(connected=True)
```

0.0.1 I will continue to analyze the dataset last week,whcih contains all the crowd funding projects on kickstarter since 2018.

0.0.2 In the last homework, I've already made a general analysis. I discusssed the the success rate distribution and the most successful projects categories.

0.1 ### In this homework, I'll focus on the more detailed analysis about other variable. And hopefully, I can find out the reason why they are more easy to succeed in fundraising.

Firstly, we just have some basic understanding about the dataset

[9]:
```
df_kick=pd.read_csv("./ks-projects.csv")
df_kick=df_kick.sample(10000,random_state=42).reset_index().drop('index',axis=1)

def resumetable(df):
    print(f"Dataset Shape: {df.shape}")
    summary = pd.DataFrame(df.dtypes,columns=['dtypes'])
    summary = summary.reset_index()
    summary['Name'] = summary['index']
    summary = summary[['Name','dtypes']]
    summary['Missing'] = df.isnull().sum().values
    summary['Uniques'] = df.nunique().values
    summary['First Value'] = df.loc[0].values
```

```
    summary['Second Value'] = df.loc[1].values
    summary['Third Value'] = df.loc[2].values

    for name in summary['Name'].value_counts().index:
        summary.loc[summary['Name'] == name, 'Entropy'] = round(stats.
↪entropy(df[name].value_counts(normalize=True), base=2),2)

    return summary

resumetable(df_kick)
```

```
Dataset Shape: (10000, 15)
```

[9]:

	Name	dtypes	Missing	Uniques	First Value	Second Value	Third Value
0	ID	int64	0	10000	1576537356	675907016	361890770
1	name	object	0	9999	Deko	Westside BJ's: The Gluten-Free, Organic Food T…	Crepe Diem Food Truck
2	category	object	0	158	Hardware	Food Trucks	Food
3	main_category	object	0	15	Technology	Food	Food
4	currency	object	0	14	USD	USD	USD
5	deadline	object	0	2617	2015-10-24	2015-02-01	2014-01-17
6	goal	float64	0	779	70000	250000	30000
7	launched	object	0	10000	2015-09-24 03:12:52	2015-01-02 20:55:07	2013-12-18 03:26:04
8	pledged	float64	0	4601	1888	1466	5723
9	state	object	0	6	failed	failed	failed
10	backers	int64	0	718	41	9	90
11	country	object	0	23	US	US	US
12	usd pledged	float64	105	5165	1888	1466	5723
13	usd_pledged_real	float64	0	5660	1888	1466	5723
14	usd_goal_real	float64	0	2769	70000	250000	30000

```
    Entropy
0     13.29
1     13.29
2      6.24
3      3.57
4      1.27
5     11.06
6      6.50
7     13.29
8     10.16
9      1.52
10     6.52
11     1.47
12    10.16
13    10.67
14     8.19
```

[6]:
```
df_kick.head()
```

[6]:

	ID	name	category	main_category	currency	deadline	goal	launched	pledged	state	backers	country	usd pledged	usd_pledged_real	usd_goal_real
0	1576537356	Deko	Hardware	Technology	USD	2015-10-24	70000.0	2015-09-24 03:12:52	1888.0	failed	41	US	1888.00	1888.00	70000.00
1	675907016	Westside BJ's: The Gluten-Free, Organic Food T…	Food Trucks	Food	USD	2015-02-01	250000.0	2015-01-02 20:55:07	1466.0	failed	9	US	1466.00	1466.00	250000.00
2	361890770	Crepe Diem Food Truck	Food	Food	USD	2014-01-17	30000.0	2013-12-18 03:26:04	5723.0	failed	90	US	5723.00	5723.00	30000.00
3	1225211551	Season's End - A horror novel ready for public…	Fiction	Publishing	GBP	2016-11-23	5500.0	2016-10-24 15:44:36	25.0	failed	2	GB	23.24	31.09	6839.01
4	2122944289	Colorado City Arizona Restaurant (Canceled)	Restaurants	Food	USD	2015-05-13	30000.0	2015-03-14 05:18:34	100.0	canceled	3	US	100.00	100.00	30000.00

Then we list out some valuable statistic information about dataset

[5]:
```
print("Min Goal and Pledged values")
print(df_kick[["goal", "pledged"]].min())
print("")
print("Mean Goal and Pledged values")
```

```
print(round(df_kick[["goal", "pledged"]].mean(),2))
print("")
print("Median Goal and Pledged values")
print(df_kick[["goal", "pledged"]].median())
print("")
print("Max Goal and Pledged values")
print("goal       100000000.0") #If i put the both together give me back log␣
 ↪values,
print("pledged     20338986.27") # so i decide to just show this values
print("dtype: float64")
print("")
print("Std Goal and Pledged values")
print(round(df_kick[["goal", "pledged"]].std(),2))
```

```
Min Goal and Pledged values
goal       1.0
pledged    0.0
dtype: float64

Mean Goal and Pledged values
goal       48037.94
pledged    10061.02
dtype: float64

Median Goal and Pledged values
goal       5400.0
pledged     656.0
dtype: float64

Max Goal and Pledged values
goal       100000000.0
pledged     20338986.27
dtype: float64

Std Goal and Pledged values
goal       1315264.22
pledged     109205.70
dtype: float64
```

From last homework we found out categories that has most number of successful projects are ”Film & video” , ”Music” and ”Game”

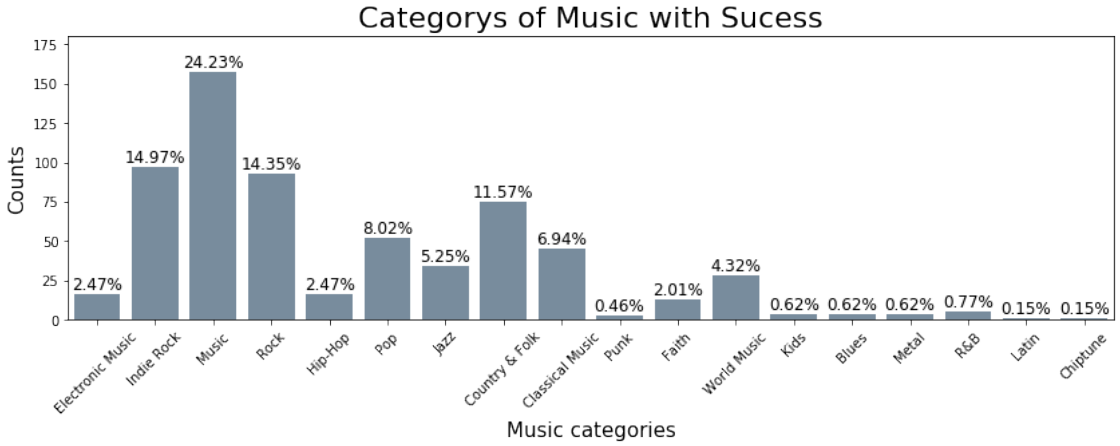
On the other hand,mcategories that has most number of failed projects are ”Film & video” , ”Publishin” and ”MUsic”. Which maybe confusing,but infact the numer the ”Film & vidoe” and ”Music” just outnumber others greatly,so they both have the most successful and most failed projects, because they simply have too many projects.

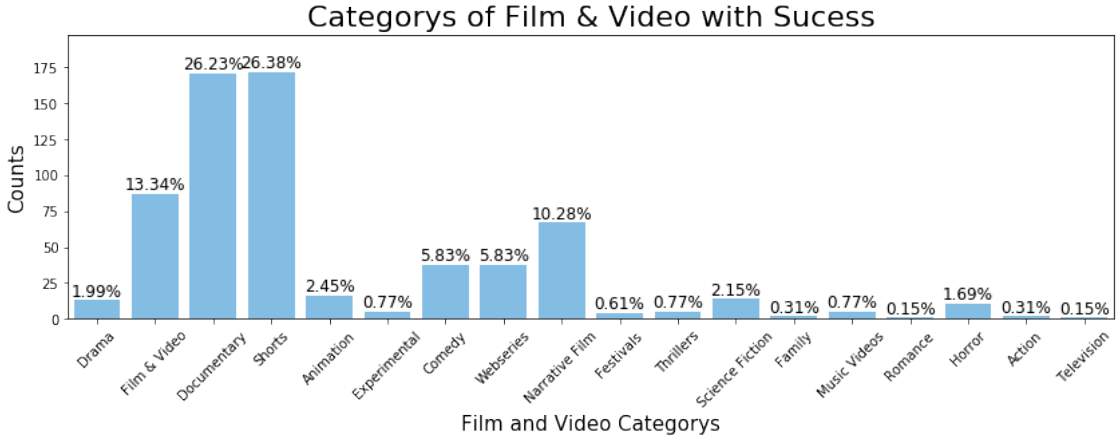
However, under the main category, each project still has its category that indicates its project style. So further I will analyze the categories of top 3 successful projets and top 3 failed projets.

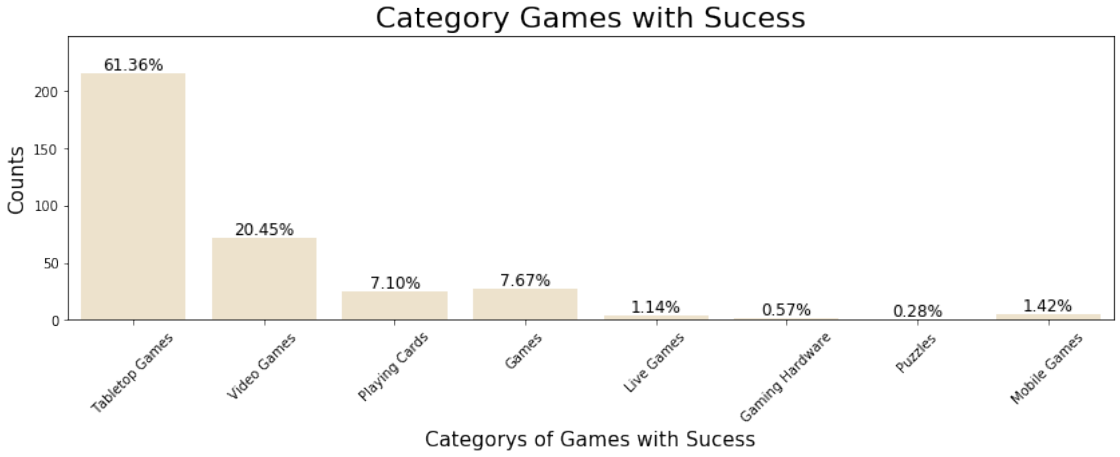
[11]:
```
# Also count suspended and canceled projects as failed.
# df_kick.loc[df_kick.state.isin(['suspended', 'canceled']), 'state'] = 'failed'
df_kick = df_kick.loc[df_kick['state'].isin(['failed','successful'])]
```

[17]:
```
sucess_music = df_kick[(df_kick['main_category'] == 'Music') &
                       (df_kick['state'] == 'successful')]
sucess_filme_video = df_kick[(df_kick['main_category'] == 'Film & Video') &
                       (df_kick['state'] == 'successful')]
sucess_games = df_kick[(df_kick['main_category'] == 'Games') &
                       (df_kick['state'] == 'successful')]

plt.figure(figsize=(14,16))
total = len(df_kick)
plt.subplot(311)
ax0 = sns.countplot(x='category', data=sucess_music,
                    color="#728ca3")
ax0.set_xticklabels(ax0.get_xticklabels(),rotation=45)
ax0.set_title("Categorys of Music with Sucess", fontsize=22)
ax0.set_xlabel("Music categories", fontsize=15)
ax0.set_ylabel("Counts", fontsize=15)
sizes=[]
for p in ax0.patches:
    height = p.get_height()
    sizes.append(height)
    ax0.text(p.get_x()+p.get_width()/2.,
            height + 3,
            '{:1.2f}%'.format(height/len(sucess_music)*100),
            ha="center", fontsize=12)
ax0.set_ylim(0, max(sizes) * 1.15)


plt.subplot(312)
ax1 = sns.countplot(x='category', data=sucess_filme_video,
                    color="#73C0F4")
ax1.set_xticklabels(ax1.get_xticklabels(),rotation=45)
ax1.set_title("Categorys of Film & Video with Sucess", fontsize=22)
ax1.set_xlabel("Film and Video Categorys", fontsize=15)
ax1.set_ylabel("Counts", fontsize=15)
sizes=[]
for p in ax1.patches:
    height = p.get_height()
    sizes.append(height)
    ax1.text(p.get_x()+p.get_width()/2.,
```

```
            height + 3,
            '{:1.2f}%'.format(height/len(sucess_filme_video)*100),
            ha="center", fontsize=12)
ax1.set_ylim(0, max(sizes) * 1.15)

plt.subplot(313)
ax2 = sns.countplot(x='category', data=sucess_games,
                    color="#f3e4c6")
ax2.set_xticklabels(ax2.get_xticklabels(),rotation=45)
ax2.set_title("Category Games with Sucess", fontsize=22)
ax2.set_xlabel("Categorys of Games with Sucess", fontsize=15)
ax2.set_ylabel("Counts", fontsize=15)
sizes=[]
for p in ax2.patches:
    height = p.get_height()
    sizes.append(height)
    ax2.text(p.get_x()+p.get_width()/2.,
            height + 3,
            '{:1.2f}%'.format(height/len(sucess_games)*100),
            ha="center", fontsize=12)
ax2.set_ylim(0, max(sizes) * 1.15)

plt.subplots_adjust(wspace = 0.3, hspace = 0.6,top = 0.9)

plt.show()
```


Categorys of Music with Sucess
Counts
Music categories
Electronic Music
Indie Rock
Music
Rock
Hip-Hop
Pop
Jazz
Country & Folk
Classical Music
Punk
Faith
World Music
Kids
Blues
Metal
R&B
Latin
Chiptune
2.47%
14.97%
24.23%
14.35%
2.47%
8.02%
5.25%
11.57%
6.94%
0.46%
2.01%
4.32%
0.62%
0.62%
0.62%
0.77%
0.15%
0.15%


Categorys of Film & Video with Sucess
Counts
Film and Video Categorys
Drama
Film & Video
Documentary
Shorts
Animation
Experimental
Comedy
Webseries
Narrative Film
Festivals
Thrillers
Science Fiction
Family
Music Videos
Romance
Horror
Action
Television
1.99%
13.34%
26.23%
26.38%
2.45%
0.77%
5.83%
5.83%
10.28%
0.61%
0.77%
2.15%
0.31%
0.77%
0.15%
1.69%
0.31%
0.15%


Category Games with Sucess
Counts
Categorys of Games with Sucess
Tabletop Games
Video Games
Playing Cards
Games
Live Games
Gaming Hardware
Puzzles
Mobile Games
61.36%
20.45%
7.10%
7.67%
1.14%
0.57%
0.28%
1.42%

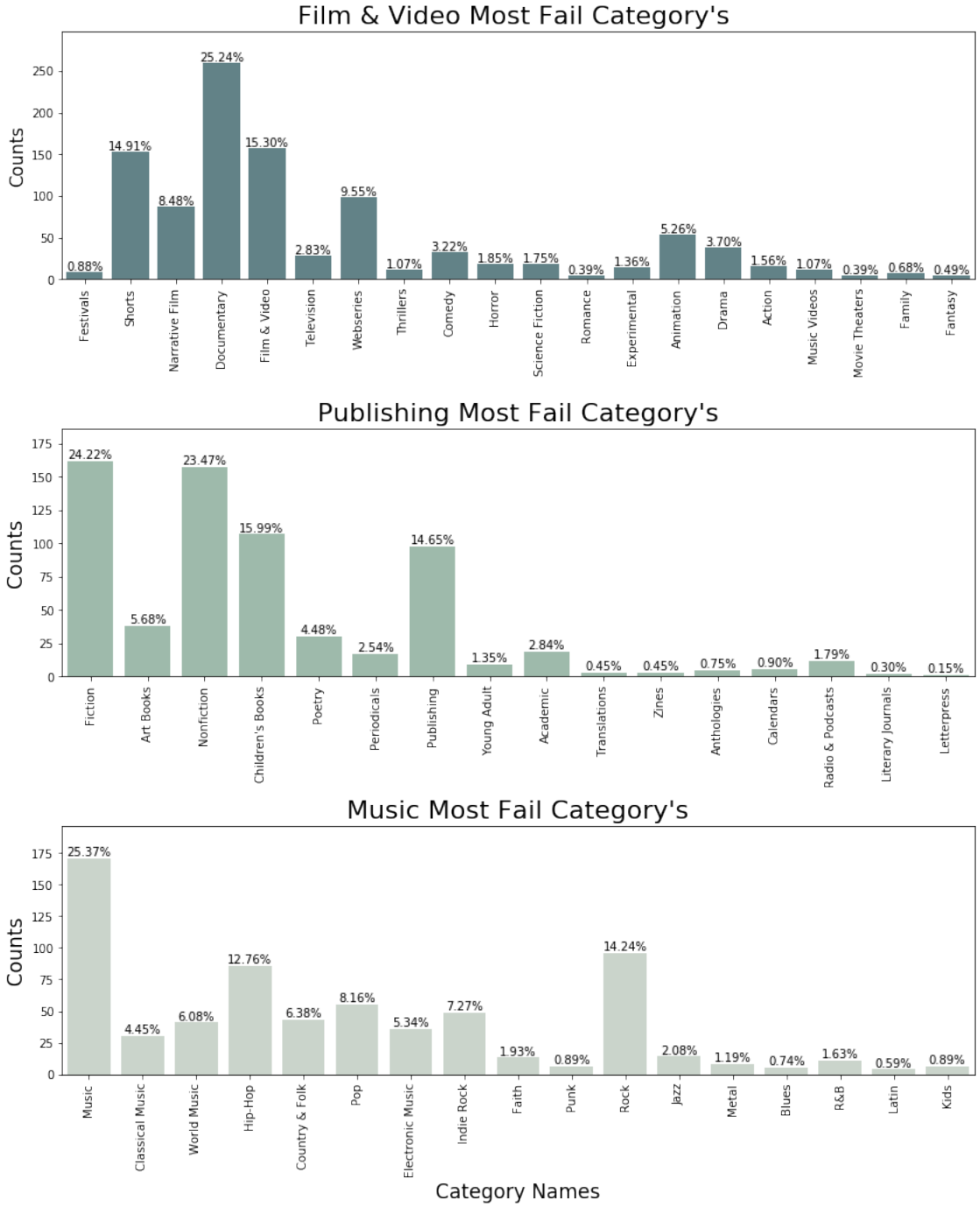
0.1.1 The most successful categories in music are : Indie Rock , Rock ,Country & Folk

0.1.2 The most successful categories in Film are : Documentary, Shorts, Narrative Film.

0.1.3 The most successful categories Games is basically :Tabletop Games.

[13]:
```
failed_film = df_kick[(df_kick['main_category'] == 'Film & Video') &
                      (df_kick['state'] == 'failed')]
failed_publishing = df_kick[(df_kick['main_category'] == 'Publishing') &
                      (df_kick['state'] == 'failed')]
failed_music = df_kick[(df_kick['main_category'] == 'Music') &
                      (df_kick['state'] == 'failed')]

plt.figure(figsize=(14,16))

plt.subplot(3,1,1)
ax0 = sns.countplot(x='category', data=failed_film, color="#5c868d")
ax0.set_xticklabels(ax0.get_xticklabels(),rotation=90)
ax0.set_title("Film & Video Most Fail Category's ", fontsize=22)
ax0.set_xlabel("", fontsize=15)
ax0.set_ylabel("Counts", fontsize=15)
sizes=[]
for p in ax0.patches:
    height = p.get_height()
    sizes.append(height)
    ax0.text(p.get_x()+p.get_width()/2.,
            height + 2,
            '{:1.2f}%'.format(height/len(failed_film)*100),
            ha="center", fontsize=10)
ax0.set_ylim(0, max(sizes) * 1.15)

plt.subplot(3,1,2)
ax1 = sns.countplot(x='category', data=failed_publishing, color="#99bfaa")
ax1.set_xticklabels(ax1.get_xticklabels(),rotation=90)
ax1.set_title("Publishing Most Fail Category's", fontsize=22)
ax1.set_xlabel("", fontsize=17)
ax1.set_ylabel("Counts", fontsize=17)
sizes=[]
for p in ax1.patches:
    height = p.get_height()
    sizes.append(height)
    ax1.text(p.get_x()+p.get_width()/2.,
            height + 2,
            '{:1.2f}%'.format(height/len(failed_publishing)*100),
            ha="center", fontsize=10)
```

```
ax1.set_ylim(0, max(sizes) * 1.15)

plt.subplot(3,1,3)
ax2 = sns.countplot(x='category', data=failed_music,
                    color="#c8d6ca")
ax2.set_xticklabels(ax2.get_xticklabels(),rotation=90)
ax2.set_title("Music Most Fail Category's", fontsize=22)
ax2.set_xlabel("Category Names", fontsize=17)
ax2.set_ylabel("Counts", fontsize=17)
sizes=[]
for p in ax2.patches:
    height = p.get_height()
    sizes.append(height)
    ax2.text(p.get_x()+p.get_width()/2.,
            height + 2,
            '{:1.2f}%'.format(height/len(failed_music)*100),
            ha="center", fontsize=10)
ax2.set_ylim(0, max(sizes) * 1.15)

plt.subplots_adjust(wspace = 0.5, hspace = 0.6,top = 0.9)

plt.show()
```


Film & Video Most Fail Category's
Counts
0.88%
14.91%
8.48%
25.24%
15.30%
2.83%
9.55%
1.07%
3.22%
1.85%
1.75%
0.39%
1.36%
5.26%
3.70%
1.56%
1.07%
0.39%
0.68%
0.49%
Festivals
Shorts
Narrative Film
Documentary
Film & Video
Television
Webseries
Thrillers
Comedy
Horror
Science Fiction
Romance
Experimental
Animation
Drama
Action
Music Videos
Movie Theaters
Family
Fantasy
Publishing Most Fail Category's
Counts
24.22%
5.68%
23.47%
15.99%
4.48%
2.54%
14.65%
1.35%
2.84%
0.45%
0.45%
0.75%
0.90%
1.79%
0.30%
0.15%
Fiction
Art Books
Nonfiction
Children's Books
Poetry
Periodicals
Publishing
Young Adult
Academic
Translations
Zines
Anthologies
Calendars
Radio & Podcasts
Literary Journals
Letterpress
Music Most Fail Category's
Counts
25.37%
4.45%
6.08%
12.76%
6.38%
8.16%
5.34%
7.27%
1.93%
0.89%
14.24%
2.08%
1.19%
0.74%
1.63%
0.59%
0.89%
Music
Classical Music
World Music
Hip-Hop
Country & Folk
Pop
Electronic Music
Indie Rock
Faith
Punk
Rock
Jazz
Metal
Blues
R&B
Latin
Kids
Category Names

0.1.4 The most failed categories in Film are : Documentary, Shorts.

0.1.5 The most failed categories in music are : Rock , Hipop

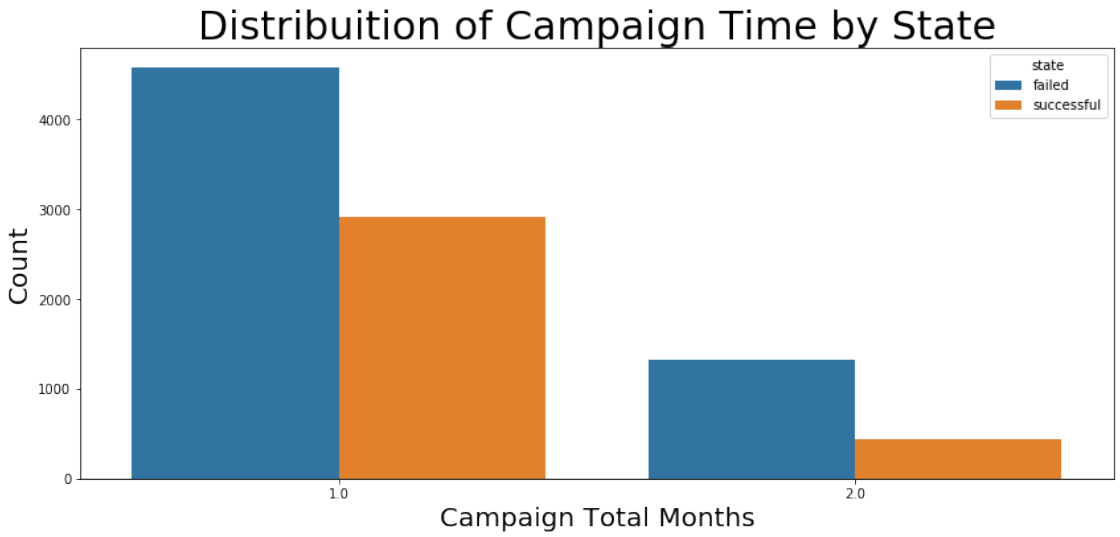
0.1.6 The most failed categories publishing are : Fiction, Nonfiction, Children's books

Though we can get a rough picture, about which categories are more likely to succeed. But due to the overwhelming number of " "film&video" ,"Music". So we still cannot be sure that categories is the decisive factor. Next, I will look into time and other feature.

[15]:
```
df_kick['launched'] = pd.to_datetime(df_kick['launched'])
df_kick['launched_date'] = df_kick['launched'].dt.date

df_kick['deadline'] = pd.to_datetime(df_kick['deadline'])
df_kick['deadline_date'] = df_kick['deadline'].dt.date
```

[16]:
```
#Creating a new columns with Campaign total months
df_kick['time_campaign_d'] = (df_kick['deadline_date'] -␣
 ↪df_kick['launched_date']).dt.days
df_kick['time_campaign_d'] = df_kick['time_campaign_d'].astype(int)

#removing outlier value
df_kick = df_kick[df_kick['time_campaign_d'] != 14867]

df_kick['time_campaign'] = round(df_kick['time_campaign_d'] / 30 )
```

[17]:
```
plt.figure(figsize = (14,6))

ax = sns.countplot(x='time_campaign', hue='state',
                   data=df_kick[(df_kick['time_campaign'] > .7) &
                                (df_kick['time_campaign'] < 2.1)])
ax.set_title("Distribuition of Campaign Time by State", fontsize=30)
ax.set_xlabel("Campaign Total Months", fontsize=20)
ax.set_ylabel("Count", fontsize=20)
plt.show()
```



0.1.7 The most part of projects have 1 month of campaign. We can see that the ratio of successful one month campaigns is better than projects with 1.5 or 2 months of campaign

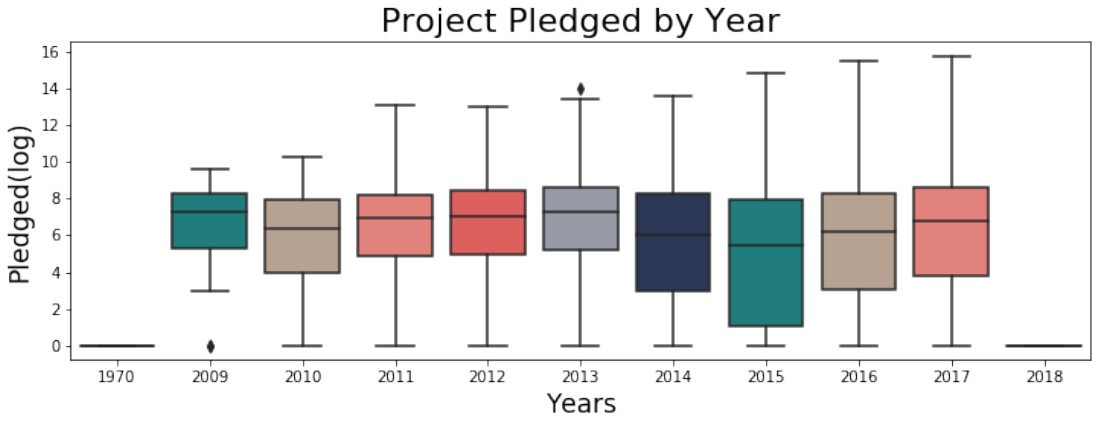
---

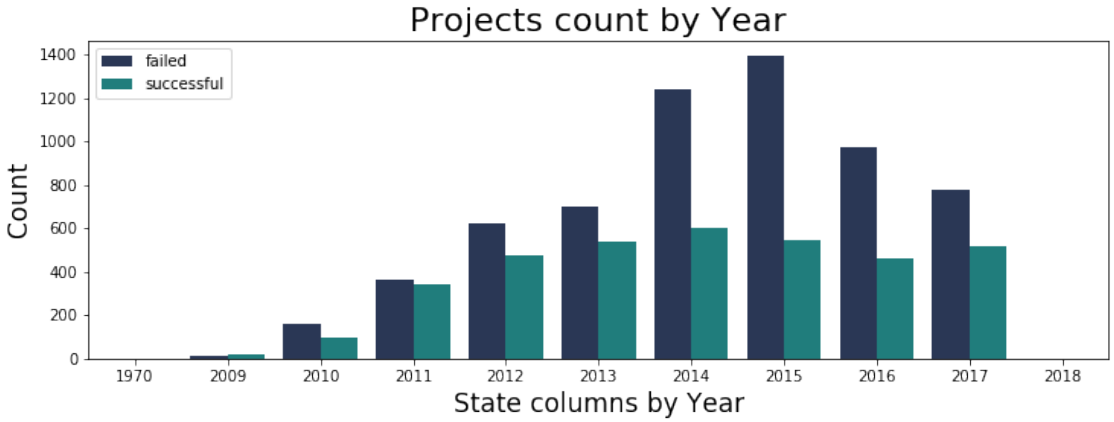
0.1.8 Launched year distribution

[18]:
```
df_kick['laun_month_year'] = df_kick.launched.dt.month
df_kick['laun_year'] = df_kick.launched.dt.year
```

[42]:
```
year = df_kick.laun_year.value_counts()
month = df_kick.laun_month_year.value_counts()

df_kick['pledged_log'] = np.log(df_kick['usd_pledged_real'] + 1)
year=year[year[:]>30]
# print(year)

flatui = ["#23345c", "#118c8b", "#bca18d", "#f2746b", "#f14d49", "#9499a6"]
fig, ax = plt.subplots(2,1, figsize=(12,10))

plt.subplot(211)
ax1 = sns.boxplot(x="laun_year", y='pledged_log',
                  data=df_kick, palette=sns.color_palette(flatui))
ax1.set_title("Project Pledged by Year", fontsize=22)
ax1.set_xlabel("Years", fontsize=17)
ax1.set_ylabel("Pledged(log)", fontsize=17)
```

```
plt.subplot(212)
ax2 = sns.countplot(x="laun_year", hue='state',
                    data=df_kick ,palette=sns.color_palette(flatui))
ax2.set_title("Projects count by Year", fontsize=22)
ax2.set_xlabel("State columns by Year", fontsize=17)
ax2.set_ylabel("Count", fontsize=17)
ax2.legend(loc='upper left')

plt.subplots_adjust(hspace = 0.6)

plt.show()
```

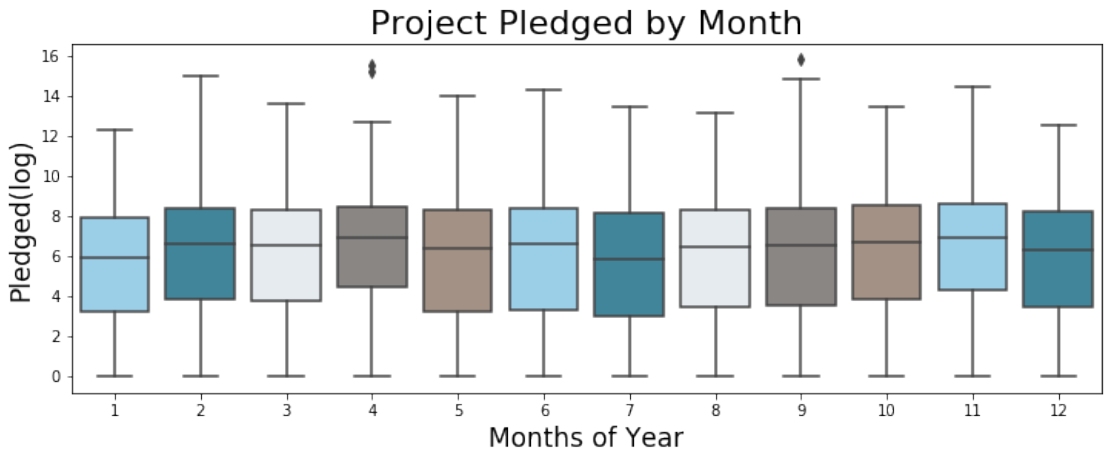


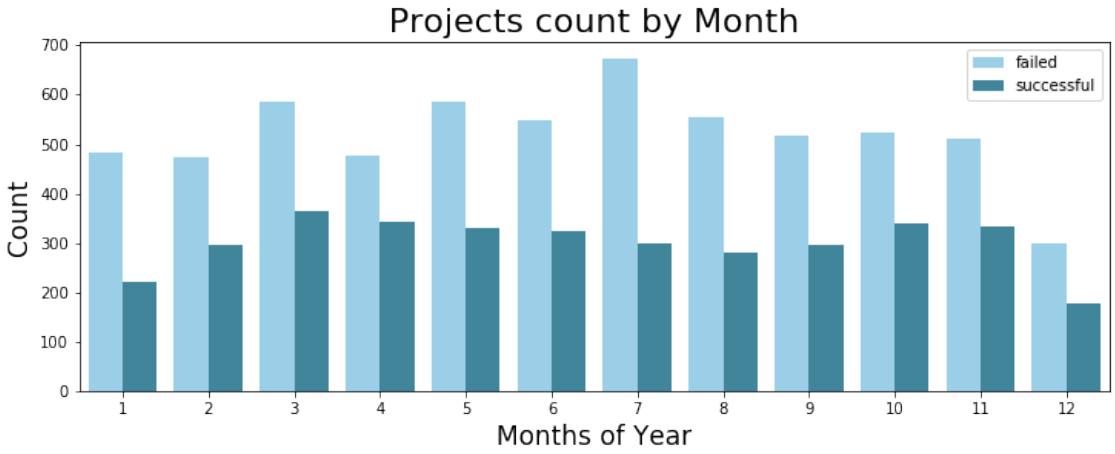


We can find out that the kickstarter grew rapdily since 2011. Eversince the successful prjects remain approximately 500 to 600. However we can see that the failed projects skyrocketed.Especially in 2014,2015.

0.1.9 Launched month distribution

[49]:
```
fig, ax = plt.subplots(2,1, figsize=(12,10))

plt.subplot(211)

flatui = ["#8ed3f4","#328daa","#e4ebf2", "#8a8683", "#a7907f"]

ax1 = sns.boxplot(x="laun_month_year", y='pledged_log',
                  data=df_kick,  palette=sns.color_palette(flatui))
ax1.set_title("Project Pledged by Month", fontsize=22)
ax1.set_xlabel("Months of Year", fontsize=17)
ax1.set_ylabel("Pledged(log)", fontsize=17)

plt.subplot(212)
ax2 = sns.countplot(x="laun_month_year", hue='state',
                    data=df_kick,palette=sns.color_palette(flatui))
ax2.set_title("Projects count by Month", fontsize=22)
ax2.set_xlabel("Months of Year", fontsize=17)
ax2.set_ylabel("Count", fontsize=17)
ax2.legend(loc='upper right')

plt.subplots_adjust(hspace = 0.4)

plt.show()
```



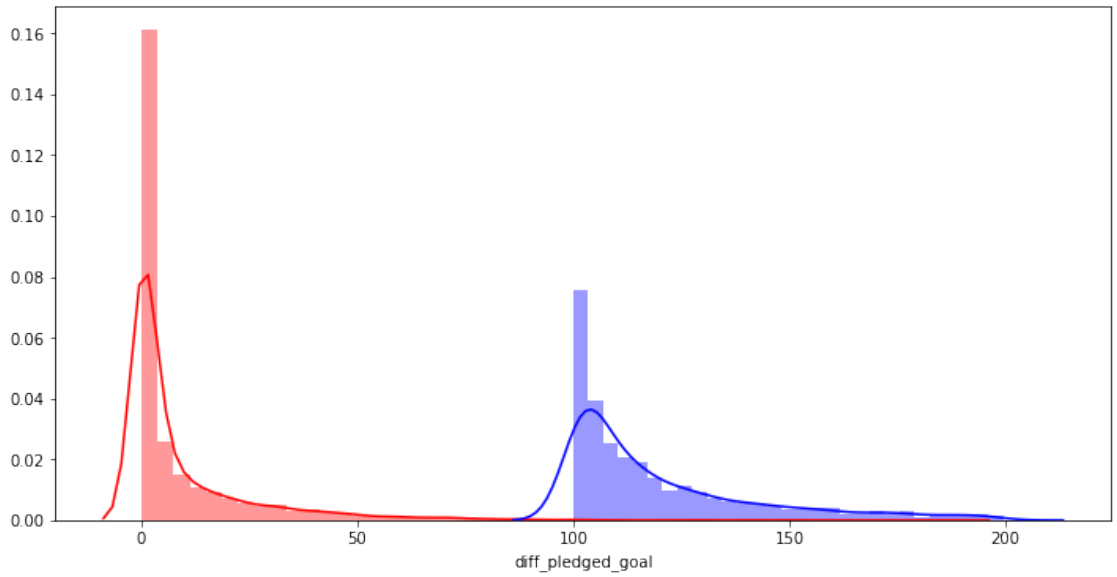


We can note that all months are very similar.

0.1.10 Then we take a look at the the distribuition of Diff Pledged sucessful and failed Projects

[52]:
```
df_kick['diff_pledged_goal'] = round((df_kick['usd_pledged_real'] /
 ↪df_kick['usd_goal_real']) * 100, 2)
df_kick['diff_pledged_goal'] = df_kick['diff_pledged_goal'].astype(float)

plt.figure(figsize = (12,6))
sns.distplot(df_kick[(df_kick['diff_pledged_goal'] < 200) &
                     (df_kick['state'] == 'failed')]['diff_pledged_goal'],␣
 ↪color='r')
sns.distplot(df_kick[(df_kick['diff_pledged_goal'] < 200) &
```

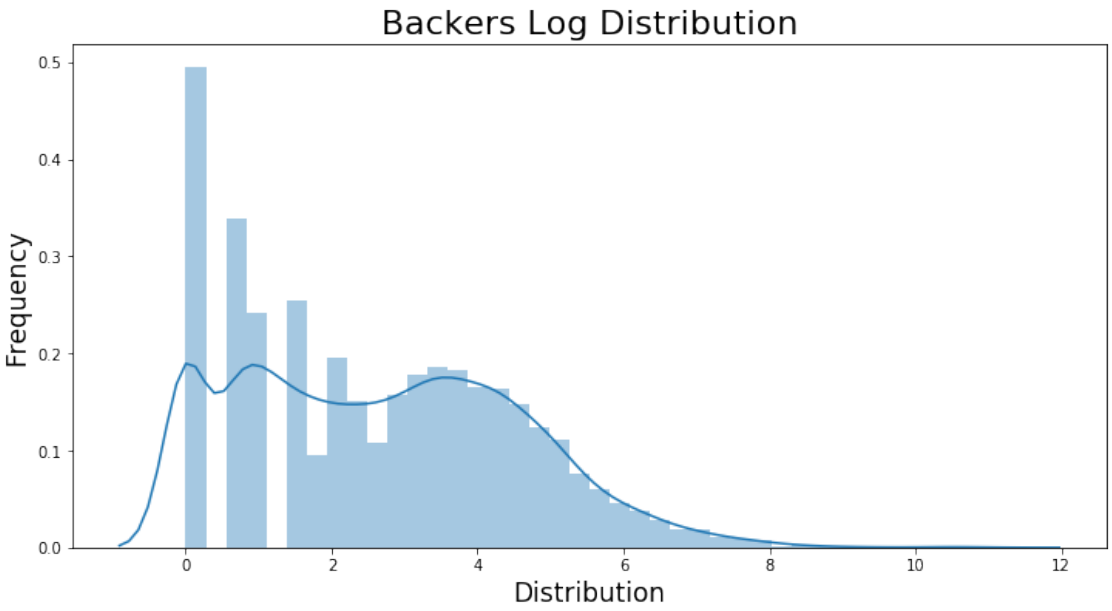
```
                    (df_kick['state'] ==␣
 ↪'successful')]['diff_pledged_goal'],color='b')
plt.show()
```



0.2 ## We can easily find that the successful projects have higher number with regard to pledged goal.

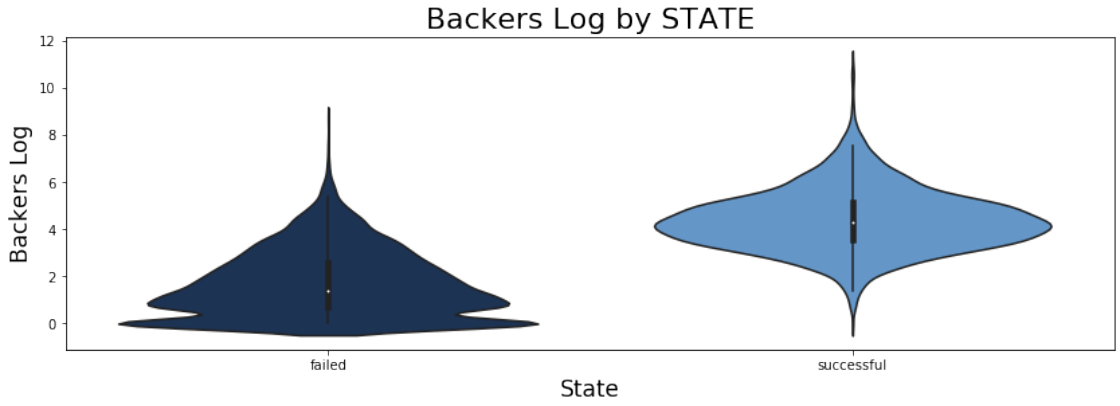
0.3 Distribution of backers

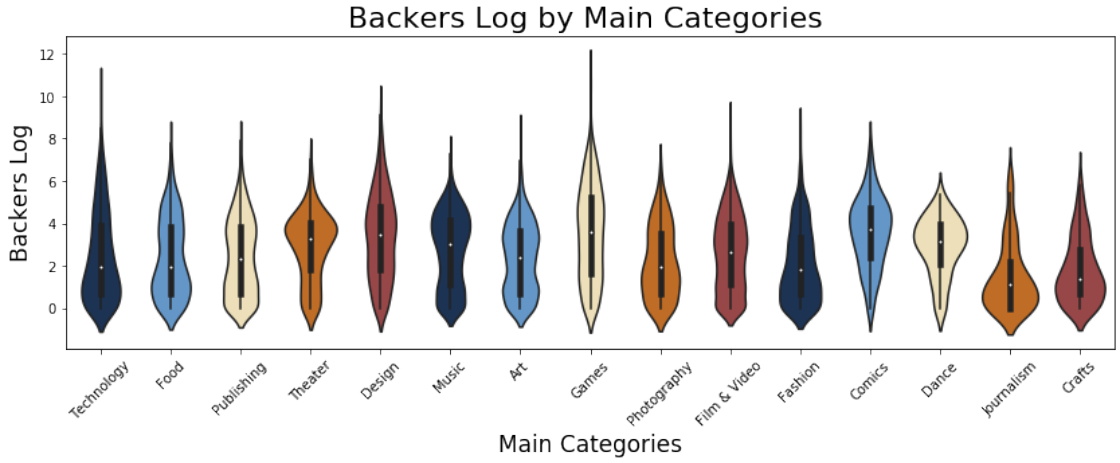
[53]:
```
df_kick['backers_log'] = np.log(df_kick['backers'] + 1 )
#The + 1 is to normalize the zero or negative values

plt.figure(figsize = (12,6))
g = sns.distplot(df_kick['backers_log'])
g.set_xlabel("Distribution", fontsize=17)
g.set_ylabel("Frequency", fontsize=17)
g.set_title("Backers Log Distribution", fontsize=22)

plt.show()
```



0.4 Backers by the state

[60]:
```
plt.figure(figsize = (14,12))

plt.subplots_adjust(hspace = 0.50, top = 0.8)

flatui=['#14325c','#5398d9','#f4e3b1','#d96b0c','#a53a3b']
plt.subplot(211)

g = sns.violinplot(x='state',y='backers_log', data=df_kick,
                   palette=sns.color_palette(flatui))
g.set_title("Backers Log by STATE", fontsize=22)
g.set_xlabel("State", fontsize=17)
g.set_ylabel("Backers Log", fontsize=17)

plt.subplot(212)
g1 = sns.violinplot(x='main_category',y='backers_log',
                    palette=sns.color_palette(flatui), data=df_kick)
g1.set_xticklabels(g1.get_xticklabels(),rotation=45)
g1.set_title("Backers Log by Main Categories ", fontsize=22)
g1.set_xlabel("Main Categories", fontsize=17)
g1.set_ylabel("Backers Log", fontsize=17)

plt.show()
```





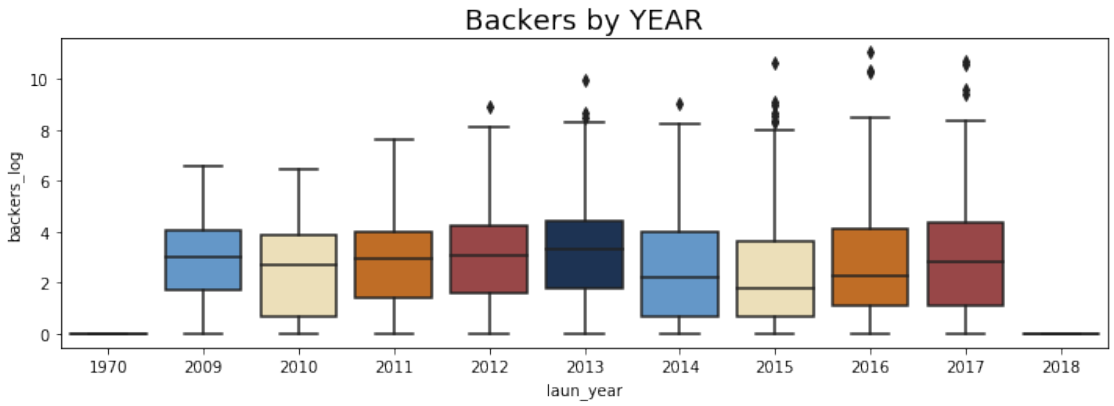
0.4.1 We can find for the successful funding, the medeian of backers number is noticeable higher than the failed ones. As for main categories, we can the distribution is quite similar.

0.4.2 Except for Technology and Games it may occur some extremely high funding, but such situation is rare.

0.5 Backers by the year

[64]:
```
plt.figure(figsize = (12,8))

plt.subplot(211)
g = sns.boxplot(x='laun_year',y='backers_log',
                palette=sns.color_palette(flatui),
               data=df_kick,
                order=df_kick['laun_year'].value_counts().index.sort_values().
 ↪values)
```

```
g.set_title("Backers by YEAR", fontsize=18)

plt.show()
```



0.6 Word Cloud

I found this interesting tool, that can help us to show the word cloud of the dataset. And I will use this tool to show what are the most frequent words that are used in the name of the corwd funding projects.

[14]:
```
from wordcloud import WordCloud, STOPWORDS
```

[17]:
```
stopwords = set(STOPWORDS)

wordcloud = WordCloud(
    background_color='white',
    stopwords=stopwords,
    max_words=500,
    max_font_size=200,
    width=1000, height=800,
    random_state=42,
).generate(" ".join(df_kick['name'].dropna().astype(str)))

print(wordcloud)
fig = plt.figure(figsize = (12,14))
plt.imshow(wordcloud)

plt.title("WORD CLOUD - REGION DESCRIPTION",fontsize=25)
plt.axis('off')
```

```
plt.show()
```

```
<wordcloud.wordcloud.WordCloud object at 0x7f45dc4782b0>
```

[ ]: