M2_J008_amazon_fine_dine_reviews

In [1]:
```
!pip install kaggle
```

```
Requirement already satisfied: kaggle in /usr/local/lib/python3.10/dist-pa
ckages (1.5.16)
Requirement already satisfied: six>=1.10 in /usr/local/lib/python3.10/dist
-packages (from kaggle) (1.16.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-p
ackages (from kaggle) (2023.7.22)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.1
0/dist-packages (from kaggle) (2.8.2)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-
packages (from kaggle) (2.31.0)
Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-pack
ages (from kaggle) (4.66.1)
Requirement already satisfied: python-slugify in /usr/local/lib/python3.1
0/dist-packages (from kaggle) (8.0.1)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.10/dist-p
ackages (from kaggle) (2.0.4)
Requirement already satisfied: bleach in /usr/local/lib/python3.10/dist-pa
ckages (from kaggle) (6.0.0)
Requirement already satisfied: webencodings in /usr/local/lib/python3.10/d
ist-packages (from bleach->kaggle) (0.5.1)
Requirement already satisfied: text-unidecode>=1.3 in /usr/local/lib/pytho
n3.10/dist-packages (from python-slugify->kaggle) (1.3)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/
python3.10/dist-packages (from requests->kaggle) (3.2.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/d
ist-packages (from requests->kaggle) (3.4)
```

In [2]:
```
!mkdir ~/.kaggle
!cp /content/kaggle.json ~/.kaggle/kaggle.json
!chmod 600 /root/.kaggle/kaggle.json
```

In [3]:
```
!kaggle datasets download snap/amazon-fine-food-reviews
```

```
Downloading amazon-fine-food-reviews.zip to /content
100% 241M/242M [00:01<00:00, 235MB/s]
100% 242M/242M [00:01<00:00, 235MB/s]
```

In [4]:
```
!unzip *.zip
```

```
Archive:  amazon-fine-food-reviews.zip
  inflating: Reviews.csv
  inflating: database.sqlite
  inflating: hashes.txt
```

In [5]:
```
import pandas as pd
import re
import string
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from nltk.stem import WordNetLemmatizer
from nltk.probability import FreqDist
from wordcloud import WordCloud
from collections import defaultdict
from wordcloud import STOPWORDS
import seaborn as sns
from sklearn.feature_extraction.text import TfidfVectorizer,CountVectorizer
from sklearn.decomposition import LatentDirichletAllocation
from sklearn.decomposition import TruncatedSVD
import matplotlib.pyplot as plt
```

In [6]:
```
nltk.download('punkt')
nltk.download('stopwords')
nltk.download('wordnet')
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
```

Out[6]: True

In [7]:
```
df = pd.read_csv('/content/Reviews.csv')
```

In [9]:
```
df.head()
```

Out[9]:

	Id	ProductId	UserId	ProfileName	HelpfulnessNumerator	HelpfulnessDenc
0	1	B001E4KFG0	A3SGXH7AUHU8GW	delmartian	1	
1	2	B00813GRG4	A1D87F6ZCVE5NK	dll pa	0	
2	3	B000LQOCH0	ABXLMWJIXXAIN	Natalia Corres "Natalia Corres"	1	
3	4	B000UA0QIQ	A395BORC6FGVXV	Karl	3	
4	5	B006K2ZZ7K	A1UQRSCLF8GW1T	Michael D. Bigham "M. Wassir"	0	

In [10]:
```
df.drop(['Id','ProductId','UserId', 'ProfileName', 'HelpfulnessNumerator',
'HelpfulnessDenominator','Score','Time','Summary'],axis=1,inplace=True)
df.head()
```

Out[10]:

	Text
0	I have bought several of the Vitality canned d...
1	Product arrived labeled as Jumbo Salted Peanut...
2	This is a confection that has been around a fe...
3	If you are looking for the secret ingredient i...
4	Great taffy at a great price. There was a wid...

EDA & PREPROCESS

In [11]:
```
df.shape
```

Out[11]:
```
(568454, 1)
```

In [12]:
```
df.isna().sum()
```

Out[12]:
```
Text    0
dtype: int64
```

In [13]:
```
print(df.duplicated().sum())
df.drop_duplicates(subset='Text', keep='first',inplace=True)
df.shape
```

```
174875
```

Out[13]:
```
(393579, 1)
```

In [14]:
```
stop_words = set(nltk.corpus.stopwords.words('english'))
```

In [15]:
```
def cleanse(string):
    # Lower casing
    string = str(string).lower()

    # Getting rid of mentions
    string = re.sub(r"@\S+", " ", string)

    # Removing HTML
    string = re.sub(r"&.*?;|<.*?>", " ", string)

    # URL removal
    string = re.sub(r"https?://\S+|www\.\S+", " ", string)

    # Handling abbreviations
    # string = convert_abbrev_in_text(string)

    # Non-word removals (special chars)
    string = re.sub(r"[^a-z]", " ", string)

    # Stop word removal
    string = " ".join(word for word in nltk.tokenize.word_tokenize(string)
if word not in nltk.corpus.stopwords.words('english'))

    # Lemmatization
    lemma = nltk.stem.WordNetLemmatizer()
    string = " ".join(lemma.lemmatize(word) for word in nltk.tokenize.word_
tokenize(string))

    # Single char removal
    string = re.sub(r"\b\w\b", "", string).strip()

    return string
```

In [16]:
```
# Example usage
text_to_clean = "This is an example text with @mentions, <html> tags, and h
ttps://example.com links."
cleaned_text = cleanse(text_to_clean)
print(cleaned_text)
```

```
example text tag link
```

In [17]:
```
df['cleaned']=df['Text'].apply(cleanse)
```

In [18]:
```
df2 = df.copy()
```

In [19]:
```
df2.to_csv('ReviewsClean.csv',index = False)
```

In [20]:
```
df2.head(10)
```

Out[20]:

	Text	cleaned
0	I have bought several of the Vitality canned d...	bought several vitality canned dog food produc...
1	Product arrived labeled as Jumbo Salted Peanut...	product arrived labeled jumbo salted peanut pe...
2	This is a confection that has been around a fe...	confection around century light pillowy citrus...
3	If you are looking for the secret ingredient i...	looking secret ingredient robitussin believe f...
4	Great taffy at a great price. There was a wid...	great taffy great price wide assortment yummy ...
5	I got a wild hair for taffy and ordered this f...	got wild hair taffy ordered five pound bag taf...
6	This saltwater taffy had great flavors and was...	saltwater taffy great flavor soft chewy candy ...
7	This taffy is so good. It is very soft and ch...	taffy good soft chewy flavor amazing would def...
8	Right now I'm mostly just sprouting this so my...	right mostly sprouting cat eat grass love rota...
9	This is a very healthy dog food. Good for thei...	healthy dog food good digestion also good smal...

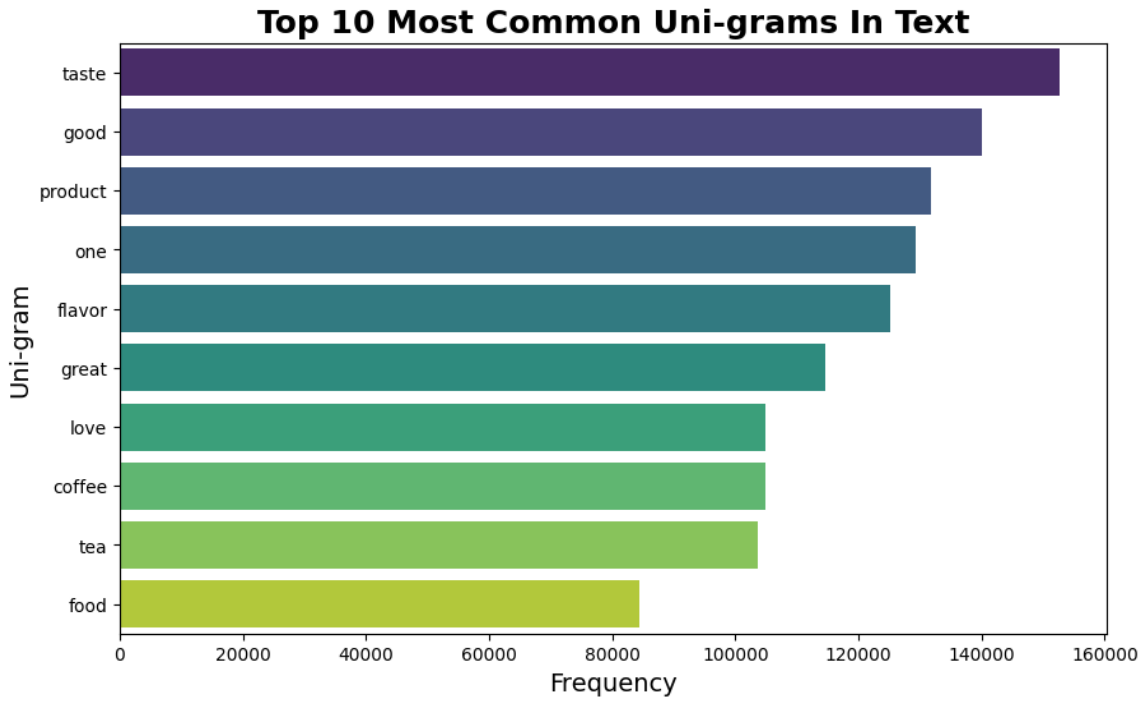
In [21]:
```
text_combined = ' '.join(df2['cleaned'])

wordcloud = WordCloud(width=800, height=400, background_color='white').gene
rate(text_combined)

plt.figure(figsize=(10, 5))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')
plt.show()
```

Uni,Bi,Trigrams

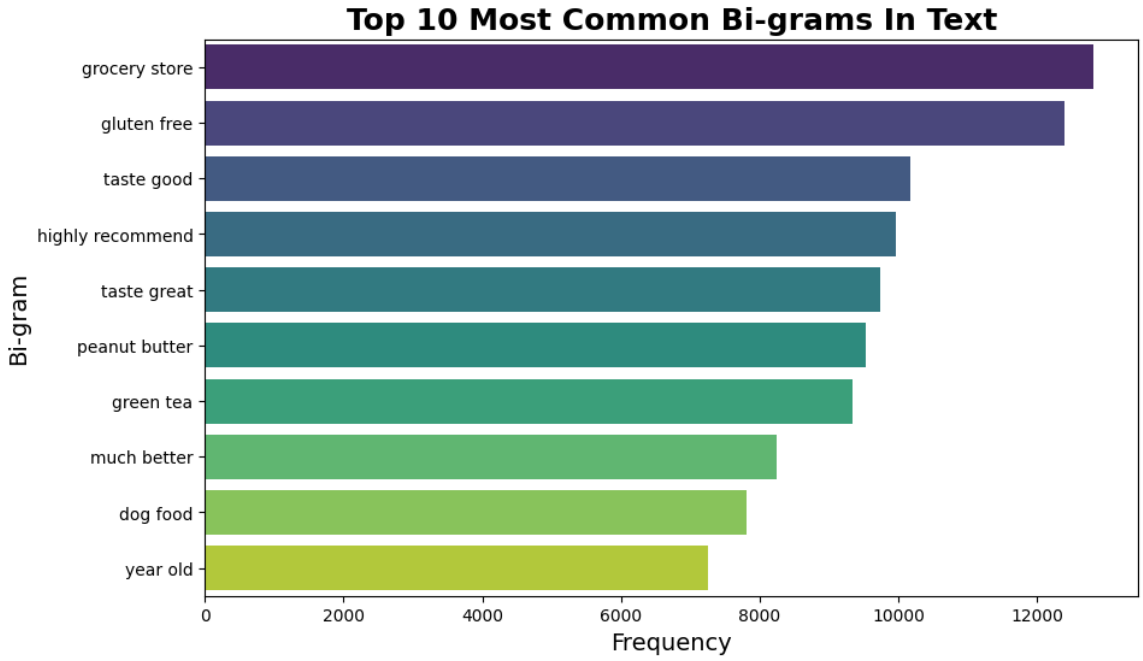
In [22]:
```
N = 10
```

In [23]:
```
def generate_ngrams(text, n_gram=1):
    token = [token for token in text.lower().split(' ') if token != '' if t
oken not in STOPWORDS]
    ngrams = zip(*[token[i:] for i in range(n_gram)])
    return [' '.join(ngram) for ngram in ngrams]
```

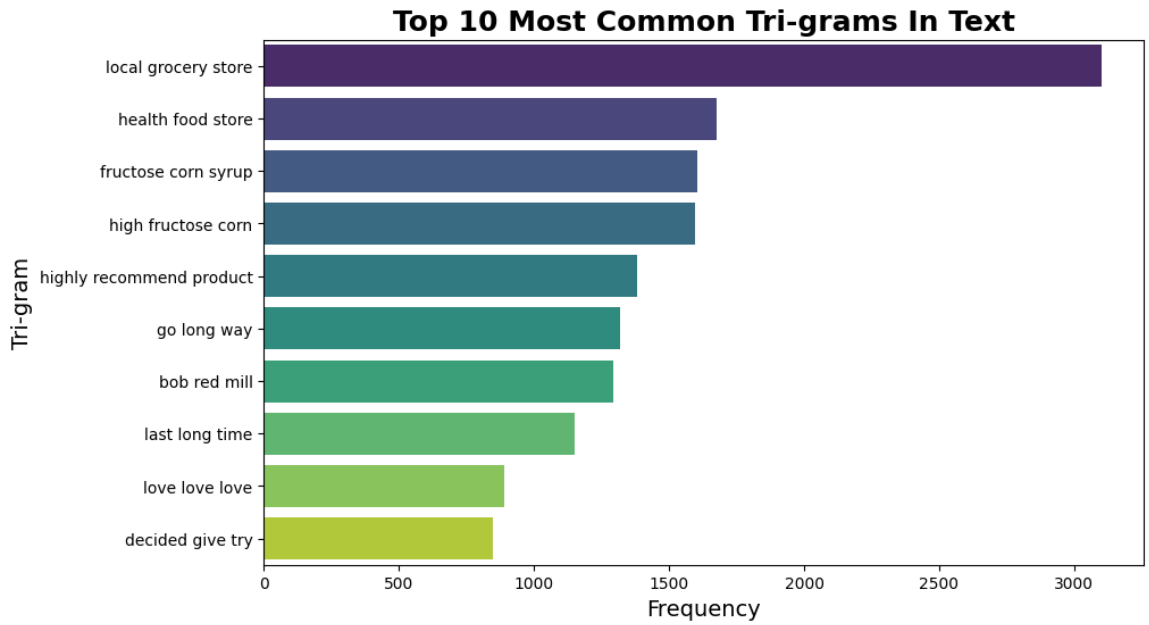
In [24]:
```
unigrams = defaultdict(int)
for i in df2['cleaned']:
    for word in generate_ngrams(i, 1):
        unigrams[word] += 1

df_unigrams = pd.DataFrame(sorted(unigrams.items(), key=lambda x: x[1])[::-
1])

# Sort the DataFrame by frequency in descending order and select the top N
unigrams
unigrams_less_11 = df_unigrams.sort_values(by=1, ascending=False)[:N]

# Create a horizontal bar plot using Seaborn and Matplotlib
plt.figure(figsize=(10, 6))
sns.barplot(x=unigrams_less_11[1], y=unigrams_less_11[0], palette='viridi
s')

# Customize the plot
plt.title("Top 10 Most Common Uni-grams In Text", fontsize=18, fontweight
='bold')
plt.xlabel("Frequency", fontsize=14)
plt.ylabel("Uni-gram", fontsize=14)
plt.show()
```



In [25]:
```
unigrams = defaultdict(int)
for i in df2['cleaned']:
    for word in generate_ngrams(i, 2):
        unigrams[word] += 1

df_unigrams = pd.DataFrame(sorted(unigrams.items(), key=lambda x: x[1])[::-
1])

# Sort the DataFrame by frequency in descending order and select the top N
unigrams
bigrams_less_11 = df_unigrams.sort_values(by=1, ascending=False)[:N]

# Create a horizontal bar plot using Seaborn and Matplotlib
plt.figure(figsize=(10, 6))
sns.barplot(x=bigrams_less_11[1], y=bigrams_less_11[0], palette='viridis')

# Customize the plot
plt.title("Top 10 Most Common Bi-grams In Text", fontsize=18, fontweight='b
old')
plt.xlabel("Frequency", fontsize=14)
plt.ylabel("Bi-gram", fontsize=14)
plt.show()
```



In [26]:
```
unigrams = defaultdict(int)
for i in df2['cleaned']:
    for word in generate_ngrams(i, 3):
        unigrams[word] += 1

df_unigrams = pd.DataFrame(sorted(unigrams.items(), key=lambda x: x[1])[::-
1])

# Sort the DataFrame by frequency in descending order and select the top N
unigrams
trigrams_less_11 = df_unigrams.sort_values(by=1, ascending=False)[:N]

# Create a horizontal bar plot using Seaborn and Matplotlib
plt.figure(figsize=(10, 6))
sns.barplot(x=trigrams_less_11[1], y=trigrams_less_11[0], palette='viridi
s')

# Customize the plot
plt.title("Top 10 Most Common Tri-grams In Text", fontsize=18, fontweight
='bold')
plt.xlabel("Frequency", fontsize=14)
plt.ylabel("Tri-gram", fontsize=14)
plt.show()
```



Tf-idf

In [27]:
```
vect =TfidfVectorizer(max_df=0.95,min_df=2,stop_words=list(stop_words),max_
features=1000)
```

In [28]:
```
vect_text=vect.fit_transform(df2['cleaned'])
```

In [29]:
```
print(vect_text.shape)
print(vect_text)
```

```
(393579, 1000)
  (0, 75)       0.36190249665967467
  (0, 797)      0.2392603295367937
  (0, 512)      0.28066572115948346
  (0, 673)      0.3428893597291888
  (0, 470)      0.1221960825414594
  (0, 484)      0.23654254987260223
  (0, 684)      0.22091349393496684
  (0, 366)      0.1293620227222932
  (0, 336)      0.19421299819848462
  (0, 674)      0.41572690067509005
  (0, 332)      0.17834688042833638
  (0, 239)      0.21239804277023372
  (0, 121)      0.30226093357702666
  (0, 764)      0.24771649932346113
  (0, 93)       0.19702774781403584
  (1, 860)      0.2673698552171813
  (1, 790)      0.40162147354370425
  (1, 795)      0.2691501970010162
  (1, 5)        0.28072249316371717
  (1, 620)      0.6447672166653906
  (1, 41)       0.30049940203971637
  (1, 674)      0.3315749560556801
  (2, 755)      0.28313413144827143
  (2, 914)      0.36436082215579674
  (2, 999)      0.23570841451569235
  :     :
  (393576, 427) 0.3007110347272529
  (393576, 914) 0.14927584132717078
  (393576, 795) 0.1533522687378606
  (393576, 797) 0.16309139678126736
  (393576, 470) 0.08329475187745626
  (393576, 332) 0.36470954332819366
  (393576, 239) 0.43434229405352914
  (393577, 494) 0.3364818736372956
  (393577, 968) 0.36964770449554313
  (393577, 656) 0.32049095819829615
  (393577, 118) 0.2545524095007062
  (393577, 749) 0.2910856625090349
  (393577, 74)  0.18970195518988697
  (393577, 863) 0.21635322502949617
  (393577, 491) 0.2669288913700154
  (393577, 305) 0.222970918083957
  (393577, 914) 0.4716190998866417
  (393577, 366) 0.13929611856517016
  (393577, 239) 0.22870872243739204
  (393578, 951) 0.5178761253022001
  (393578, 132) 0.3956597857301488
  (393578, 694) 0.472482714881269
  (393578, 735) 0.49075930141190505
  (393578, 937) 0.26088283222328174
  (393578, 674) 0.20763716638703172
```

In [30]:
```
idf=vect.idf_
```

In [31]:
```
dd=dict(zip(vect.get_feature_names_out(), idf))
l=sorted(dd, key=(dd).get)

print(l[0],l[-1])
```

```
like trap
```

In [32]:
```
print(dd['like'])
print(dd['trap'])
```

```
2.170403020559765
7.007807542584503
```

LSA

In [33]:
```
lsa_model = TruncatedSVD(n_components=10, algorithm='randomized', n_iter=1
0, random_state=42)

lsa_top=lsa_model.fit_transform(vect_text)
```

In [34]:
```
print(lsa_top.shape)
print(lsa_top)
```

```
(393579, 10)
[[ 0.25600471 -0.15528136 -0.08724707 ... -0.10639967  0.30036274
   0.00074538]
 [ 0.11582923 -0.07415849 -0.03765638 ... -0.07350944  0.21012766
  -0.08138592]
 [ 0.09634653 -0.05333172 -0.03396878 ... -0.01742019 -0.0124043
  -0.01638114]
 ...
 [ 0.26586946 -0.20778231 -0.1387796  ... -0.04425128  0.02000985
  -0.02301816]
 [ 0.1544926  -0.11421697 -0.07216748 ... -0.05519854 -0.04600259
   0.03550716]
 [ 0.08594531 -0.04677028 -0.02092259 ... -0.0042275   0.10472295
  -0.07850701]]
```

In [35]:
```
l=lsa_top[0]
print("Document 0 :")
for i,topic in enumerate(l):
  print("Topic ",i," : ",topic*100)
```

```
Document 0 :
Topic  0  :  25.600471253452227
Topic  1  :  -15.528135604978768
Topic  2  :  -8.724707200216471
Topic  3  :  14.607938321966959
Topic  4  :  6.378731459903345
Topic  5  :  -10.128612986972838
Topic  6  :  12.88463116835121
Topic  7  :  -10.639966602669386
Topic  8  :  30.036274157196598
Topic  9  :  0.07453802288939389
```

In [36]:
```
for index,topic in enumerate(lsa_model.components_):
    print(f'THE TOP 15 WORDS FOR TOPIC #{index+1}')
    print([vect.get_feature_names_out()[i] for i in topic.argsort()[-15:]])
    print('\n')
```

```
THE TOP 15 WORDS FOR TOPIC #1
['really', 'make', 'get', 'would', 'food', 'one', 'love', 'flavor', 'grea
t', 'product', 'good', 'taste', 'coffee', 'like', 'tea']


THE TOP 15 WORDS FOR TOPIC #2
['bag', 'blend', 'bitter', 'brew', 'drinking', 'leaf', 'iced', 'black', 's
trong', 'flavor', 'drink', 'green', 'cup', 'coffee', 'tea']


THE TOP 15 WORDS FOR TOPIC #3
['bitter', 'espresso', 'smooth', 'flavor', 'blend', 'keurig', 'starbucks',
'dark', 'pod', 'bold', 'strong', 'bean', 'roast', 'cup', 'coffee']


THE TOP 15 WORDS FOR TOPIC #4
['year', 'bone', 'toy', 'vet', 'pet', 'chew', 'bag', 'cup', 'love', 'tea',
'cat', 'treat', 'coffee', 'food', 'dog']


THE TOP 15 WORDS FOR TOPIC #5
['item', 'ordered', 'time', 'box', 'grocery', 'local', 'buy', 'shipping',
'order', 'find', 'great', 'store', 'price', 'amazon', 'product']


THE TOP 15 WORDS FOR TOPIC #6
['chip', 'peanut', 'amazon', 'box', 'price', 'dark', 'cooky', 'candy', 'sn
ack', 'great', 'treat', 'love', 'bar', 'dog', 'chocolate']


THE TOP 15 WORDS FOR TOPIC #7
['easy', 'good', 'add', 'make', 'oil', 'drink', 'love', 'sauce', 'water',
'treat', 'use', 'taste', 'dog', 'product', 'great']


THE TOP 15 WORDS FOR TOPIC #8
['make', 'coffee', 'price', 'eat', 'bar', 'best', 'healthy', 'gluten', 'fr
ee', 'flavor', 'snack', 'food', 'cat', 'love', 'great']


THE TOP 15 WORDS FOR TOPIC #9
['dark', 'recommend', 'sugar', 'would', 'coffee', 'quality', 'tea', 'grea
t', 'good', 'cat', 'bar', 'food', 'taste', 'chocolate', 'product']


THE TOP 15 WORDS FOR TOPIC #10
['local', 'grocery', 'bag', 'candy', 'great', 'cereal', 'amazon', 'snack',
'buy', 'really', 'store', 'price', 'like', 'taste', 'good']
```

In [37]:
```
vocab = vect.get_feature_names_out()

for i, comp in enumerate(lsa_model.components_):
    vocab_comp = zip(vocab, comp)
    sorted_words = sorted(vocab_comp, key= lambda x:x[1], reverse=True)[:1
0]
    print("Topic "+str(i+1)+": ")
    for t in sorted_words:
        print(t[0],end=" ")
    print("\n")
```

```
Topic 1:
tea like coffee taste good product great flavor love one

Topic 2:
tea coffee cup green drink flavor strong black iced leaf

Topic 3:
coffee cup roast bean strong bold pod dark starbucks keurig

Topic 4:
dog food coffee treat cat tea love cup bag chew

Topic 5:
product amazon price store great find order shipping buy local

Topic 6:
chocolate dog bar love treat great snack candy cooky dark

Topic 7:
great product dog taste use treat water sauce love drink

Topic 8:
great love cat food snack flavor free gluten healthy best

Topic 9:
product chocolate taste food bar cat good great tea quality

Topic 10:
good taste like price store really buy snack amazon cereal
```

LDA

In [38]:
```
from sklearn.decomposition import LatentDirichletAllocation
lda_model=LatentDirichletAllocation(n_components=10,learning_method='onlin
e',random_state=42,max_iter=1)
```

In [39]:
```
lda_top=lda_model.fit_transform(vect_text)
```

In [40]:
```
print(lda_top.shape)
print(lda_top)
```

```
(393579, 10)
[[0.02136106 0.02136107 0.02136366 ... 0.02136558 0.02136414 0.02136802]
 [0.028609   0.02860653 0.02860922 ... 0.3180979  0.45301302 0.0286131 ]
 [0.02209655 0.12399172 0.02210617 ... 0.02210426 0.4424778  0.10119466]
 ...
 [0.01851302 0.01851386 0.07187891 ... 0.01851548 0.01851938 0.01851521]
 [0.02321506 0.02322994 0.02321642 ... 0.02321862 0.31345511 0.02322018]
 [0.0298927  0.14816596 0.02989595 ... 0.02989869 0.39005298 0.02990033]]
```

In [41]:
```
sum=0
for i in lda_top[0]:
  sum=sum+i
print(sum)
```

```
1.0
```

In [42]:
```
print("Document 0: ")
for i,topic in enumerate(lda_top[0]):
  print("Topic ",i,": ",topic*100,"%")
```

```
Document 0:
Topic  0 :  2.136106096014303 %
Topic  1 :  2.1361071380176173 %
Topic  2 :  2.1363658384997994 %
Topic  3 :  80.77052609160931 %
Topic  4 :  2.1380488225437215 %
Topic  5 :  2.136495418036506 %
Topic  6 :  2.1365762015657834 %
Topic  7 :  2.136558132403181 %
Topic  8 :  2.136414390714995 %
Topic  9 :  2.1368018705947778 %
```

In [43]:
```
print(lda_model.components_)
print(lda_model.components_.shape)
```

```
[[1.00015157e-01 1.00020643e-01 1.00010906e-01 ... 1.00014608e-01
  4.99378644e+02 1.00026202e-01]
 [1.00013815e-01 1.00028873e-01 1.00010472e-01 ... 1.00057906e-01
  1.00014643e-01 6.93749082e+02]
 [1.00030457e-01 1.00039297e-01 1.00014341e-01 ... 1.00014647e-01
  1.00012333e-01 1.00040597e-01]
 ...
 [1.63083974e+02 4.73411998e+02 1.00027863e-01 ... 1.00033286e-01
  1.00017947e-01 1.00037722e-01]
 [8.87031650e+01 2.99108965e+02 1.00021465e-01 ... 1.00129593e-01
  1.00029566e-01 6.67586860e+02]
 [8.78554460e+02 1.00043376e-01 1.00019806e-01 ... 1.00027099e-01
  1.00010105e-01 1.00029570e-01]]
(10, 1000)
```

In [44]:
```
for index,topic in enumerate(lda_model.components_):
    print(f'THE TOP 15 WORDS FOR TOPIC #{index+1}')
    print([vect.get_feature_names_out()[i] for i in topic.argsort()[-15:]])
    print('\n')
```

```
THE TOP 15 WORDS FOR TOPIC #1
['berry', 'gf', 'pop', 'hooked', 'yum', 'melt', 'craving', 'seed', 'mom',
'ordering', 'cheese', 'licorice', 'thank', 'cracker', 'popcorn']


THE TOP 15 WORDS FOR TOPIC #2
['everyone', 'wine', 'loved', 'wrapped', 'jerky', 'enjoyed', 'kid', 'chil
d', 'party', 'yummy', 'son', 'soft', 'chewy', 'candy', 'cereal']


THE TOP 15 WORDS FOR TOPIC #3
['rice', 'italian', 'puppy', 'com', 'wheat', 'tuna', 'waffle', 'mix', 'cak
e', 'espresso', 'bread', 'free', 'flour', 'pasta', 'gluten']


THE TOP 15 WORDS FOR TOPIC #4
['would', 'eat', 'year', 'time', 'good', 'get', 'bag', 'like', 'product',
'one', 'treat', 'cat', 'love', 'food', 'dog']


THE TOP 15 WORDS FOR TOPIC #5
['dish', 'pill', 'lime', 'salmon', 'dressing', 'mango', 'lemon', 'meat',
'bone', 'salt', 'chicken', 'salad', 'olive', 'oil', 'soup']


THE TOP 15 WORDS FOR TOPIC #6
['decaf', 'bitter', 'smooth', 'great', 'good', 'blend', 'like', 'green',
'taste', 'drink', 'strong', 'flavor', 'cup', 'coffee', 'tea']


THE TOP 15 WORDS FOR TOPIC #7
['drink', 'great', 'sugar', 'hot', 'make', 'use', 'coffee', 'sauce', 'on
e', 'water', 'product', 'good', 'flavor', 'like', 'taste']


THE TOP 15 WORDS FOR TOPIC #8
['jelly', 'time', 'item', 'candy', 'would', 'ordered', 'good', 'box', 'gre
at', 'received', 'arrived', 'order', 'product', 'gift', 'chocolate']


THE TOP 15 WORDS FOR TOPIC #9
['sweet', 'eat', 'oatmeal', 'calorie', 'like', 'love', 'butter', 'cookie',
'good', 'cooky', 'taste', 'peanut', 'great', 'bar', 'snack']


THE TOP 15 WORDS FOR TOPIC #10
['found', 'love', 'order', 'delivery', 'shipping', 'purchase', 'great', 'b
uy', 'grocery', 'local', 'product', 'find', 'price', 'store', 'amazon']
```

In [45]:
```
vocab = vect.get_feature_names_out()

for i, comp in enumerate(lda_model.components_):

    vocab_comp = zip(vocab, comp) # It pairs each term with its importance score in the topic.

    sorted_words = sorted(vocab_comp, key= lambda x:x[1], reverse=True)[:10]

    print("Topic "+str(i)+": ")
    for t in sorted_words:
        print(t[0],end=" ")
    print("\n")
```

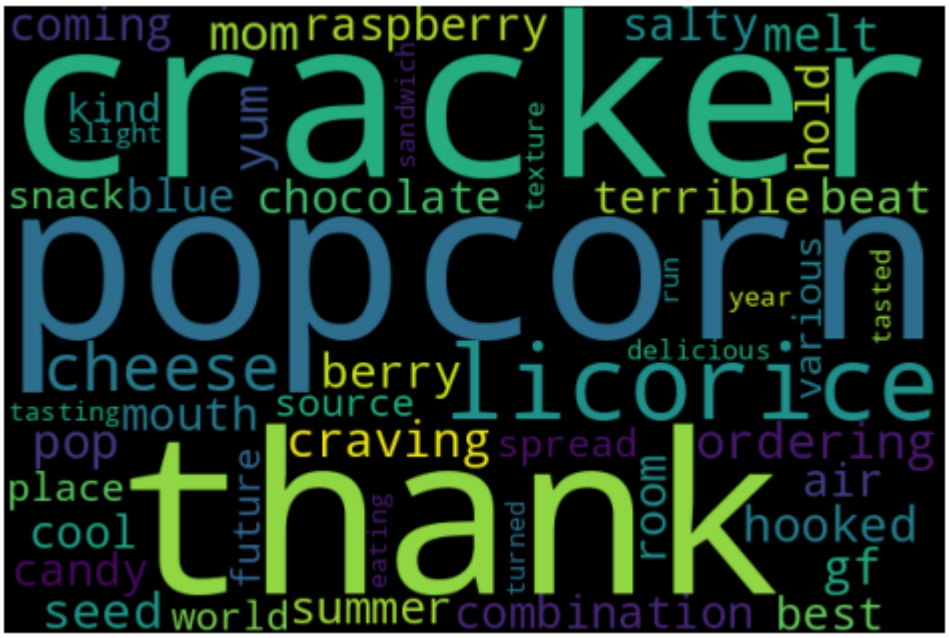
```
Topic 0:
popcorn cracker thank licorice cheese ordering mom seed craving melt

Topic 1:
cereal candy chewy soft son yummy party child kid enjoyed

Topic 2:
gluten pasta flour free bread espresso cake mix waffle tuna

Topic 3:
dog food love cat treat one product like bag get

Topic 4:
soup oil olive salad chicken salt bone meat lemon mango

Topic 5:
tea coffee cup flavor strong drink taste green like blend

Topic 6:
taste like flavor good product water one sauce coffee use

Topic 7:
chocolate gift product order arrived received great box good ordered

Topic 8:
snack bar great peanut taste cooky good cookie butter love

Topic 9:
amazon store price find product local grocery buy great purchase
```

In [46]:

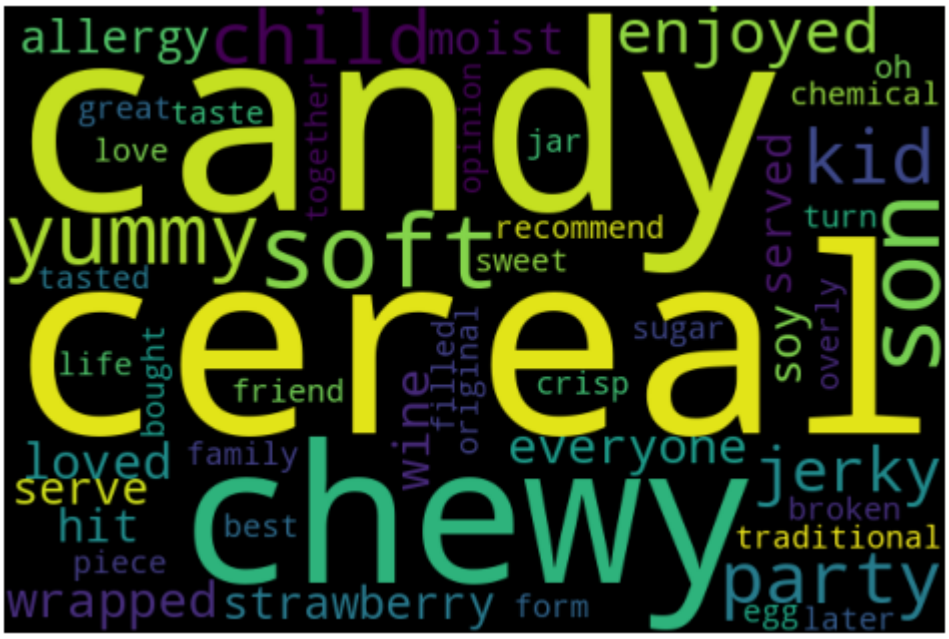
```
from wordcloud import WordCloud

def draw_word_cloud(index):

    imp_words_topic=""
    comp=lda_model.components_[index]
    vocab_comp = zip(vocab, comp)
    sorted_words = sorted(vocab_comp, key= lambda x:x[1], reverse=True)[:5
0]
    for word in sorted_words:
        imp_words_topic=imp_words_topic+" "+word[0]
    wordcloud = WordCloud(width=600, height=400).generate(imp_words_topic)
    plt.figure( figsize=(5,5))
    plt.imshow(wordcloud)
    plt.axis("off")
    plt.tight_layout()
    plt.show()
```

In [47]:
```
num_topics = len(lda_model.components_)
for topic_index in range(num_topics):
    print(f"Wordcloud for topic {topic_index+1} is:")
    draw_word_cloud(topic_index)
```

Wordcloud for topic 1 is:



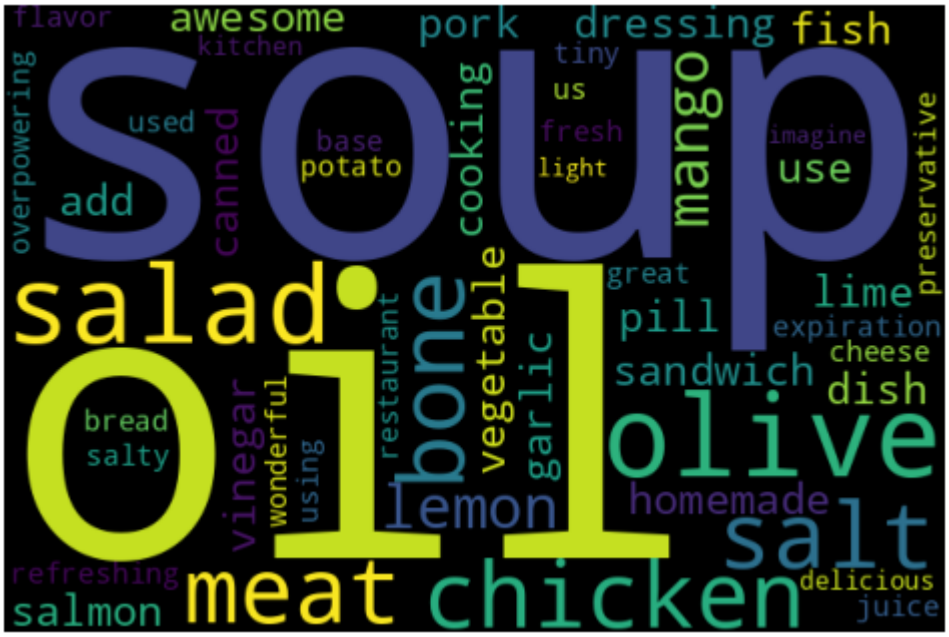
Wordcloud for topic 2 is:



Wordcloud for topic 3 is:

Wordcloud for topic 4 is:

Wordcloud for topic 5 is:



Wordcloud for topic 6 is:

Wordcloud for topic 7 is:

Wordcloud for topic 8 is:

Wordcloud for topic 9 is:

Wordcloud for topic 10 is: