This is just an initial block to insert an intor

In [ ]:

```
import numpy as np
from sklearn import metrics
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans
from sklearn.datasets import fetch_20newsgroups
from sklearn.feature_extraction.text import TfidfVectorizer
from nltk.stem.snowball import SnowballStemmer
from nltk.tokenize import word_tokenize, sent_tokenize
```

In [ ]:

```
import pandas as pd

df = pd.read_csv("census-block-group-data.csv")
#df.drop([0], axis=0, inplace=True)
Arrival_df = pd.read_csv("MBTA-Bus-Arrival-Departure-Times_2023-01.csv")

df = df.drop(columns = ['FILEID','STUSAB','SUMLEV','GEOCODE','REGION', 'DIVISION','STATE
','COUNTY','COUSUB'])

Neighborhood_df = pd.read_csv("redistricting_data_tract20_nbhd_hhpopsize_ab-1.csv")
Neighborhood_df.columns = Neighborhood_df.iloc[0]

# Optionally, drop the first row from the DataFrame
Neighborhood_df = Neighborhood_df.drop(Neighborhood_df.index[0])
Bus_stops = pd.read_csv("MBTA_Systemwide_GTFS_Map.csv")
```

In [ ]:

```
Bus_stops.head()
```

Out[ ]:

	X	Y	OBJECTID	stop_id	stop_code	stop_name	stop_desc	platform_code	platform_name	stop_lat	..
0	-71.082754	42.330957	647997	1	1.0	Washington St opp Ruggles St	NaN	NaN	NaN	42.330957	..
1	-71.068787	42.330555	647998	10	10.0	Theo Glynn Way @ Newmarket Sq	NaN	NaN	NaN	42.330555	..
2	-71.062911	42.355692	647999	10000	10000.0	Tremont St opp Temple Pl	NaN	NaN	NaN	42.355692	..
3	-71.076237	42.331591	648000	10003	10003.0	Albany St opp Randall St	NaN	NaN	NaN	42.331591	..
4	-71.071280	42.335017	648001	10005	10005.0	Albany St opp E Concord St	NaN	NaN	NaN	42.335017	..

5 rows × 34 columns

In [ ]:

```
Bus_stops = Bus_stops[["stop_name","Neighborhood","Routes"]]
Bus_stops.describe()
```

Out[ ]:

	stop_name	Neighborhood	Routes
count	6879	1787	6046
unique	6082	26	726
top	Sullivan Square	Dorchester	230
freq	14	315	115

In [ ]:

```
Neighborhood_df = Neighborhood_df.iloc[:, :7]

Neighborhood_df.head()
```

Out[ ]:

	field concept	Total:	White alone	Black or African American alone	Hispanic or Latino	Asian, Native Hawaiian and Pacific Islander alone, all ages	Other Races or Multiple Races, all ages
1	Allston	24904	12536	1326	3259	6271	1512
2	Back Bay	18190	13065	690	1208	2410	817
3	Beacon Hill	9336	7521	252	537	630	396
4	Brighton	52047	32694	2414	5376	8703	2860
5	Charlestown	19120	13626	990	2075	1650	779

In [ ]:

```
Neighborhood_df['Total:'] = pd.to_numeric(Neighborhood_df['Total:'].str.replace(',', '')
, errors='coerce')
Neighborhood_df['White alone'] = pd.to_numeric(Neighborhood_df['White alone'].str.replac
e(',', ''), errors='coerce')
Neighborhood_df['Black or African American alone'] = pd.to_numeric(Neighborhood_df['Black
or African American alone'].str.replace(',', ''), errors='coerce')
Neighborhood_df['Hispanic or Latino'] = pd.to_numeric(Neighborhood_df['Hispanic or Latino
'].str.replace(',', ''), errors='coerce')
Neighborhood_df['Asian, Native Hawaiian and Pacific Islander alone, all ages'] = pd.to_nu
meric(Neighborhood_df['Asian, Native Hawaiian and Pacific Islander alone, all ages'].str.
replace(',', ''), errors='coerce')
# Neighborhood_df['Other Races or Multiple Races, all ages '] = pd.to_numeric(Neighborhoo
d_df['Other Races or Multiple Races, all ages '].str.replace(',', ''), errors='coerce')

Neighborhood_df.head()
```

Out[ ]:

	field concept	Total:	White alone	Black or African American alone	Hispanic or Latino	Asian, Native Hawaiian and Pacific Islander alone, all ages	Other Races or Multiple Races, all ages
1	Allston	24904	12536	1326	3259	6271	1512
2	Back Bay	18190	13065	690	1208	2410	817
3	Beacon Hill	9336	7521	252	537	630	396
4	Brighton	52047	32694	2414	5376	8703	2860
5	Charlestown	19120	13626	990	2075	1650	779

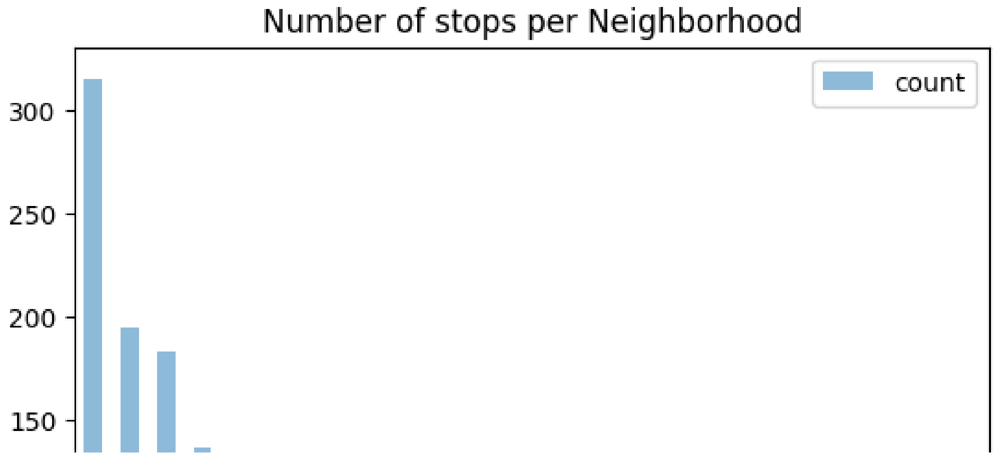
In [ ]:

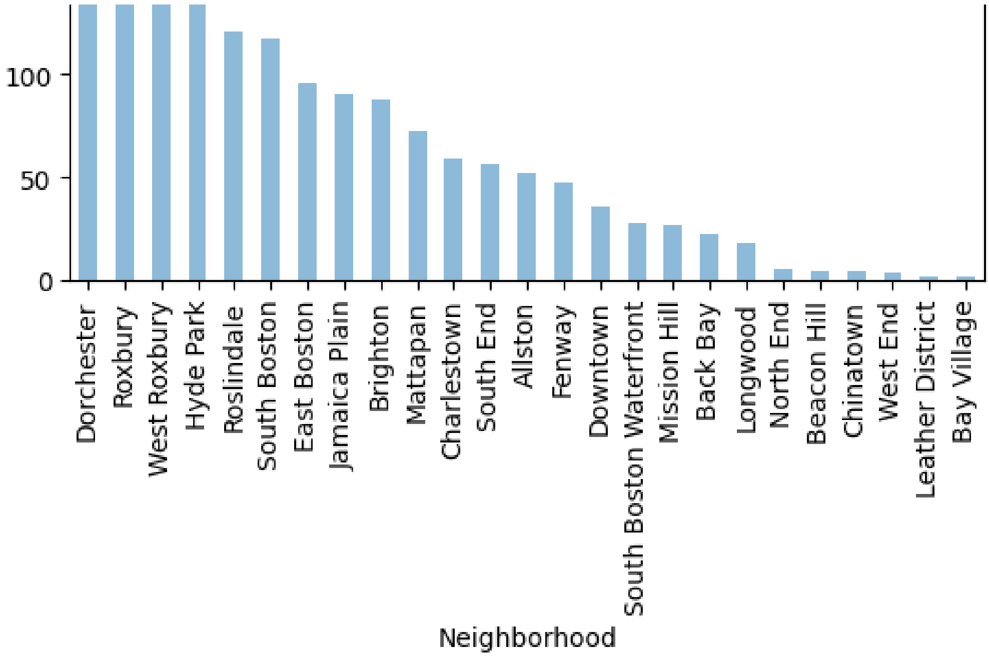
```
# if Neighborhood_df['Total:'].dtype == 'object':
#     Neighborhood_df['Total:'] = pd.to_numeric(Neighborhood_df['Total:'].str.replace(','
, ''), errors='coerce')

Neighborhood_Percentages_df = pd.DataFrame()
Neighborhood_Ints_df = pd.DataFrame()

Neighborhood_Percentages_df["Neighborhood"] = Neighborhood_df["field concept"]
```

```
Neighborhood_Percentages_df["White"] = np.nan
Neighborhood_Percentages_df["Black"] = np.nan
Neighborhood_Percentages_df["Hispanic"] = np.nan
Neighborhood_Percentages_df["Asian, Native Hawaiian and Pacific Islander"] = np.nan
Neighborhood_Percentages_df["Other"] = np.nan

Neighborhood_Ints_df["Neighborhood"] = Neighborhood_df["field concept"]
Neighborhood_Ints_df["White"] = np.nan
Neighborhood_Ints_df["Black"] = np.nan
Neighborhood_Ints_df["Hispanic"] = np.nan
Neighborhood_Ints_df["Asian, Native Hawaiian and Pacific Islander"] = np.nan
Neighborhood_Ints_df["Other"] = np.nan

race_categories = {
    "White": "White alone",
    "Black": "Black or African American alone",
    "Hispanic": "Hispanic or Latino",
    "Asian, Native Hawaiian and Pacific Islander": "Asian, Native Hawaiian and Pacific Is
lander alone, all ages",
    "Other": "Other Races or Multiple Races,  all ages"
}

for i, row in Neighborhood_df.iterrows():
    total_population = row['Total:']  # This should be a numeric value, not a string
    for new_col, old_col in race_categories.items():
        if isinstance(row[old_col], str):
            count = pd.to_numeric(row[old_col].replace(',', ''), errors='coerce')
        else:
            count = pd.to_numeric(row[old_col], errors='coerce')

        percentage = (count / total_population) * 100 if total_population else np.nan
        # percentage = count

        # Assign the percentage to the new DataFrame
        Neighborhood_Percentages_df.at[i, new_col] = percentage

for i, row in Neighborhood_df.iterrows():
    total_population = row['Total:']  # This should be a numeric value, not a string
    for new_col, old_col in race_categories.items():
        if isinstance(row[old_col], str):
            count = pd.to_numeric(row[old_col].replace(',', ''), errors='coerce')
        else:
            count = pd.to_numeric(row[old_col], errors='coerce')

        # percentage = (count / total_population) * 100 if total_population else np.nan
        percentage = count

        # Assign the percentage to the new DataFrame
        Neighborhood_Ints_df.at[i, new_col] = percentage
```

In [ ]:

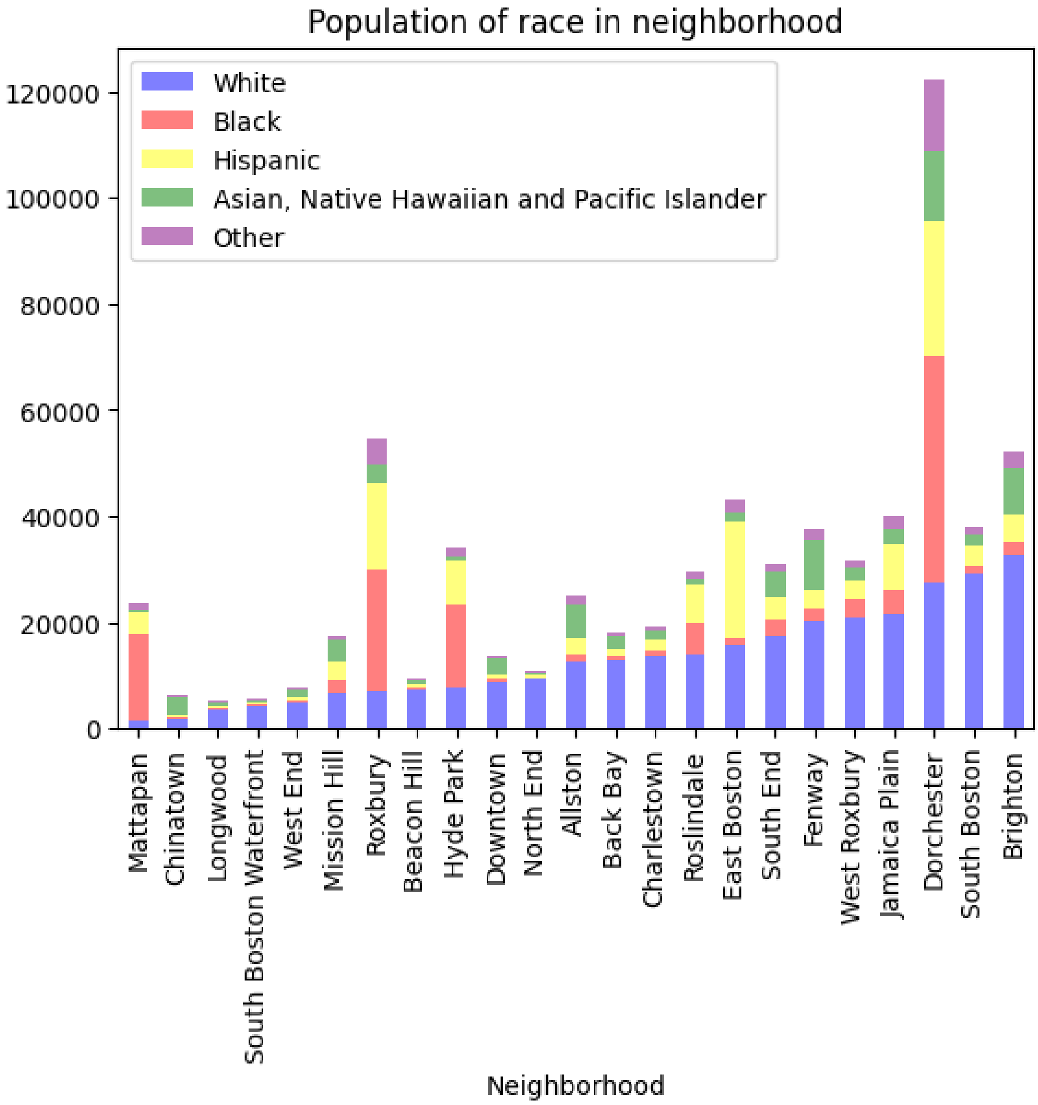
```
Bus_stops['Neighborhood'].value_counts().nlargest(25).plot(kind='bar', legend=True, alph
a=.5)
plt.title("Number of stops per Neighborhood")
plt.show()
```





In [ ]:

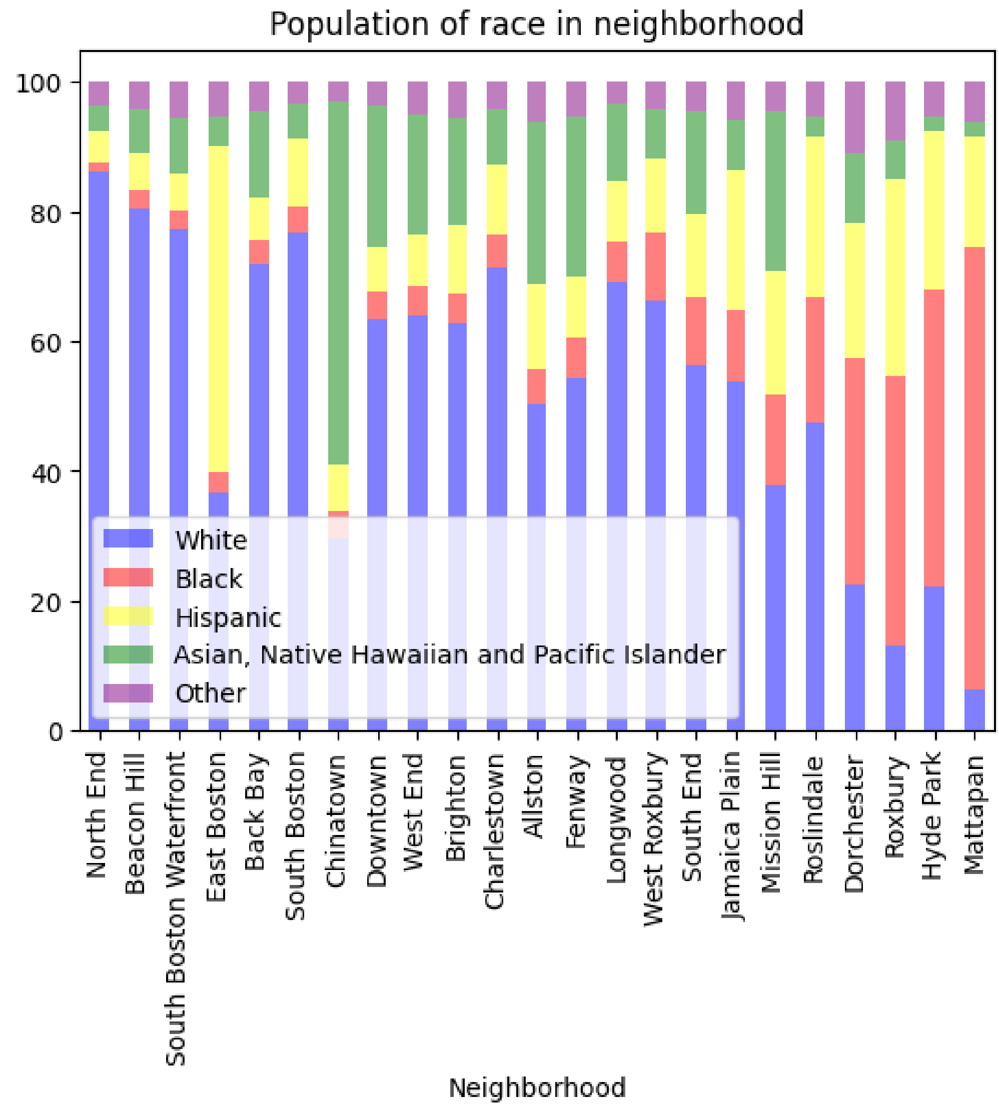
```
stacked_df = Neighborhood_Ints_df.sort_values(by = ["White"])
# races = ["White alone", "Black or African American alone","Hispanic or Latino","Asian,
Native Hawaiian and Pacific Islander alone, all ages", "Other Races or Multiple Races,  a
ll ages" ]
ax = stacked_df.plot(kind = 'bar',x='Neighborhood', stacked=True, color=['blue','red','y
ellow','green','purple'],legend=True, alpha=.5)
plt.title("Population of race in neighborhood")
plt.show()
```



In [ ]:

In [ ]:

```
stacked_percentage_df = Neighborhood_Percentages_df.sort_values(by = ["Black"])
# races = ["White alone", "Black or African American alone","Hispanic or Latino","Asian, Native Hawaiian and Pacific Islander alone, all ages", "Other Races or Multiple Races,  all ages" ]
ax = stacked_percentage_df.plot(kind = 'bar',x='Neighborhood', stacked=True, color=['blue','red','yellow','green','purple'],legend=True, alpha=.5)
plt.title("Population of race in neighborhood")
plt.show()
```



In [ ]:

```
Bus_stops = Bus_stops.loc[worst_on_time_routes]
merged = pd.merge(Bus_stops, Neighborhood_Percentages_df, left_on='Neighborhood', right_on='Neighborhood')
merged.head()
```

```
---------------------------------------------------------------------------
KeyError                                  Traceback (most recent call last)
Cell In[68], line 1
----> 1 Bus_stops = Bus_stops.loc[worst_on_time_routes]
      2 merged = pd.merge(Bus_stops, Neighborhood_Percentages_df, left_on='Neighborhood',
right_on='Neighborhood')
      3 merged.head()

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexing.py:1153, in _LocationIndexer.__getitem__(self, key)
   1150 axis = self.axis or 0
   1152 maybe_callable = com.apply_if_callable(key, self.obj)
-> 1153 return self._getitem_axis(maybe_callable, axis=axis)

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexing.py:1382, in _LocIndexer._getitem_axis(self, key, axis)
   1379     if hasattr(key, "ndim") and key.ndim > 1:
   1380         raise ValueError("Cannot index with multidimensional key")
   1380         raise ValueError("Cannot index with multidimensional key")
-> 1382     return self._getitem_iterable(key, axis=axis)
   1384 # nested tuple slicing
   1385 if is_nested_tuple(key, labels):

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexing.py:1322, in _LocInde
xer._getitem_iterable(self, key, axis)
   1319 self._validate_key(key, axis)
   1321 # A collection of keys
-> 1322 keyarr, indexer = self._get_listlike_indexer(key, axis)
   1323 return self.obj._reindex_with_indexers(
   1324     {axis: [keyarr, indexer]}, copy=True, allow_dups=True
   1325 )

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexing.py:1520, in _LocInde
xer._get_listlike_indexer(self, key, axis)
   1517 ax = self.obj._get_axis(axis)
   1518 axis_name = self.obj._get_axis_name(axis)
-> 1520 keyarr, indexer = ax._get_indexer_strict(key, axis_name)
   1522 return keyarr, indexer

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexes/base.py:6114, in Inde
x._get_indexer_strict(self, key, axis_name)
   6111 else:
   6112     keyarr, indexer, new_indexer = self._reindex_non_unique(keyarr)
-> 6114 self._raise_if_missing(keyarr, indexer, axis_name)
   6116 keyarr = self.take(indexer)
   6117 if isinstance(key, Index):
   6118     # GH 42790 - Preserve name from an Index

File /opt/homebrew/lib/python3.11/site-packages/pandas/core/indexes/base.py:6175, in Inde
x._raise_if_missing(self, key, indexer, axis_name)
   6173     if use_interval_msg:
   6174         key = list(key)
-> 6175     raise KeyError(f"None of [{key}] are in the [{axis_name}]")
   6177 not_found = list(ensure_index(key)[missing_mask.nonzero()[0]].unique())
   6178 raise KeyError(f"{not_found} not in index")

KeyError: "None of [Index(['14', '70A', '19', '701', '41', '747', '459', '448', '449', '9
703'], dtype='object')] are in the [index]"
```

In [ ]:

```
average_neighborhood = merged.groupby('Routes')[['White', 'Black', 'Hispanic', 'Asian, N
ative Hawaiian and Pacific Islander', 'Other']].mean()
average_neighborhood.head()
```

Out[ ]:

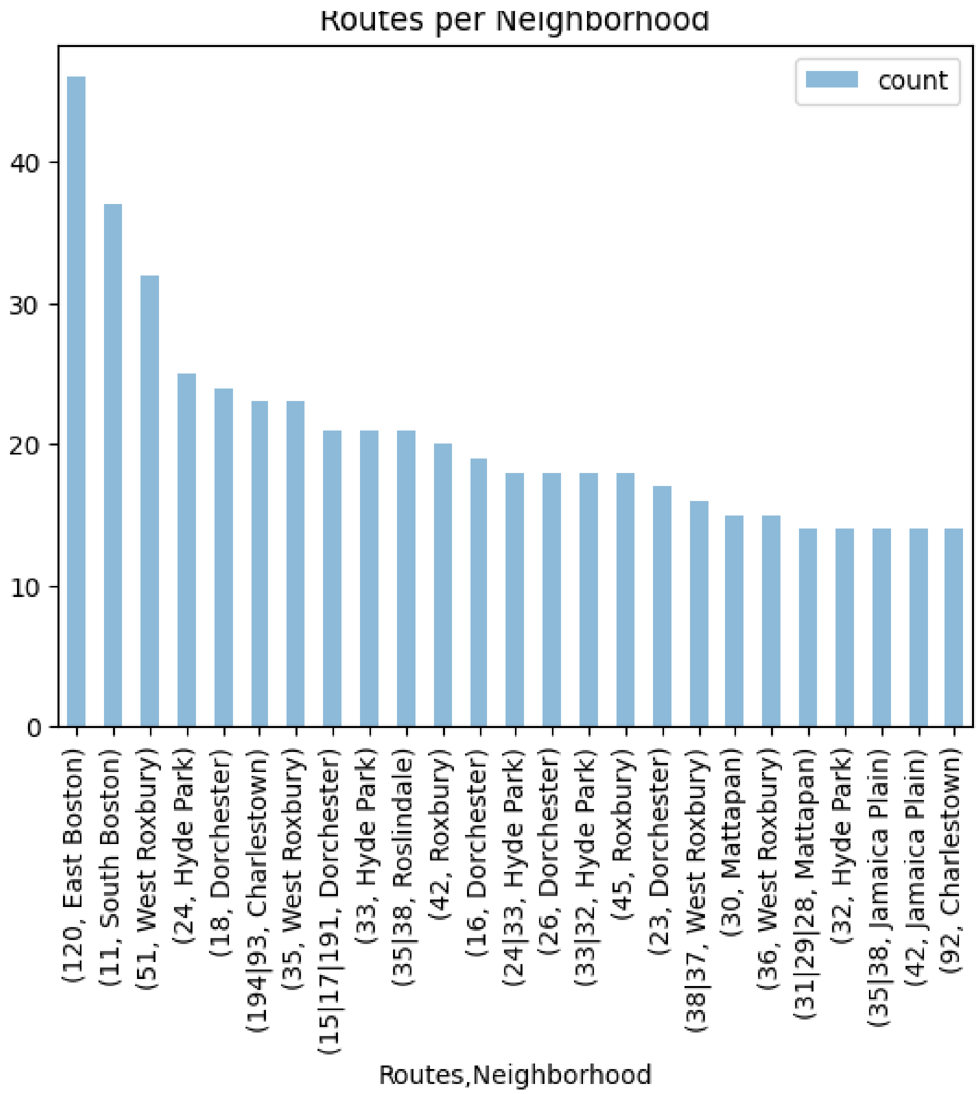
	White	Black	Hispanic	Asian, Native Hawaiian and Pacific Islander	Other
Routes					
1	34.158051	24.935417	20.861718	13.038985	7.005828
10	56.180430	10.545560	12.936837	15.774657	4.562516
104|105|109	71.265690	5.177824	10.852510	8.629707	4.074268
109|104|105	71.265690	5.177824	10.852510	8.629707	4.074268
10|170	61.395346	8.294805	10.838228	14.932784	4.538837

In [ ]:

```
average_neighborhood = merged.groupby('Routes')['Neighborhood']
```

In [ ]:

```
average_neighborhood.value_counts().nlargest(25).plot(kind='bar', legend=True, alpha=.5)
plt.title("Routes per Neighborhood")
plt.show()
```



In [1]:

```
# worst_on_time_routes = ['14', '70A', '19', '701', '41', '747', '459', '448', '449', '9
703']

# worst_routes_neighborhood = average_neighborhood.loc[worst_on_time_routes]
```

In [ ]:

```
```