Text Analysis Complains

In [1]:
```
import pandas as pd
import re
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:
```
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from sklearn.feature_extraction.text import CountVectorizer, TfidfV
ectorizer
```

In [3]:
```
# Wordcloud python library
from wordcloud import WordCloud
```

In [4]:
```
import plotly.express as px
```

In [5]:
```
cis_complaints = pd.read_excel('ftc_data/00612_redacted_covid_19_co
mplaints.xlsx', sheet_name='CIS Complaints', header=0)
idt_complaints = pd.read_excel('ftc_data/00612_redacted_covid_19_co
mplaints.xlsx', sheet_name='IDT Complaints', header=0)
dnc_complaints = pd.read_excel('ftc_data/00612_redacted_covid_19_co
mplaints.xlsx', sheet_name='DNC Complaints', header=0)
```

In [6]:
```
list_complaints = []
list_complaints.extend(list(cis_complaints['Complaint Info Comments
']))
list_complaints.extend(list(idt_complaints['Theft Activity Comments
']))
list_complaints.extend(list(dnc_complaints['Other Information Comme
nts']))
list_complaints = [str(i).lower() for i in list_complaints]
```

In [7]:
```
def clean_text_round(text):
    '''Make text lowercase, remove text in square brackets, remove
punctuation and remove words containing numbers.'''
    text = text.lower()
    text = re.sub('\[.*?\]', ' ', text)
    text = re.sub('\w*\d\w*', ' ', text)
#    text = re.sub('[‘’“”…]', '', text)
    text = re.sub('<.*?>', ' ', text)
#    text = re.sub('\\n', ' ', text)
    text = re.sub('\n', ' ', text)
    text = re.sub('\t', ' ', text)
    text = re.sub('\(b\)\(6\)', ' ', text)
    text = re.sub('&quot', ' ', text)
    text = re.sub('---', ' ', text)
    #text = re.sub('wa', ' ', text)
    return text
```

In [8]:
```
stop_words = set(stopwords.words('english'))
your_list = ['additional','comments','br','gt']
for i, line in enumerate(list_complaints):
    list_complaints[i] = ' '.join([str(x).lower() for
        x in nltk.word_tokenize(line) if
        ( x not in stop_words ) and ( x not in your_list )])
```

In [9]:
```
list_complaints = [clean_text_round(text) for text in list_complain
ts]
```

In [10]:
```
list_complaints[0]
```

Out[10]:
```
'recently purchased flights swoop wife travel phoenix , az . sever
al weeks later , covid-  crisis became pandemic travel recommended
. international travel deemed non-essential military persons cance
lled precaution covid-  . & #  ; trying reach swoop  days order
cancel flights , receive credit , re-book later date . customer se
rvice phone line recording states company receiving calls time , r
ecommends contacting facebook . facebook contact , states placed d
igital queue contacted shortly . queue  hours response . way cont
act company deal issues , also one airlines amend policy & #  ; d
eal covid-  pandemic . completely unprofessional unacceptable cust
omer service . & #  ; trying cancel tickets . -- - : would comple
tely satisfied refund tickets well pre-purchased add-ons luggage s
eat selection . would somewhat satisfied refund pre-purchased add-
ons credit flights re-book later date .'
```

In [11]:
```
# Getting n-grams table
def ngrams_table(n, list_texts):
    vectorizer = CountVectorizer(ngram_range = (n,n))
    X1 = vectorizer.fit_transform(list_texts)
    features = vectorizer.get_feature_names()
    # Applying TFIDF
    vectorizer = TfidfVectorizer(ngram_range = (n,n))
    X2 = vectorizer.fit_transform(list_texts)
    # Getting top ranking features
    sums1 = X1.sum(axis = 0)
    sums2 = X2.sum(axis = 0)
    data = []
    for col, term in enumerate(features):
        data.append( (term, sums1[0,col], sums2[0,col] ))

    return pd.DataFrame(data, columns = ['term','rankCount', 'rankT
FIDF']).sort_values('rankCount', ascending = False).reset_index(dro
p=True)
```

Frequency of terms in complaints

In [12]:
```
table_1grams = ngrams_table(1, list_complaints)
```

In [13]:
```
# Dfining wordcloud object
wc = WordCloud(background_color="white",
               colormap="Dark2",
               max_font_size=60,
               random_state=42)
```

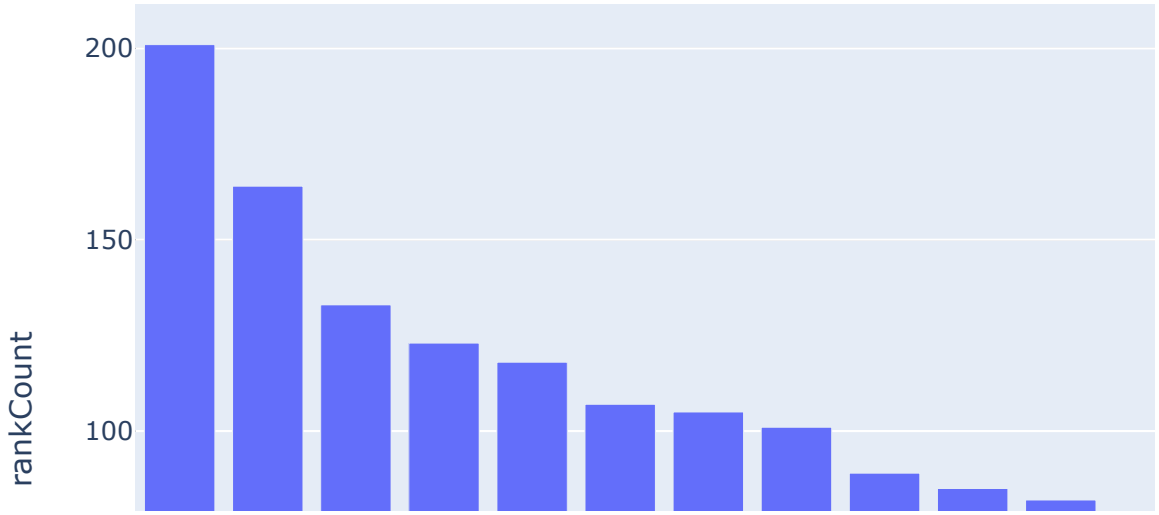
In [14]:
```
text_complaints = ' '.join([i for i in table_1grams['term']])
wc.generate(text_complaints)
plt.figure(figsize=(20,16))
plt.imshow(wc, interpolation="bilinear")
plt.axis("off")
plt.title('Complaints')
plt.show()
```

In [15]:
```
table_1grams.head(20)
```

Out[15]:

	term	rankCount	rankTFIDF
0	refund	201	10.230796
1	coronavirus	164	12.523902
2	call	133	10.200284
3	would	123	6.349337
4	due	118	7.934794
5	credit	107	8.893769
6	get	105	6.383168
7	flight	101	5.212184
8	back	89	4.807804
9	cancel	85	4.578479
10	said	82	7.563221
11	company	79	4.952846
12	number	79	6.088824
13	told	78	4.363980
14	time	77	5.172546
15	called	75	4.639485
16	travel	73	3.596445
17	account	71	6.528610
18	covid	69	6.657087
19	china	68	3.815473

In [16]:
```
px.bar(table_1grams.head(20), 'term', 'rankCount')
```

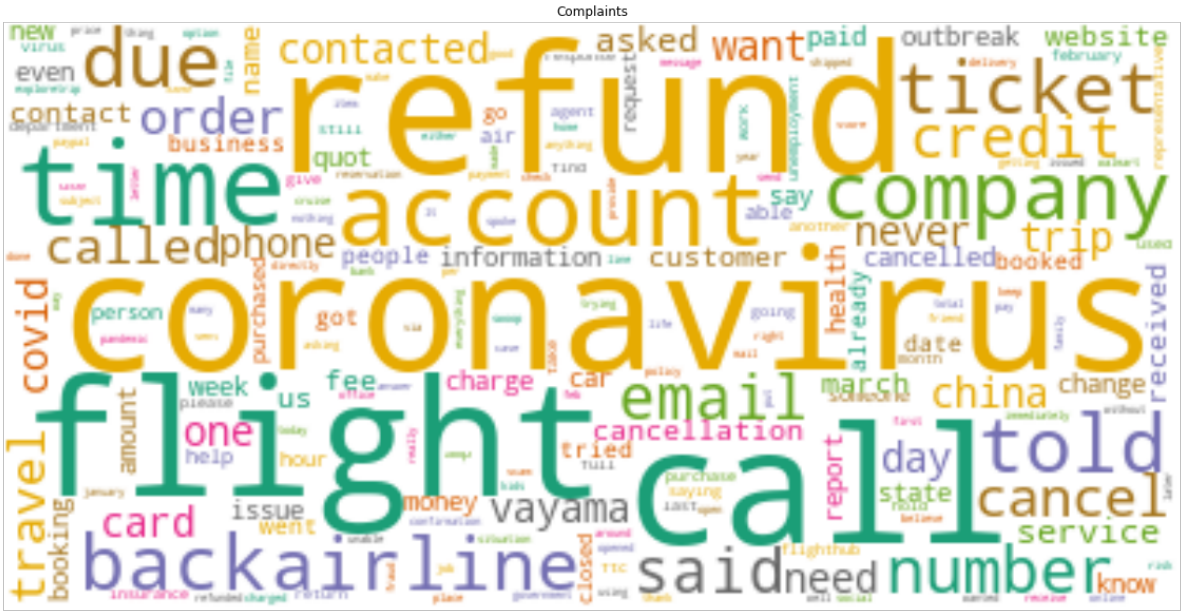


Frequency of 2-consecutive-words terms in complaints

In [17]:
```
table_2grams = ngrams_table(2, list_complaints)
```

In [18]:
```
# Dfining wordcloud object
wc = WordCloud(background_color="white",
               colormap="Dark2",
               max_font_size=60,
               random_state=42)
```

In [19]:
```
text_complaints = ' '.join([i for i in table_2grams['term']])
wc.generate(text_complaints)
plt.figure(figsize=(20,16))
plt.imshow(wc, interpolation="bilinear")
plt.axis("off")
plt.title('Complaints')
plt.show()
```

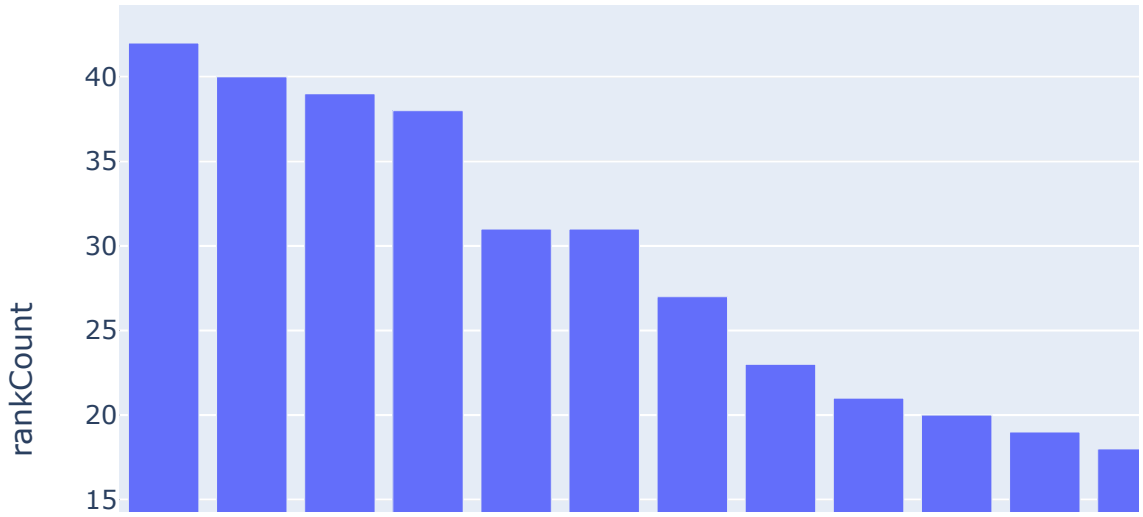


In [20]:
```
table_2grams.head(20)
```

Out[20]:

	term	rankCount	rankTFIDF
0	credit card	42	3.603702
1	customer service	40	2.740659
2	full refund	39	2.147768
3	due coronavirus	38	3.180489
4	subject matter	31	4.373456
5	matter call	31	4.373456
6	credit report	27	3.348916
7	would like	23	1.596497
8	due covid	21	2.221384
9	please help	20	2.485352
10	social security	19	1.932405
11	china eastern	18	1.224097
12	air france	16	0.808437
13	get refund	16	1.101331
14	cancellation fee	16	0.964270
15	coronavirus outbreak	16	1.231780
16	air china	15	0.909638
17	scammer said	15	3.239319
18	call back	14	1.181355
19	hong kong	13	0.926775

In [21]:
```
px.bar(table_2grams.head(20), 'term', 'rankCount')
```



Frequency of 3-consecutive-words terms in complaints

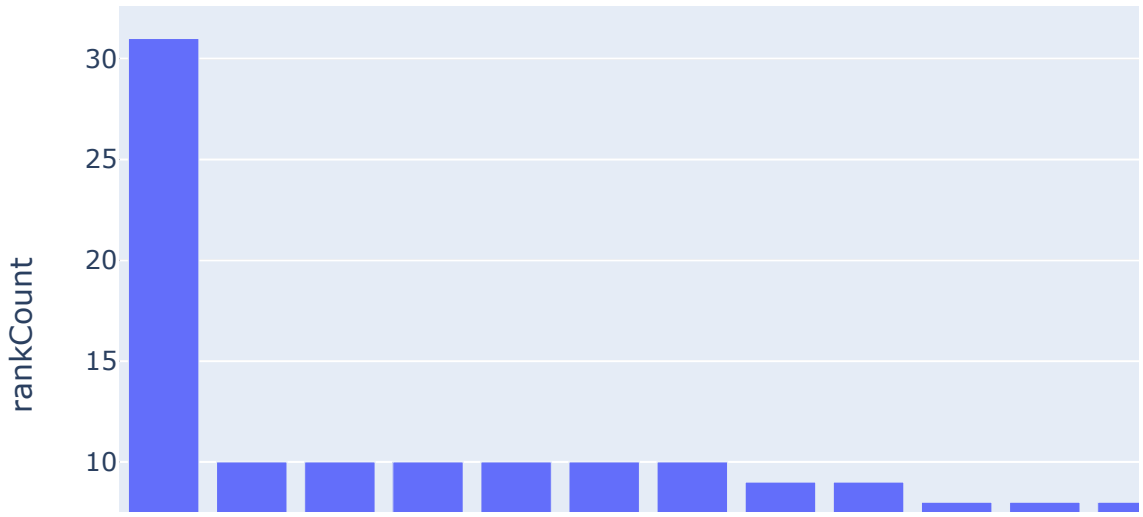
In [22]:
```
table_3grams = ngrams_table(3, list_complaints)
```

In [25]:
```
table_3grams.head(20)
```

Out[25]:

	term	rankCount	rankTFIDF
0	subject matter call	31	4.431367
1	government businesses family	10	1.273609
2	businesses family friends	10	1.273609
3	call calls pretending	10	1.273609
4	calls pretending government	10	1.273609
5	matter call calls	10	1.273609
6	pretending government businesses	10	1.273609
7	social security number	9	1.107664
8	please help get	9	1.274533
9	apply loan declined	8	1.230906
10	take loan visited	8	1.230906
11	report time check	8	1.230906
12	brought today please	8	1.230906
13	payments brought today	8	1.230906
14	scammer said ftc	8	1.997432
15	today please help	8	1.230906
16	defaulted payments brought	8	1.230906
17	help get account	8	1.230906
18	website paid copy	8	1.230906
19	paid copy credit	8	1.230906

In [24]:
```
px.bar(table_3grams.head(20), 'term', 'rankCount')
```



In [ ]:

In [ ]: