## **City comparison**

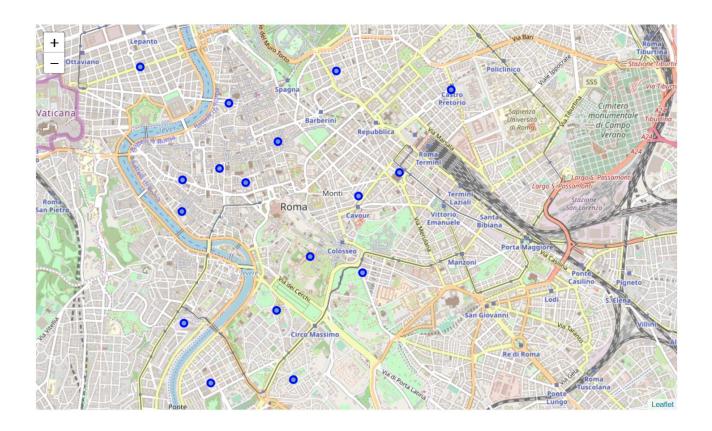
## Data section

The data are retrieve mainly on internet. An easy research made me create 3 csv files containing the neighborhoods of each downtown of interest, which were enriched with the geo coordinates.

Here an example for Rome, the other 2 cities follows the same examples.

1         TREVI         41.900978         12.483285           2         COLONNA         41.833718         12.753184           3         CAMPO MARZIO         41.904647         12.477055           4         PIGNA         41.897116         12.479196           5         PONTE         42.040346         12.853573           6         PARIONE         41.897358         12.471103           7         REGOLA         41.894375         12.471030           8         S. EUSTACHIO         41.898437         12.487416           10         S. ANGELO         42.134941         12.838770           11         R. XII – RIPA         41.884987         12.483107           12         TRASTEVERE         41.883765         12.471270           13         BORGO         41.840235         12.889186           14         CELIO         41.888552         12.494115           15         ESQUILINO         41.898044         12.49863           16         LUDOVISI         41.684213         12.776364           17         SALLUSTIANO         41.905911         12.505453           19         TESTACCIO         41.878065         12.474757           20		Neighbourhood	latitude	longitude	
2 COLONNA 41.833718 12.753184 3 CAMPO MARZIO 41.904647 12.477055 4 PIGNA 41.897116 12.479196 5 PONTE 42.040346 12.853573 6 PARIONE 41.897358 12.471103 7 REGOLA 41.894375 12.471030 8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907972 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	0	MONTI	41.895813	12.493587	
3 CAMPO MARZIO 41.904647 12.477055 4 PIGNA 41.897116 12.479196 5 PONTE 42.040346 12.853573 6 PARIONE 41.897358 12.471103 7 REGOLA 41.894375 12.471030 8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.898552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	1	TREVI	41.900978	12.483285 12.753184 12.477055	
4 PIGNA 41.897116 12.479196 5 PONTE 42.040346 12.853573 6 PARIONE 41.897358 12.471103 7 REGOLA 41.894375 12.471030 8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.471270 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	2	COLONNA	41.833718		
5         PONTE         42.040346         12.853573           6         PARIONE         41.897358         12.471103           7         REGOLA         41.894375         12.471030           8         S. EUSTACHIO         41.898437         12.475792           9         CAMPITELLI         41.890085         12.487416           10         S. ANGELO         42.134941         12.838770           11         R. XII – RIPA         41.884987         12.483107           12         TRASTEVERE         41.883765         12.471270           13         BORGO         41.840235         12.889186           14         CELIO         41.888552         12.494115           15         ESQUILINO         41.898044         12.498863           16         LUDOVISI         41.684213         12.776364           17         SALLUSTIANO         41.905911         12.505453           19         TESTACCIO         41.878065         12.474757           20         S. SABA         41.878352         12.485295	3	CAMPO MARZIO	41.904647		
6 PARIONE 41.897358 12.471103 7 REGOLA 41.894375 12.471030 8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907724 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	4	PIGNA	41.897116	12.479196	
7 REGOLA 41.894375 12.471030 8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.898552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	5	PONTE	42.040346	12.853573	
8 S. EUSTACHIO 41.898437 12.475792 9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907724 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	6	PARIONE	41.897358	12.471103 12.471030	
9 CAMPITELLI 41.890085 12.487416 10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907724 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	7	REGOLA	41.894375		
10 S. ANGELO 42.134941 12.838770 11 R. XII – RIPA 41.884987 12.483107 12 TRASTEVERE 41.883765 12.471270 13 BORGO 41.840235 12.889186 14 CELIO 41.888552 12.494115 15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907724 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	8	S. EUSTACHIO	41.898437	12.475792	
11       R. XII – RIPA       41.884987       12.483107         12       TRASTEVERE       41.883765       12.471270         13       BORGO       41.840235       12.889186         14       CELIO       41.888552       12.494115         15       ESQUILINO       41.898044       12.498863         16       LUDOVISI       41.684213       12.776364         17       SALLUSTIANO       41.907724       12.490797         18       CASTRO PRETORIO       41.905911       12.505453         19       TESTACCIO       41.878065       12.474757         20       S. SABA       41.878352       12.485295	9	CAMPITELLI	41.890085	12.487416	
12       TRASTEVERE       41.883765       12.471270         13       BORGO       41.840235       12.889186         14       CELIO       41.888552       12.494115         15       ESQUILINO       41.898044       12.498863         16       LUDOVISI       41.684213       12.776364         17       SALLUSTIANO       41.907724       12.490797         18       CASTRO PRETORIO       41.905911       12.505453         19       TESTACCIO       41.878065       12.474757         20       S. SABA       41.878352       12.485295	10	S. ANGELO	42.134941	12.838770	
13         BORGO         41.840235         12.889186           14         CELIO         41.888552         12.494115           15         ESQUILINO         41.898044         12.498863           16         LUDOVISI         41.684213         12.776364           17         SALLUSTIANO         41.907724         12.490797           18         CASTRO PRETORIO         41.905911         12.505453           19         TESTACCIO         41.878065         12.474757           20         S. SABA         41.878352         12.485295	11	R. XII – RIPA	41.884987	12.483107	
14         CELIO         41.888552         12.494115           15         ESQUILINO         41.898044         12.498863           16         LUDOVISI         41.684213         12.776364           17         SALLUSTIANO         41.907724         12.490797           18         CASTRO PRETORIO         41.905911         12.505453           19         TESTACCIO         41.878065         12.474757           20         S. SABA         41.878352         12.485295	12	TRASTEVERE	41.883765	12.471270	
15 ESQUILINO 41.898044 12.498863 16 LUDOVISI 41.684213 12.776364 17 SALLUSTIANO 41.907724 12.490797 18 CASTRO PRETORIO 41.905911 12.505453 19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	13	BORGO	41.840235	12.889186	
16         LUDOVISI         41.684213         12.776364           17         SALLUSTIANO         41.907724         12.490797           18         CASTRO PRETORIO         41.905911         12.505453           19         TESTACCIO         41.878065         12.474757           20         S. SABA         41.878352         12.485295	14	CELIO	41.888552	12.494115	
17       SALLUSTIANO       41.907724       12.490797         18       CASTRO PRETORIO       41.905911       12.505453         19       TESTACCIO       41.878065       12.474757         20       S. SABA       41.878352       12.485295	15	ESQUILINO	41.898044	12.498863	
18 CASTRO PRETORIO       41.905911       12.505453         19 TESTACCIO       41.878065       12.474757         20 S. SABA       41.878352       12.485295	16	LUDOVISI	41.684213	12.776364	
19 TESTACCIO 41.878065 12.474757 20 S. SABA 41.878352 12.485295	17	SALLUSTIANO	41.907724	12.490797	
<b>20</b> S. SABA 41.878352 12.485295	18	CASTRO PRETORIO	41.905911	12.505453	
	19	TESTACCIO	41.878065	12.474757	
21 PRATI 41.908078 12.465706	20	S. SABA	41.878352	12.485295	
	21	PRATI	41.908078	12.465706	

Such Neighborhoods have been also mapped thanks to folium:



Using Foursquare API, each neighborhood have been explored and its most popular venues (including their categories) have been save in a dataframe

	Neighbourh	nood Ne	ighboyrhood Latitude	Neighboyrhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
	0 MC	ITAC	41.895813	12.493587	Fatamorgana	41.895610	12.493304	Ice Cream Shop
	1 MC	ITAC	41.895813	12.493587	Trieste	41.896305	12.494132	Pizza Place
	2 MC	ITAC	41.895813	12.493587	Grezzo	41.896681	12.494535	Pastry Shop
	3 MC	ITAC	41.895813	12.493587	Black Market	41.897096	12.494645	Cocktail Bar
	4 MC	ITAC	41.895813	12.493587	Analemma Cafe	41.894763	12.491536	Bar
	5 MC	ITAC	41.895813	12.493587	Montipalace Hotel	41.895384	12.493839	Hotel
	6 MC	ITAC	41.895813	12.493587	Libreria Caffè Bohemien	41.895444	12.492863	Cocktail Bar
	7 MC	ITAC	41.895813	12.493587	Aromaticus	41.896840	12.494611	Salad Place
	8 MC	ITAC	41.895813	12.493587	Relais Monti	41.896606	12.494637	Bed & Breakfast
	9 MC	ITAC	41.895813	12.493587	Gelateria dell'Angeletto	41.894815	12.491431	Ice Cream Shop
1	0 MC	ITAC	41.895813	12.493587	The K Boutique Hotel	41.894849	12.493646	Hotel

Repeating this process for all 3 cities we obtain the dataframe that will be used for the cluster analysis