```
# import libraries
import pandas as pd
import numpy as np
import seaborn as sns
import requests
import xml.dom.minidom as m
import xml.etree.ElementTree as et
import time as time
import json
from matplotlib import pyplot as plt
```

```
# import data for Alzheimer articles
al_dict = {}
with open("Alzheimer.json") as f:
    al_dict = json.load(f)
```

```
# import data for cancer articles
cn_dict = {}
with open("Cancer.json") as f:
    cn_dict = json.load(f)
```

```
# create dataframe from al_dict
al_df = pd.DataFrame.from_dict(al_dict, orient='index')
al_df.head()
```

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	title	abstract	query	mesh
33939349	Electroconvulsive Therapy for the Treatment of...	Dementia refers to a state of cognitive impair...	Alzheimer's	N/A
33841007	Gintonin facilitates brain delivery of donepez...	Gintonin is a ginseng-derived exogenous G-prot...	Alzheimer's	N/A
33627920	Bayesian Scalar on Image Regression With Nonig...	Medical imaging has become an increasingly imp...	Alzheimer's	N/A
33463291	The Structural Basis of Amyloid Strains in Alz...	Amyloid fibrils represent one of the defining ...	Alzheimer's	Alzheimer Disease
33323224	Healthy ageing through internet counselling in...	Although web-based interventions have been pro...	Alzheimer's	Aged

```
# create dataframe from cn_dict
cn_df = pd.DataFrame.from_dict(cn_dict, orient='index')
cn_df.head()
```

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	title	abstract	query	mesh
34590506	Diarylpentanones from the root of Wikstroemia ...	One new diarylpentanone, 4(S)-hydroxy-1, 5-dip...	Cancer	A549 Cells
34539049	Re-evaluating standards of human subjects prot...	This study addresses ethical questions about c...	Cancer	N/A

	title	abstract	query	mesh
34539046	Inference for L-estimators of location using a...	In this note we propose a new semi-parametric ...	Cancer	N/A
34493369	The ITGB6 gene: its role in experimental and c...	Integrin αvβ6 is a membrane-spanning...	Cancer	Animals
34460208	Advancing the Science of Cancer in Latinos	Cancer is the leading cause of death among Lat...	Cancer	N/A

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```
# count number of Alzheimer papers that have no MeSH terms
# note that the finding of mesh terms in Q1 is incorrect hence no mesh terms exist in dataframes, but thi
al_no_mesh = len(al_df[al_df['mesh'] == "N/A"])
print("There are", al_no_mesh, "Alzheimer papers that have no MeSH terms.")
```

```
There are 164 Alzheimer papers that have no MeSH terms.
```

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```
# count number of cancer papers that have no MeSH terms
cn_no_mesh = len(cn_df[cn_df['mesh'] == "N/A"])
print("There are", cn_no_mesh, "cancer papers that have no MeSH terms.")
```

```
There are 756 cancer papers that have no MeSH terms.
```

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```
# function for finding 10 most frequent mesh terms
# returns a dictionary sorted by keys in descending order
def mesh_frequency(df):
    mesh_counts = {}
    meshes = df['mesh']
    for m in meshes:
        if m not in mesh_counts: mesh_counts[m] = 0
        mesh_counts[m] += 1
    mesh_counts = sorted(mesh_counts.items(), key=lambda item: item[1], reverse=True)
    return mesh_counts
```

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```
# mesh terms in al_df ordered by frequency
al_top_10_mesh = mesh_frequency(al_df)
al_top_10_mesh = al_top_10_mesh[:11]
index_na = [i[0] for i in al_top_10_mesh].index('N/A')
na_mesh_al = al_top_10_mesh.pop(index_na)
# print(al_top_10_mesh)
```

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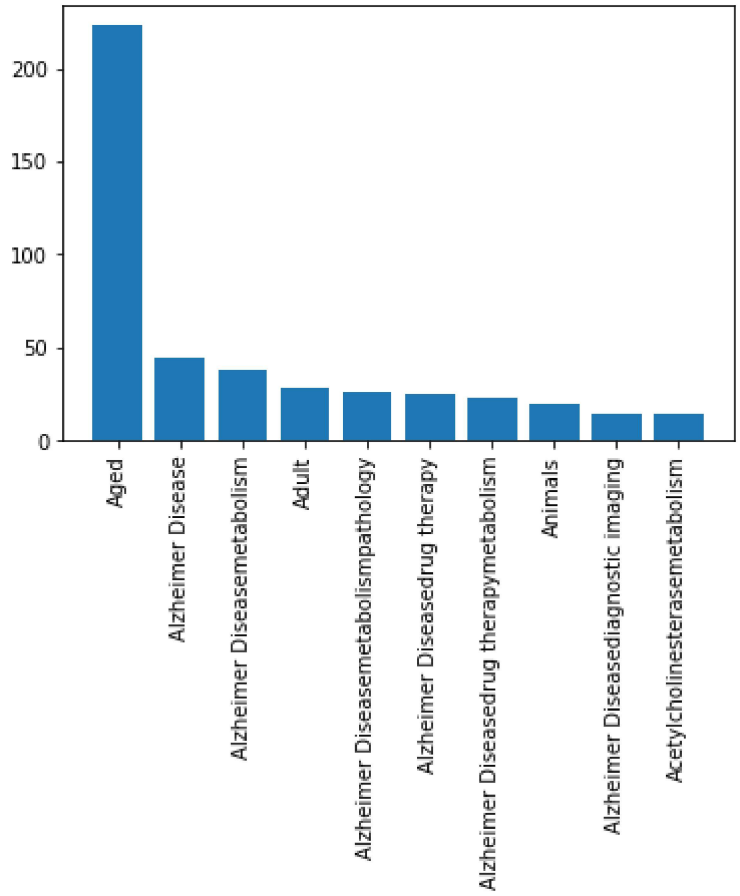
```
# plot frequency of 10 most common al_df mesh terms
al_x = [i[0] for i in al_top_10_mesh]
# print(al_x)
al_y = [i[1] for i in al_top_10_mesh]
# print(al_y)

plt.bar(range(len(al_top_10_mesh)), al_y, tick_label=al_x)
plt.xticks(rotation='vertical')
plt.show()
```



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```
# 10 most frequent mesh terms in cn_df
cn_top_10_mesh = mesh_frequency(cn_df)
cn_top_10_mesh = cn_top_10_mesh[:11]
index_na = [i[0] for i in cn_top_10_mesh].index('N/A')
na_mesh = cn_top_10_mesh.pop(index_na)
# print(cn_top_10_mesh)
```

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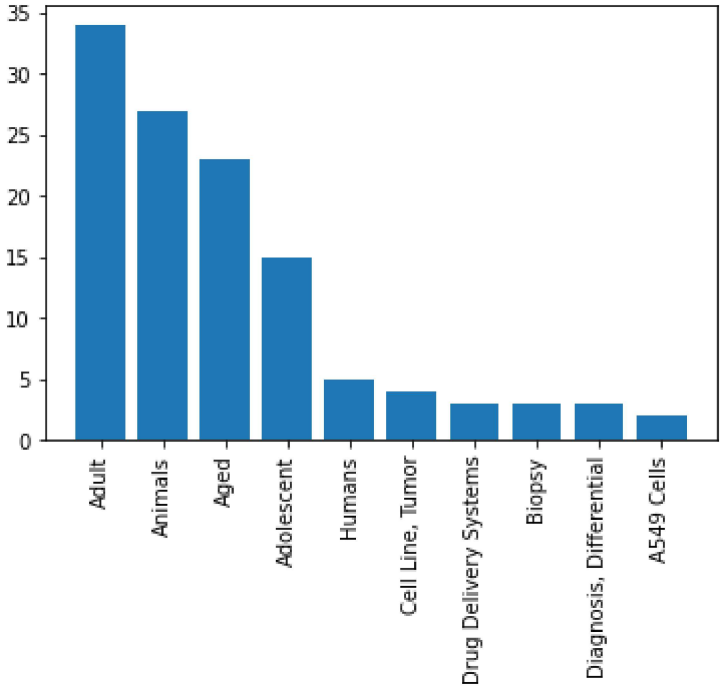
```
# plot frequency of 10 most common cn_df mesh terms
cn_x = [i[0] for i in cn_top_10_mesh]
print(cn_x)
cn_y = [i[1] for i in cn_top_10_mesh]
print(cn_y)

plt.bar(range(len(cn_top_10_mesh)), cn_y, tick_label=cn_x)
plt.xticks(rotation='vertical')
plt.show()
```

```
['Adult', 'Animals', 'Aged', 'Adolescent', 'Humans', 'Cell Line, Tumor', 'Drug Delivery Systems', 'Biopsy
[34, 27, 23, 15, 5, 4, 3, 3, 3, 2]
```



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```
# table comparing number of articles from cn_df and al_df that have both matching mesh terms as specified
al_top_5_mesh = al_x[:5]
al_top_5_mesh_freq = al_y[:5]

cn_top_5_mesh = cn_x[:5]
cn_top_5_mesh_freq = cn_y[:5]
print(al_top_5_mesh, '\n', cn_top_5_mesh)
print(al_top_5_mesh_freq, '\n', cn_top_5_mesh_freq)

al_cn_mesh = pd.DataFrame(index=al_top_5_mesh, columns=cn_top_5_mesh)

i = 0
while i < 5:
    j = 0
    while j < 5:
        al_cn_mesh.iloc[i][j] = al_top_5_mesh_freq[i] + cn_top_5_mesh_freq[j]
        j += 1
    i += 1

al_cn_mesh.head()
```

```
['Aged', 'Alzheimer Disease', 'Alzheimer Diseasemetabolism', 'Adult', 'Alzheimer Diseasemetabolismpatholo
 ['Adult', 'Animals', 'Aged', 'Adolescent', 'Humans']
[223, 45, 38, 28, 26]
 [34, 27, 23, 15, 5]
```

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	Adult	Animals	Aged	Adolescent	Humans
Aged	257	250	246	238	228
Alzheimer Disease	79	72	68	60	50
Alzheimer Diseasemetabolism	72	65	61	53	43
Adult	62	55	51	43	33
Alzheimer Diseasemetabolismpathology	60	53	49	41	31