

PMF BL

Matematika i informatika – opšti smjer

Osnove računarskih sistema 2

Seminarski rad

Istraživanje podataka o kvalitetu života u svjetskim
gradovima

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Uvod

Istraživanje podataka je rađeno nad skupom City Quality of Life Dataset.

Skup se sastoji od 21 atributa i 266 instanci.

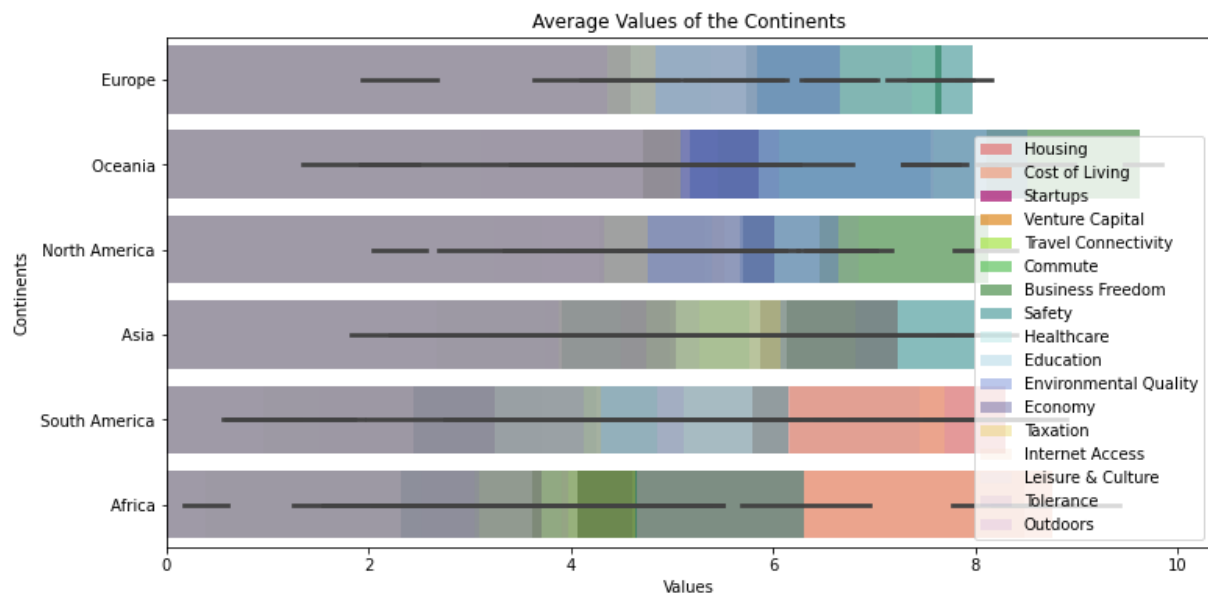
Atributi

1.	Unnamed	Indeksi
2.	UA_Name	Grad
3.	UA_Country	Država
4.	UA_Continent	Kontinent
5.	Housing	Stanovanje
6.	Cost of Living	Troškovi života
7.	Startups	Startups
8.	Venture Capital	Preduzetnički kapital
9.	Travel Connectivity	Putnička povezanost
10.	Commute	Putovanje na posao
11.	Business Freedom	Poslovna sloboda
12.	Safety	Sigurnost
13.	Healthcare	Zdravstvena zaštita
14.	Education	Obrazovanje
15.	Environmental Quality	Kvalitet životne sredine
16.	Economy	Ekonomija
17.	Taxation	Oporezivanje
18.	Internet Access	Pristup internetu
19.	Leisure & Culture	Raznoda i kultura
20.	Tolerance	Tolerancija
21.	Outdoors	Otvorenost

Tabelarni prikaz skupa podataka

	Unnamed	UA_Name	UA_Country	UA_Continent	Housing	Cost of Living	Startups	Venture Capital	Travel Connectivity	Commute	...	Safety	Healthcare	Education	Environmental Quality	Economy	Taxation	Internet Access	Leisure & Culture	Tolerance	Outdoors
0	0	Aarhus	Denmark	Europe	6.1315	4.015	2.8270	2.512	3.5360	6.31175	...	9.6165	8.704333	5.3665	7.63300	4.8865	5.0680	8.3730	3.1870	9.7385	4.1300
1	1	Adelaide	Australia	Oceania	6.3095	4.692	3.1365	2.640	1.7765	5.33625	...	7.9260	7.936667	5.1420	8.33075	6.0695	4.5885	4.3410	4.3285	7.8220	5.5310
2	2	Albuquerque	New Mexico	North America	7.2620	6.059	3.7720	1.493	1.4555	5.05575	...	1.3435	6.430000	4.1520	7.31950	6.5145	4.3460	5.3960	4.8900	7.0285	3.5155
3	3	Almaty	Kazakhstan	Asia	9.2820	9.333	2.4585	0.000	4.5920	5.87125	...	7.3090	4.545667	2.2830	3.85675	5.2690	8.5220	2.8860	2.9370	6.5395	5.5000
4	4	Amsterdam	Netherlands	Europe	3.0530	3.824	7.9715	6.107	8.3245	6.11850	...	8.5035	7.907333	6.1800	7.59725	5.0530	4.9550	4.5230	8.8740	8.3680	5.3070
...
261	261	Winnipeg	Canada	North America	7.5525	5.882	3.7965	0.000	1.4755	5.10450	...	6.0155	7.755667	5.3440	5.67475	5.8405	7.2745	4.9025	4.6880	6.6590	4.2430
262	262	Wroclaw	Poland	Europe	8.4520	8.434	3.5860	2.386	2.2445	4.95475	...	8.1655	6.781333	4.1615	4.96475	4.7615	5.0970	5.7615	4.7495	3.9045	4.0850
263	263	Yerevan	Armenia	Asia	9.6945	9.431	3.9265	0.000	1.7870	5.64925	...	8.8730	5.102000	0.0000	4.43950	3.4580	8.0550	3.9000	4.7370	7.3465	7.7765
264	264	Zagreb	Croatia	Europe	8.9100	7.194	4.4530	1.775	2.0280	4.83000	...	8.6575	7.266000	3.2110	7.33150	2.2365	7.9935	5.0335	4.9945	7.9545	4.8090
265	265	Zurich	Switzerland	Europe	1.4730	1.000	6.2035	3.872	7.7335	5.83950	...	9.0665	7.670333	7.2875	8.64300	6.5520	6.4285	7.2675	4.9655	8.7845	5.4000

Grafički prikaz vrijednosti atributa po kontinentima



Priprema podataka za klasterizaciju

Tabelarni prikaz skupa podataka nakon izostavljanja kolone Unnamed

	UA_Name	UA_Country	UA_Continent	Housing	Cost of Living	Startups	Venture Capital	Travel Connectivity	Commute	Business Freedom	Safety	Healthcare	Education	Environmental Quality	Economy	Taxation	Internet Access	Leisure & Culture	Tolerance	Outdoors
0	Aarhus	Denmark	Europe	6.1315	4.015	2.8270	2.512	3.5360	6.31175	9.940000	9.6165	8.704333	5.3665	7.63300	4.8865	5.0680	8.3730	3.1870	9.7385	4.1300
1	Adelaide	Australia	Oceania	6.3095	4.692	3.1365	2.640	1.7765	5.33625	9.399667	7.9260	7.936667	5.1420	8.33075	6.0695	4.5885	4.3410	4.3285	7.8220	5.5310
2	Albuquerque	New Mexico	North America	7.2620	6.059	3.7720	1.493	1.4555	5.05575	8.671000	1.3435	6.430000	4.1520	7.31950	6.5145	4.3460	5.3960	4.8900	7.0285	3.5155
3	Almaty	Kazakhstan	Asia	9.2820	9.333	2.4585	0.000	4.5920	5.87125	5.568000	7.3090	4.545667	2.2830	3.85675	5.2690	8.5220	2.8860	2.9370	6.5395	5.5000
4	Amsterdam	Netherlands	Europe	3.0530	3.824	7.9715	6.107	8.3245	6.11850	8.836667	8.5035	7.907333	6.1800	7.59725	5.0530	4.9550	4.5230	8.8740	8.3680	5.3070
...
261	Winnipeg	Canada	North America	7.5525	5.882	3.7965	0.000	1.4755	5.10450	8.966000	6.0155	7.755667	5.3440	5.67475	5.8405	7.2745	4.9025	4.6880	6.6590	4.2430
262	Wroclaw	Poland	Europe	8.4520	8.434	3.5860	2.386	2.2445	4.95475	5.704333	8.1655	6.781333	4.1615	4.96475	4.7615	5.0970	5.7615	4.7495	3.9045	4.0850
263	Yerevan	Armenia	Asia	9.6945	9.431	3.9265	0.000	1.7870	5.64925	6.501000	8.8730	5.102000	0.0000	4.43950	3.4580	8.0550	3.9000	4.7370	7.3465	7.7765
264	Zagreb	Croatia	Europe	8.9100	7.194	4.4530	1.775	2.0280	4.83000	5.720333	8.6575	7.266000	3.2110	7.33150	2.2365	7.9935	5.0335	4.9945	7.9545	4.8090
265	Zurich	Switzerland	Europe	1.4730	1.000	6.2035	3.872	7.7335	5.83950	8.888000	9.0665	7.670333	7.2875	8.64300	6.5520	6.4285	7.2675	4.9655	8.7845	5.4000

Provjera broja NaN vrijednosti unutar svake kolone

UA_Name	0
UA_Country	0
UA_Continent	0
Housing	0
Cost of Living	0
Startups	0
Venture Capital	0
Travel Connectivity	0
Commute	0
Business Freedom	0
Safety	0
Healthcare	0
Education	0
Environmental Quality	0
Economy	0
Taxation	0
Internet Access	0
Leisure & Culture	0
Tolerance	0
Outdoors	0

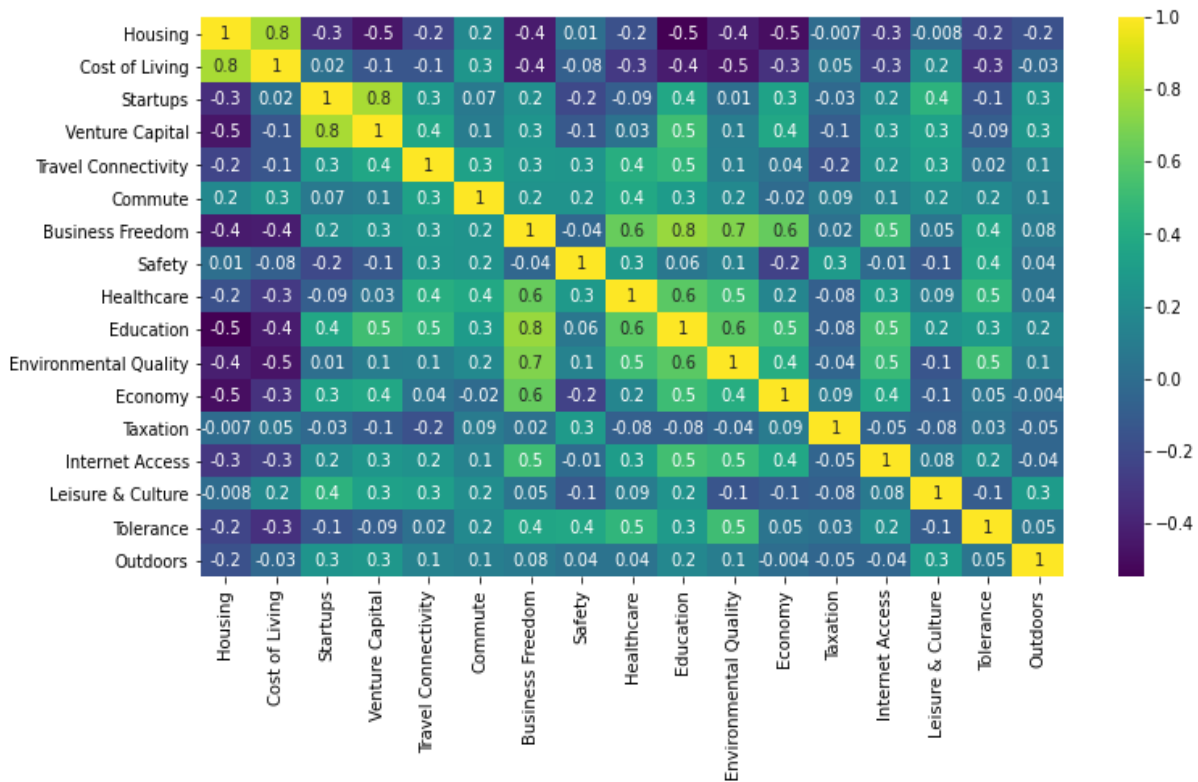
Kako skup podataka ne sadrži NaN vrijednosti, nije potrebno njihovo izbacivanje, niti zamjena nekom drugom vrijednošću.

Osnovni podaci o skupu

	Housing	Cost of Living	Startups	Venture Capital	Travel Connectivity	Commute	Business Freedom	Safety	Healthcare	Education	Environmental Quality	Economy	Taxation	Internet Access	Leisure & Culture	Tolerance	Outdoors
count	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000	266.000000
mean	6.467271	5.745940	4.595295	2.702515	3.446966	4.631770	7.330762	6.971635	6.796580	3.835224	6.078278	5.058141	4.953195	5.205013	5.710068	6.792742	4.492836
std	2.294482	2.447104	2.152841	2.553445	2.091628	1.523065	2.109427	1.746631	1.481896	2.213013	2.199913	1.517210	1.689790	1.872223	2.006776	1.724671	1.591768
min	0.000000	0.000000	0.000000	0.000000	0.500000	0.000000	0.000000	1.343500	0.000000	0.000000	1.000000	0.000000	0.500000	1.000000	0.000000	1.406000	0.500000
25%	5.149500	4.795000	3.097500	0.000000	1.703250	4.399625	5.771417	5.972375	6.064083	2.184375	4.328688	4.103000	3.920500	4.134000	4.448125	5.779875	3.698625
50%	6.726000	5.630500	4.214000	2.317500	2.921500	5.064375	8.403667	7.188500	6.780500	4.273250	6.480750	5.373500	4.759750	5.378750	5.706750	7.154500	4.733000
75%	8.312750	7.595500	5.790375	3.764750	4.766000	5.613188	8.836667	8.269125	8.054500	5.294375	7.887625	6.514500	5.954500	6.265250	7.062500	8.052125	5.500000
max	10.000000	10.000000	10.000000	10.000000	10.000000	6.728500	10.000000	10.000000	9.320667	9.711000	9.953250	9.390000	10.000000	9.716000	10.000000	9.738500	7.933000

Korelacija između kolona

	Housing	Cost of Living	Startups	Venture Capital	Travel Connectivity	Commute	Business Freedom	Safety	Healthcare	Education	Environmental Quality	Economy	Taxation	Internet Access	Leisure & Culture	Tolerance	Outdoors
Housing	1.000000	0.794576	-0.344616	-0.462969	-0.233817	0.176004	-0.434984	0.011744	-0.166979	-0.549433	-0.417733	-0.490245	-0.006933	-0.301744	-0.008200	-0.231671	-0.165499
Cost of Living	0.794576	1.000000	0.024625	-0.132262	-0.134216	0.258755	-0.423645	-0.080333	-0.291351	-0.430197	-0.467667	-0.327045	0.050611	-0.259348	0.184746	-0.336006	-0.030574
Startups	-0.344616	0.024625	1.000000	0.796214	0.276168	0.074896	0.215702	-0.209409	-0.094998	0.376239	0.009754	0.342311	-0.025140	0.193212	0.446968	-0.142096	0.253847
Venture Capital	-0.462969	-0.132262	0.796214	1.000000	0.368431	0.097133	0.250429	-0.119737	0.032858	0.524150	0.103033	0.373194	-0.101222	0.266309	0.332004	-0.094176	0.269300
Travel Connectivity	-0.233817	-0.134216	0.276168	0.368431	1.000000	0.335116	0.262558	0.260882	0.420599	0.467839	0.108372	0.038983	-0.163445	0.233239	0.312039	0.018287	0.137780
Commute	0.176004	0.258755	0.074896	0.097133	0.335116	1.000000	0.249281	0.247376	0.378433	0.297148	0.180436	-0.016677	0.088150	0.139976	0.204701	0.178782	0.106957
Business Freedom	-0.434984	-0.423645	0.215702	0.250429	0.262558	0.249281	1.000000	-0.039642	0.636899	0.757955	0.706070	0.633438	0.022459	0.518809	0.054772	0.362165	0.081170
Safety	0.011744	-0.080333	-0.209409	-0.119737	0.260882	0.247376	-0.039642	1.000000	0.283774	0.063285	0.139070	-0.241724	0.290702	-0.012387	-0.121699	0.374310	0.042885
Healthcare	-0.166979	-0.291351	-0.094998	0.032858	0.420599	0.378433	0.636899	0.283774	1.000000	0.605745	0.516984	0.158573	-0.078670	0.302419	0.092242	0.462240	0.038525
Education	-0.549433	-0.430197	0.376239	0.524150	0.467939	0.297148	0.757955	0.063285	0.605745	1.000000	0.601733	0.513191	-0.080942	0.530963	0.246393	0.290475	0.165344
Environmental Quality	-0.417733	-0.467667	0.009754	0.103033	0.108372	0.180436	0.706070	0.139070	0.516984	0.601733	1.000000	0.415545	-0.042959	0.491950	-0.142371	0.519564	0.102688
Economy	-0.490245	-0.327045	0.342311	0.373194	0.038983	-0.016677	0.633438	-0.241724	0.158573	0.513191	0.415545	1.000000	0.089817	0.372945	-0.096647	0.049305	-0.004326
Taxation	-0.006933	0.050611	-0.025140	-0.101222	-0.163445	0.088150	0.022459	0.290702	-0.078670	-0.080942	-0.042959	0.089817	1.000000	-0.051477	-0.077609	0.027594	-0.045732
Internet Access	-0.301744	-0.259348	0.193212	0.266309	0.233239	0.139976	0.518809	-0.012387	0.302419	0.530963	0.491950	0.372945	-0.051477	1.000000	0.079144	0.214512	-0.044351
Leisure & Culture	-0.008200	0.184746	0.446968	0.332004	0.312039	0.204701	0.054772	-0.121699	0.092242	0.246393	-0.142371	-0.096647	-0.077609	0.079144	1.000000	-0.099851	0.296840
Tolerance	-0.231671	-0.336006	-0.142096	-0.094176	0.018287	0.178782	0.362165	0.374310	0.462240	0.290475	0.519564	0.049305	0.027594	0.214512	-0.099851	1.000000	0.052211
Outdoors	-0.165499	-0.030574	0.253847	0.269300	0.137780	0.106957	0.081170	0.042885	0.038525	0.165344	0.102688	-0.004326	-0.045732	-0.044351	0.296840	0.052211	1.000000



Prikaz nove tabele nastale izostavljanjem kolona UA_Name, UA_Country i UA_Continent

	Housing	Cost of Living	Startups	Venture Capital	Travel Connectivity	Commute	Business Freedom	Safety	Healthcare	Education	Environmental Quality	Economy	Taxation	Internet Access	Leisure & Culture	Tolerance	Outdoors
0	6.1315	4.015	2.8270	2.512	3.5360	6.31175	9.940000	9.6165	8.704333	5.3665	7.63300	4.8865	5.0680	8.3730	3.1870	9.7385	4.1300
1	6.3095	4.692	3.1365	2.640	1.7765	5.33625	9.399667	7.9260	7.936667	5.1420	8.33075	6.0695	4.5885	4.3410	4.3285	7.8220	5.5310
2	7.2620	6.059	3.7720	1.493	1.4555	5.05575	8.671000	1.3435	6.430000	4.1520	7.31950	6.5145	4.3460	5.3960	4.8900	7.0285	3.5155
3	9.2820	9.333	2.4585	0.000	4.5920	5.87125	5.568000	7.3090	4.545667	2.2830	3.85675	5.2690	8.5220	2.8860	2.9370	6.5395	5.5000
4	3.0530	3.824	7.9715	6.107	8.3245	6.11850	8.836667	8.5035	7.907333	6.1800	7.59725	5.0530	4.9550	4.5230	8.8740	8.3680	5.3070
...
261	7.5525	5.882	3.7965	0.000	1.4755	5.10450	8.966000	6.0155	7.755667	5.3440	5.67475	5.8405	7.2745	4.9025	4.6880	6.6590	4.2430
262	8.4520	8.434	3.5860	2.386	2.2445	4.95475	5.704333	8.1655	6.781333	4.1615	4.96475	4.7615	5.0970	5.7615	4.7495	3.9045	4.0850
263	9.6945	9.431	3.9265	0.000	1.7870	5.64925	6.501000	8.8730	5.102000	0.0000	4.43950	3.4580	8.0550	3.9000	4.7370	7.3465	7.7765
264	8.9100	7.194	4.4530	1.775	2.0280	4.83000	5.720333	8.6575	7.266000	3.2110	7.33150	2.2365	7.9935	5.0335	4.9945	7.9545	4.8090
265	1.4730	1.000	6.2035	3.872	7.7335	5.83950	8.888000	9.0665	7.670333	7.2875	8.64300	6.5520	6.4285	7.2675	4.9655	8.7845	5.4000

Provjera broja infinity vrijednosti unutar skupa

Skup podataka ne sadrži infinity vrijednosti, te nije potrebno njihovo izbacivanje, niti zamjena nekom drugom vrijednošću.

Klasterizacija

KMeans

0	' Aarhus', ' Adelaide', ' Albuquerque', ' Amsterdam', ' Anchorage', ' Asheville', ' Atlanta', ' Auckland', ' Austin', ' Baltimore', ' Barcelona', ' Beijing', ' Belfast', ' Bergen', ' Berlin', ' Bern', ' Bilbao', ' Birmingham', ' Birmingham', ' Boise', ' Bologna', ' Bordeaux', ' Boston', ' Boulder', ' Bozeman', ' Brighton', ' Brisbane', ' Bristol', ' Brussels', ' Buffalo', ' Calgary', ' Cambridge', ' Cardiff', ' Charleston', ' Charlotte', ' Chattanooga', ' Chicago', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cologne', ' Colorado Springs', ' Columbus', ' Copenhagen', ' Cork', ' Dallas', ' Denver', ' Des Moines', ' Detroit', ' Dresden', ' Dubai', ' Dublin', ' Dusseldorf', ' Edinburgh', ' Edmonton', ' Eindhoven', ' Eugene', ' Florence', ' Fort Collins', ' Frankfurt', ' Fukuoka', ' Galway', ' Geneva', ' Glasgow', ' Gothenburg', ' Grenoble', ' Halifax', ' Hamburg', ' Hannover', ' Helsinki', ' Hong Kong', ' Honolulu', ' Houston', ' Indianapolis', ' Innsbruck', ' Jacksonville', ' Kansas City', ' Karlsruhe', ' Kyoto', ' Las Palmas de Gran Canaria', ' Las Vegas', ' Lausanne', ' Leeds', ' Leipzig', ' Lille', ' Lisbon', ' Liverpool', ' Ljubljana', ' London', ' Los Angeles', ' Louisville', ' Luxembourg', ' Lyon', ' Madison', ' Madrid', ' Malaga', ' Malmo', ' Manchester', ' Marseille', ' Melbourne', ' Miami', ' Milan', ' Milwaukee', ' Minneapolis-Saint Paul', ' Montreal', ' Munich', ' Nantes', ' Nashville', ' New Orleans', ' New York', ' Nice', ' Oklahoma City', ' Omaha', ' Orlando', ' Osaka', ' Oslo', ' Ottawa', ' Oulu', ' Oxford', ' Palo Alto', ' Paris', ' Perth', ' Philadelphia', ' Phoenix', ' Pittsburgh', ' Portland', ' Portland', ' Porto', ' Prague', ' Providence', ' Quebec', ' Raleigh', ' Reykjavik', ' Richmond', ' Rochester', ' Rome', ' Rotterdam', ' Salt Lake City', ' San Antonio', ' San Diego', ' San Francisco Bay Area', ' San Luis Obispo', ' Saskatoon', ' Seattle', ' Seoul', ' Seville', ' Shanghai', ' Singapore', ' St. Louis', ' Stockholm', ' Stuttgart', ' Sydney', ' Taipei', ' Tallinn', ' Tampa Bay Area', ' Tampere', ' Tartu', ' Tel Aviv', ' The Hague', ' Tokyo', ' Toronto', ' Toulouse', ' Turku', ' Uppsala', ' Utrecht', ' Valencia', ' Valletta', ' Vancouver', ' Victoria', ' Vienna', ' Vilnius', ' Washington', ' Wellington', ' Winnipeg', ' Zurich'
1	' Almaty', ' Andorra', ' Ankara', ' Asuncion', ' Athens', ' Baku', ' Bali', ' Bangkok', ' Beirut', ' Belgrade', ' Belize City', ' Bengaluru', ' Bogota', ' Bratislava', ' Brno', ' Bucharest', ' Budapest', ' Buenos Aires', ' Cairo', ' Cape Town', ' Caracas', ' Casablanca', ' Chennai', ' Chiang Mai', ' Chisinau', ' Cluj-Napoca', ' Curitiba', ' Dar es Salaam', ' Delhi', ' Doha', ' Florianopolis', ' Gdansk', ' Gibraltar', ' Guadalajara', ' Guatemala City', ' Havana', ' Ho Chi Minh City', ' Hyderabad', ' Istanbul', ' Jakarta', ' Johannesburg', ' Kathmandu', ' Kiev', ' Kingston', ' Knoxville', ' Krakow', ' Kuala Lumpur', ' Lagos', ' La Paz', ' Lima', ' Lviv', ' Managua', ' Manila', ' Medellin', ' Memphis', ' Mexico City', ' Minsk', ' Montevideo', ' Moscow', ' Mumbai', ' Nairobi', ' Naples', ' Nicosia', ' Panama', ' Phnom Penh', ' Phuket', ' Porto Alegre', ' Quito', ' Riga', ' Rio De Janeiro', ' Riyadh', ' Saint Petersburg', ' San Jose', ' San Juan', ' San Salvador', ' Santiago', ' Santo Domingo', ' Sao Paulo', ' Sarajevo', ' Skopje', ' Sofia', ' Tashkent', ' Tbilisi', ' Tehran', ' Thessaloniki', ' Tunis', ' Turin', ' Warsaw', ' Wroclaw', ' Yerevan', ' Zagreb'
0	' Aarhus', ' Adelaide', ' Albuquerque', ' Anchorage', ' Asheville', ' Auckland', ' Baltimore', ' Belfast', ' Bergen', ' Bern', ' Bilbao', ' Birmingham', ' Birmingham', ' Boise', ' Bologna', ' Bordeaux', ' Bozeman', ' Brighton', ' Brisbane', ' Bristol', ' Brno', ' Buffalo', ' Calgary', ' Cambridge', ' Cardiff', ' Charleston', ' Charlotte', ' Chattanooga', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cologne', ' Colorado Springs', ' Cork', ' Des Moines', ' Doha', ' Dresden', ' Dusseldorf', ' Edinburgh', ' Edmonton', ' Eindhoven', ' Eugene', ' Florence', ' Fort Collins', ' Frankfurt', ' Fukuoka', ' Galway', ' Gdansk', ' Glasgow', ' Gothenburg', ' Grenoble', ' Halifax', ' Hannover', ' Honolulu', ' Indianapolis', ' Innsbruck', ' Jacksonville', ' Kansas City', ' Karlsruhe', ' Knoxville', ' Kyoto', ' Las

	Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lisbon', 'Liverpool', 'Ljubljana', 'Louisville', 'Luxembourg', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Marseille', 'Memphis', 'Milwaukee', 'Nantes', 'Nashville', 'New Orleans', 'Nice', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Ottawa', 'Oulu', 'Panama', 'Perth', 'Portland', 'Porto', 'Prague', 'Providence', 'Quebec', 'Reykjavik', 'Richmond', 'Riga', 'Rochester', 'Rome', 'Rotterdam', 'San Antonio', 'San Luis Obispo', 'Saskatoon', 'Seville', 'Stuttgart', 'Taipei', 'Tallinn', 'Tampere', 'Tartu', 'The Hague', 'Toulouse', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Valletta', 'Victoria', 'Vilnius', 'Wellington', 'Winnipeg'
1	'Almaty', 'Andorra', 'Ankara', 'Asuncion', 'Athens', 'Baku', 'Bali', 'Bangkok', 'Beirut', 'Belgrade', 'Belize City', 'Bengaluru', 'Bogota', 'Bratislava', 'Bucharest', 'Budapest', 'Buenos Aires', 'Cairo', 'Cape Town', 'Caracas', 'Casablanca', 'Chennai', 'Chiang Mai', 'Chisinau', 'Cluj-Napoca', 'Curitiba', 'Dar es Salaam', 'Delhi', 'Florianopolis', 'Gibraltar', 'Guadalajara', 'Guatemala City', 'Havana', 'Ho Chi Minh City', 'Hyderabad', 'Istanbul', 'Jakarta', 'Johannesburg', 'Kathmandu', 'Kiev', 'Kingston', 'Krakow', 'Kuala Lumpur', 'Lagos', 'La Paz', 'Lima', 'Lviv', 'Managua', 'Manila', 'Medellin', 'Mexico City', 'Minsk', 'Montevideo', 'Mumbai', 'Nairobi', 'Naples', 'Nicosia', 'Phnom Penh', 'Phuket', 'Porto Alegre', 'Quito', 'Rio De Janeiro', 'Riyadh', 'Saint Petersburg', 'San Jose', 'San Juan', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Skopje', 'Sofia', 'Tashkent', 'Tbilisi', 'Tehran', 'Thessaloniki', 'Tunis', 'Turin', 'Warsaw', 'Wroclaw', 'Yerevan', 'Zagreb'
2	'Amsterdam', 'Atlanta', 'Austin', 'Barcelona', 'Beijing', 'Berlin', 'Boston', 'Boulder', 'Brussels', 'Chicago', 'Columbus', 'Copenhagen', 'Dallas', 'Denver', 'Detroit', 'Dubai', 'Dublin', 'Geneva', 'Hamburg', 'Helsinki', 'Hong Kong', 'Houston', 'London', 'Los Angeles', 'Manchester', 'Melbourne', 'Miami', 'Milan', 'Minneapolis-Saint Paul', 'Montreal', 'Moscow', 'Munich', 'New York', 'Oslo', 'Oxford', 'Palo Alto', 'Paris', 'Philadelphia', 'Phoenix', 'Pittsburgh', 'Portland', 'Raleigh', 'Salt Lake City', 'San Diego', 'San Francisco Bay Area', 'Seattle', 'Seoul', 'Shanghai', 'Singapore', 'St. Louis', 'Stockholm', 'Sydney', 'Tampa Bay Area', 'Tel Aviv', 'Tokyo', 'Toronto', 'Vancouver', 'Vienna', 'Washington', 'Zurich'

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Anchorage', 'Asheville', 'Auckland', 'Baltimore', 'Belfast', 'Bergen', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Boise', 'Bologna', 'Bordeaux', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Buffalo', 'Calgary', 'Cambridge', 'Cardiff', 'Charleston', 'Charlotte', 'Chattanooga', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cologne', 'Colorado Springs', 'Columbus', 'Cork', 'Des Moines', 'Doha', 'Dresden', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Frankfurt', 'Galway', 'Gdansk', 'Glasgow', 'Gothenburg', 'Grenoble', 'Halifax', 'Hamburg', 'Hannover', 'Honolulu', 'Indianapolis', 'Innsbruck', 'Jacksonville', 'Kansas City', 'Karlsruhe', 'Knoxville', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lisbon', 'Liverpool', 'Ljubljana', 'Louisville', 'Luxembourg', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Manchester', 'Marseille', 'Memphis', 'Milan', 'Milwaukee', 'Nantes', 'Nashville', 'New Orleans', 'Nice', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Ottawa', 'Oulu', 'Oxford', 'Perth', 'Pittsburgh', 'Porto', 'Prague', 'Quebec', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rochester', 'Rome', 'Rotterdam', 'San Antonio', 'Saskatoon', 'Seville', 'St. Louis', 'Stuttgart', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'The Hague', 'Toulouse', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Victoria', 'Vienna', 'Vilnius', 'Wellington', 'Winnipeg'
1	'Amsterdam', 'Atlanta', 'Austin', 'Barcelona', 'Beijing', 'Berlin', 'Boston', 'Boulder', 'Brussels', 'Chicago', 'Copenhagen', 'Dallas', 'Denver', 'Detroit', 'Dubai', 'Dublin', 'Geneva', 'Helsinki', 'Hong Kong', 'Houston', 'London', 'Los Angeles', 'Melbourne', 'Miami', 'Minneapolis-Saint Paul', 'Montreal', 'Munich', 'New York', 'Oslo', 'Palo Alto', 'Paris', 'Philadelphia', 'Phoenix', 'Portland', 'Salt Lake City', 'San Diego', 'San Francisco Bay Area', 'Seattle', 'Seoul', 'Shanghai', 'Singapore', 'Stockholm', 'Sydney', 'Tel Aviv', 'Tokyo', 'Toronto', 'Vancouver', 'Washington', 'Zurich'
2	'Almaty', 'Ankara', 'Asuncion', 'Athens', 'Baku', 'Bangkok', 'Beirut', 'Belgrade', 'Bengaluru', 'Bogota', 'Bratislava', 'Bucharest', 'Budapest', 'Buenos Aires', 'Cairo', 'Cape Town', 'Caracas', 'Casablanca', 'Chennai', 'Chiang Mai', 'Chisinau', 'Cluj-Napoca', 'Curitiba', 'Dar es Salaam', 'Delhi', 'Florianopolis', 'Guadalajara', 'Guatemala City', 'Havana', 'Ho Chi Minh City', 'Hyderabad', 'Istanbul', 'Jakarta', 'Johannesburg', 'Kathmandu', 'Kiev', 'Kingston', 'Krakow', 'Kuala Lumpur', 'Lagos', 'Lima', 'Lviv', 'Manila', 'Medellin', 'Mexico City', 'Minsk', 'Montevideo', 'Moscow', 'Mumbai', 'Nairobi', 'Naples', 'Nicosia', 'Phnom Penh', 'Phuket', 'Porto Alegre', 'Quito', 'Rio De Janeiro', 'Riyadh', 'Saint Petersburg', 'San Jose', 'San Juan', 'San

	Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Skopje', 'Sofia', 'Tbilisi', 'Tehran', 'Thessaloniki', 'Tunis', 'Turin', 'Warsaw', 'Wroclaw', 'Yerevan', 'Zagreb'
3	'Andorra', 'Bali', 'Belize City', 'Bozeman', 'Fort Collins', 'Fukuoka', 'Gibraltar', 'Kyoto', 'La Paz', 'Managua', 'Panama', 'Portland', 'Providence', 'San Luis Obispo', 'Tashkent', 'Valletta'

	Klaster	Broj klastera	Silhouette Score
0	KMeans	2	0.25
1	KMeans	3	0.19
2	KMeans	4	0.22

Agglomerative Clustering

0	'Almaty', 'Andorra', 'Ankara', 'Asuncion', 'Baku', 'Bali', 'Bangkok', 'Beirut', 'Belgrade', 'Belize City', 'Bengaluru', 'Bogota', 'Bucharest', 'Buenos Aires', 'Cairo', 'Cape Town', 'Caracas', 'Casablanca', 'Chennai', 'Chiang Mai', 'Chisinau', 'Curitiba', 'Dar es Salaam', 'Delhi', 'Florianopolis', 'Gibraltar', 'Guadalajara', 'Guatemala City', 'Havana', 'Ho Chi Minh City', 'Hyderabad', 'Istanbul', 'Jakarta', 'Johannesburg', 'Kathmandu', 'Kiev', 'Kingston', 'Kuala Lumpur', 'Lagos', 'La Paz', 'Lima', 'Lviv', 'Managua', 'Manila', 'Medellin', 'Mexico City', 'Minsk', 'Montevideo', 'Moscow', 'Mumbai', 'Nairobi', 'Nicosia', 'Panama', 'Phnom Penh', 'Phuket', 'Porto Alegre', 'Quito', 'Rio De Janeiro', 'Riyadh', 'Saint Petersburg', 'San Jose', 'San Juan', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Skopje', 'Tashkent', 'Tbilisi', 'Tehran', 'Tunis', 'Valletta', 'Yerevan'
1	'Aarhus', 'Adelaide', 'Albuquerque', 'Amsterdam', 'Anchorage', 'Asheville', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baltimore', 'Barcelona', 'Beijing', 'Belfast', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Budapest', 'Buffalo', 'Calgary', 'Cambridge', 'Cardiff', 'Charleston', 'Charlotte', 'Chattanooga', 'Chicago', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Dallas', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Halifax', 'Hamburg', 'Hannover', 'Helsinki', 'Hong Kong', 'Honolulu', 'Houston', 'Indianapolis', 'Innsbruck', 'Jacksonville', 'Kansas City', 'Karlsruhe', 'Knoxville', 'Krakow', 'Kyoto', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Manchester', 'Marseille', 'Melbourne', 'Memphis', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Montreal', 'Munich', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Palo Alto', 'Paris', 'Perth', 'Philadelphia', 'Phoenix', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Prague', 'Providence', 'Quebec', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rochester', 'Rome', 'Rotterdam', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Luis Obispo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Zagreb', 'Zurich'

0	' Aarhus', ' Adelaide', ' Albuquerque', ' Amsterdam', ' Anchorage', ' Asheville', ' Athens', ' Atlanta', ' Auckland', ' Austin', ' Baltimore', ' Barcelona', ' Beijing', ' Belfast', ' Bergen', ' Berlin', ' Bern', ' Bilbao', ' Birmingham', ' Birm ingham', ' Boise', ' Bologna', ' Bordeaux', ' Boston', ' Boulder', ' Bozeman', ' Bratislava', ' Brighton', ' Brisbane', ' Bristol', ' Brno', ' Brussels', ' Budapest', ' Buffalo', ' Calgary', ' Cambridge', ' Cardiff', ' Charleston', ' Charlotte', ' Chattanooga', ' Chicago', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cluj-Napoca', ' Cologne', ' Colorado Springs', ' Columbus', ' Copenhagen', ' Cork', ' Dallas', ' Denver', ' Des Moines', ' Detroit', ' Doha', ' Dresden', ' Dubai', ' Dublin', ' Dusseldorf', ' Edinburgh', ' Edmonton', ' Eindhoven', ' Eugene', ' Florence', ' Fort Collins', ' Frankfurt', ' Fukuoka', ' Galway', ' Gdansk', ' Geneva', ' Glasgow', ' Gothenburg', ' Grenoble', ' Halifax', ' Hamburg', ' Hannover', ' Helsinki', ' Hong Kong', ' Honolulu', ' Houston', ' Indianapolis', ' Innsbruck', ' Jacksonville', ' Kansas City', ' K arlsruhe', ' Knoxville', ' Krakow', ' Kyoto', ' Las Palmas de Gran Canaria', ' Las Vegas', ' Lausanne', ' Leeds', ' Leip zig', ' Lille', ' Lisbon', ' Liverpool', ' Ljubljana', ' London', ' Los Angeles', ' Louisville', ' Luxembourg', ' Lyon', ' Madi son', ' Madrid', ' Malaga', ' Malmo', ' Manchester', ' Marseille', ' Melbourne', ' Memphis', ' Miami', ' Milan', ' Mi lwaukee', ' Minneapolis-Saint Paul', ' Montreal', ' Munich', ' Nantes', ' Naples', ' Nashville', ' New Orleans', ' Ne w York', ' Nice', ' Oklahoma City', ' Omaha', ' Orlando', ' Osaka', ' Oslo', ' Ottawa', ' Oulu', ' Oxford', ' Palo Alto', ' Paris', ' Perth', ' Philadelphia', ' Phoenix', ' Pittsburgh', ' Portland', ' Portland', ' Porto', ' Prague', ' Providence', ' Quebec', ' Raleigh', ' Reykjavik', ' Richmond', ' Riga', ' Rochester', ' Rome', ' Rotterdam', ' Salt Lake City', ' San A ntonio', ' San Diego', ' San Francisco Bay Area', ' San Luis Obispo', ' Saskatoon', ' Seattle', ' Seoul', ' Seville', ' Sha nghai', ' Singapore', ' Sofia', ' St. Louis', ' Stockholm', ' Stuttgart', ' Sydney', ' Taipei', ' Tallinn', ' Tampa Bay Area', ' Tampere', ' Tartu', ' Tel Aviv', ' The Hague', ' Thessaloniki', ' Tokyo', ' Toronto', ' Toulouse', ' Turin', ' Turku', ' Uppsala', ' Utrecht', ' Valencia', ' Vancouver', ' Victoria', ' Vienna', ' Vilnius', ' Warsaw', ' Washington', ' Wellingt on', ' Winnipeg', ' Wroclaw', ' Zagreb', ' Zurich'
1	' Almaty', ' Ankara', ' Asuncion', ' Baku', ' Bangkok', ' Beirut', ' Belgrade', ' Bengaluru', ' Bogota', ' Bucharest', ' B uenos Aires', ' Cairo', ' Cape Town', ' Casablanca', ' Chennai', ' Chiang Mai', ' Chisinau', ' Curitiba', ' Dar es Salaa m', ' Delhi', ' Florianopolis', ' Guadalajara', ' Guatemala City', ' Ho Chi Minh City', ' Hyderabad', ' Istanbul', ' Jaka rta', ' Johannesburg', ' Kathmandu', ' Kiev', ' Kingston', ' Kuala Lumpur', ' Lagos', ' Lima', ' Lviv', ' Manila', ' Mede llin', ' Mexico City', ' Minsk', ' Montevideo', ' Moscow', ' Mumbai', ' Nairobi', ' Nicosia', ' Phnom Penh', ' Phuket', ' Porto Alegre', ' Quito', ' Rio De Janeiro', ' Riyadh', ' Saint Petersburg', ' San Jose', ' San Salvador', ' Santiago', ' Santo Domingo', ' Sao Paulo', ' Sarajevo', ' Skopje', ' Tbilisi', ' Tehran', ' Tunis', ' Yerevan'
2	' Andorra', ' Bali', ' Belize City', ' Caracas', ' Gibraltar', ' Havana', ' La Paz', ' Managua', ' Panama', ' San Juan', ' Ta shkent', ' Valletta'

0	' Amsterdam', ' Atlanta', ' Austin', ' Beijing', ' Berlin', ' Boston', ' Boulder', ' Chicago', ' Cologne', ' Copenhagen', ' Dallas', ' Denver', ' Frankfurt', ' Hamburg', ' Helsinki', ' Hong Kong', ' Houston', ' London', ' Los Angeles', ' Melbo urne', ' Miami', ' Minneapolis-Saint Paul', ' Montreal', ' Munich', ' New York', ' Osaka', ' Palo Alto', ' Paris', ' Phil adelphia', ' Pittsburgh', ' Portland', ' Raleigh', ' Salt Lake City', ' San Diego', ' San Francisco Bay Area', ' Seattle', ' Seoul', ' Shanghai', ' Singapore', ' Stockholm', ' Sydney', ' Tel Aviv', ' Tokyo', ' Toronto', ' Vancouver', ' Vienna', ' Washington'
1	' Aarhus', ' Adelaide', ' Albuquerque', ' Anchorage', ' Asheville', ' Athens', ' Auckland', ' Baltimore', ' Barcelona', ' Belfast', ' Bergen', ' Bern', ' Bilbao', ' Birmingham', ' Birmingham', ' Boise', ' Bologna', ' Bordeaux', ' Bozeman', ' Bratislava', ' Brighton', ' Brisbane', ' Bristol', ' Brno', ' Brussels', ' Budapest', ' Buffalo', ' Calgary', ' Cambridge', ' Cardiff', ' Charleston', ' Charlotte', ' Chattanooga', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cluj-Napoca', ' Col orado Springs', ' Columbus', ' Cork', ' Des Moines', ' Detroit', ' Doha', ' Dresden', ' Dubai', ' Dublin', ' Dusseldorf', ' Edinburgh', ' Edmonton', ' Eindhoven', ' Eugene', ' Florence', ' Fort Collins', ' Fukuoka', ' Galway', ' Gdansk', ' G eneva', ' Glasgow', ' Gothenburg', ' Grenoble', ' Halifax', ' Hannover', ' Honolulu', ' Indianapolis', ' Innsbruck', ' J acksonville', ' Kansas City', ' Karlsruhe', ' Knoxville', ' Krakow', ' Kyoto', ' Las Palmas de Gran Canaria', ' Las Vega s', ' Lausanne', ' Leeds', ' Leipzig', ' Lille', ' Lisbon', ' Liverpool', ' Ljubljana', ' Louisville', ' Luxembourg', ' Lyon', ' Madison', ' Madrid', ' Malaga', ' Malmo', ' Manchester', ' Marseille', ' Memphis', ' Milan', ' Milwaukee', ' Nantes', ' Naples', ' Nashville', ' New Orleans', ' Nice', ' Oklahoma City', ' Omaha', ' Orlando', ' Oslo', ' Ottawa', ' Oulu', ' Oxford', ' Perth', ' Phoenix', ' Portland', ' Porto', ' Prague', ' Providence', ' Quebec', ' Reykjavik', ' Richmond', ' Ri ga', ' Rochester', ' Rome', ' Rotterdam', ' San Antonio', ' San Luis Obispo', ' Saskatoon', ' Seville', ' Sofia', ' St. Lo uis', ' Stuttgart', ' Taipei', ' Tallinn', ' Tampa Bay Area', ' Tampere', ' Tartu', ' The Hague', ' Thessaloniki', ' Toulou se', ' Turin', ' Turku', ' Uppsala', ' Utrecht', ' Valencia', ' Victoria', ' Vilnius', ' Warsaw', ' Wellington', ' Winnipeg',

	'Wroclaw', 'Zagreb', 'Zurich'
2	'Andorra', 'Bali', 'Belize City', 'Caracas', 'Gibraltar', 'Havana', 'La Paz', 'Managua', 'Panama', 'San Juan', 'Tashkent', 'Valletta'
3	'Almaty', 'Ankara', 'Asuncion', 'Baku', 'Bangkok', 'Beirut', 'Belgrade', 'Bengaluru', 'Bogota', 'Bucharest', 'Buenos Aires', 'Cairo', 'Cape Town', 'Casablanca', 'Chennai', 'Chiang Mai', 'Chisinau', 'Curitiba', 'Dar es Salaam', 'Delhi', 'Florianopolis', 'Guadalajara', 'Guatemala City', 'Ho Chi Minh City', 'Hyderabad', 'Istanbul', 'Jakarta', 'Johannesburg', 'Kathmandu', 'Kiev', 'Kingston', 'Kuala Lumpur', 'Lagos', 'Lima', 'Lviv', 'Manila', 'Medellin', 'Mexico City', 'Minsk', 'Montevideo', 'Moscow', 'Mumbai', 'Nairobi', 'Nicosia', 'Phnom Penh', 'Phuket', 'Porto Alegre', 'Quito', 'Rio De Janeiro', 'Riyadh', 'Saint Petersburg', 'San Jose', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Skopje', 'Tbilisi', 'Tehran', 'Tunis', 'Yerevan'

	Klaster	Broj klastera	Silhouette Score
0	Agglomerative	2	0.25
1	Agglomerative	3	0.24
2	Agglomerative	4	0.19

DBSCAN

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Caracas', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Dar es Salaam', 'Delhi', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'La Paz', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Managua', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Mumbai', 'Munich', 'Nairobi', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Palo Alto', 'Panama', 'Paris', 'Perth', 'Philadelphia', 'Phnom Penh', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Jose', 'San Juan', 'San Luis Obispo', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tashkent', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Up
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	psala', 'Utrecht', 'Valencia', 'Valletta', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb', 'Zurich'
-1	'Andorra', 'Gibraltar'

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Caracas', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Dar es Salaam', 'Delhi', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'La Paz', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Managua', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Mumbai', 'Munich', 'Nairobi', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Palo Alto', 'Panama', 'Paris', 'Perth', 'Philadelphia', 'Phnom Penh', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Jose', 'San Juan', 'San Luis Obispo', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tashkent', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Valletta', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb', 'Zurich'
-1	'Andorra', 'Gibraltar'

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Caracas', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Dar es Salaam', 'Delhi', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'La Paz', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Managua', 'Ma
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	nchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Mumbai', 'Munich', 'Nairobi', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Palo Alto', 'Panama', 'Paris', 'Perth', 'Philadelphia', 'Phnom Penh', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Jose', 'San Juan', 'San Luis Obispo', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tashkent', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Valletta', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb', 'Zurich'
-1	'Andorra', 'Gibraltar'

	Klaster	Min Samples	Silhouette Score
0	DBSCAN	4	0.37
1	DBSCAN	6	0.37
2	DBSCAN	8	0.37

Mean Shift

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bangkok', 'Barcelona', 'Belfast', 'Belgrade', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boulder', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Denver', 'Des Moines', 'Detroit', 'Dresden', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Halifax', 'Hamburg', 'Hannover', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Munich', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Perth', 'Philadelphia', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Jose', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb',
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	' Zurich'
1	' Bali', ' Beirut', ' Belize City', ' Bozeman', ' Caracas', ' Dar es Salaam', ' Fort Collins', ' Guatemala City', ' Havana', ' La Paz', ' Managua', ' Panama', ' Phnom Penh', ' Portland', ' San Juan', ' San Salvador', ' Tashkent', ' Valletta'
2	' Beijing', ' Bengaluru', ' Delhi', ' Jakarta', ' London', ' Los Angeles', ' Mumbai', ' Nairobi', ' New York', ' Paris', ' Shanghai'
3	' Andorra', ' Gibraltar'
4	' Doha', ' Dubai', ' Lagos', ' Riyadh'
5	' Baltimore'
6	' Boston', ' Palo Alto', ' San Francisco Bay Area', ' San Luis Obispo'

0	' Aarhus', ' Adelaide', ' Albuquerque', ' Almaty', ' Amsterdam', ' Anchorage', ' Ankara', ' Asheville', ' Athens', ' Atlanta', ' Auckland', ' Austin', ' Baku', ' Baltimore', ' Bangkok', ' Barcelona', ' Belfast', ' Belgrade', ' Bergen', ' Berlin', ' Bern', ' Bilbao', ' Birmingham', ' Birmingham', ' Bogota', ' Boise', ' Bologna', ' Bordeaux', ' Boston', ' Boulder', ' Bratislava', ' Brighton', ' Brisbane', ' Bristol', ' Brno', ' Brussels', ' Bucharest', ' Budapest', ' Buenos Aires', ' Buffalo', ' Cairo', ' Calgary', ' Cambridge', ' Cape Town', ' Cardiff', ' Charleston', ' Charlotte', ' Chattanooga', ' Chennai', ' Chiang Mai', ' Chicago', ' Chisinau', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cluj-Napoca', ' Cologne', ' Colorado Springs', ' Columbus', ' Copenhagen', ' Cork', ' Curitiba', ' Dallas', ' Denver', ' Des Moines', ' Detroit', ' Dresden', ' Dubai', ' Dublin', ' Dusseldorf', ' Edinburgh', ' Edmonton', ' Eindhoven', ' Eugene', ' Florence', ' Florianopolis', ' Fort Collins', ' Frankfurt', ' Fukuoka', ' Galway', ' Gdansk', ' Geneva', ' Glasgow', ' Gothenburg', ' Grenoble', ' Guadalajara', ' Halifax', ' Hamburg', ' Hannover', ' Helsinki', ' Ho Chi Minh City', ' Hong Kong', ' Honolulu', ' Houston', ' Hyderabad', ' Indianapolis', ' Innsbruck', ' Istanbul', ' Jacksonville', ' Johannesburg', ' Kansas City', ' Karlsruhe', ' Kathmandu', ' Kiev', ' Knoxville', ' Krakow', ' Kuala Lumpur', ' Kyoto', ' Las Palmas de Gran Canaria', ' Las Vegas', ' Lausanne', ' Leeds', ' Leipzig', ' Lille', ' Lima', ' Lisbon', ' Liverpool', ' Ljubljana', ' Louisville', ' Luxembourg', ' Lviv', ' Lyon', ' Madison', ' Madrid', ' Malaga', ' Malmo', ' Manchester', ' Manila', ' Marseille', ' Medellin', ' Melbourne', ' Memphis', ' Mexico City', ' Miami', ' Milan', ' Milwaukee', ' Minneapolis-Saint Paul', ' Minsk', ' Montevideo', ' Montreal', ' Moscow', ' Munich', ' Nairobi', ' Nantes', ' Naples', ' Nashville', ' New Orleans', ' Nice', ' Nicosia', ' Oklahoma City', ' Omaha', ' Orlando', ' Osaka', ' Oslo', ' Ottawa', ' Oulu', ' Oxford', ' Palo Alto', ' Perth', ' Philadelphia', ' Phoenix', ' Phuket', ' Pittsburgh', ' Portland', ' Porto', ' Porto Alegre', ' Prague', ' Providence', ' Quebec', ' Raleigh', ' Reykjavik', ' Richmond', ' Riga', ' Rio De Janeiro', ' Riyadh', ' Rochester', ' Rome', ' Rotterdam', ' Saint Petersburg', ' Salt Lake City', ' San Antonio', ' San Diego', ' San Francisco Bay Area', ' San Jose', ' San Luis Obispo', ' Santiago', ' Santo Domingo', ' Sao Paulo', ' Sarajevo', ' Saskatoon', ' Seattle', ' Seoul', ' Seville', ' Singapore', ' Skopje', ' Sofia', ' St. Louis', ' Stockholm', ' Stuttgart', ' Sydney', ' Taipei', ' Tallinn', ' Tampa Bay Area', ' Tampere', ' Tartu', ' Tbilisi', ' Tehran', ' Tel Aviv', ' The Hague', ' Thessaloniki', ' Tokyo', ' Toronto', ' Toulouse', ' Tunis', ' Turin', ' Turku', ' Uppsala', ' Utrecht', ' Valencia', ' Vancouver', ' Victoria', ' Vienna', ' Vilnius', ' Warsaw', ' Washington', ' Wellington', ' Winnipeg', ' Wroclaw', ' Yerevan', ' Zagreb', ' Zurich'
1	' Asuncion', ' Bali', ' Beirut', ' Belize City', ' Bozeman', ' Caracas', ' Casablanca', ' Dar es Salaam', ' Doha', ' Guatemala City', ' Havana', ' Kingston', ' Lagos', ' La Paz', ' Managua', ' Panama', ' Phnom Penh', ' Portland', ' Quito', ' San Juan', ' San Salvador', ' Tashkent', ' Valletta'
2	' Beijing', ' Bengaluru', ' Delhi', ' Jakarta', ' London', ' Los Angeles', ' Mumbai', ' New York', ' Paris', ' Shanghai'
3	' Andorra', ' Gibraltar'

0	' Aarhus', ' Adelaide', ' Albuquerque', ' Almaty', ' Amsterdam', ' Anchorage', ' Ankara', ' Asheville', ' Asuncion', ' Athens', ' Atlanta', ' Auckland', ' Austin', ' Baku', ' Bali', ' Baltimore', ' Bangkok', ' Barcelona', ' Beijing', ' Beirut', ' Belfast', ' Belgrade', ' Bengaluru', ' Bergen', ' Berlin', ' Bern', ' Bilbao', ' Birmingham', ' Birmingham', ' Bogota', ' Boise', ' Bologna', ' Bordeaux', ' Boston', ' Boulder', ' Bozeman', ' Bratislava', ' Brighton', ' Brisbane', ' Bristol', ' Brno', ' Brussels', ' Bucharest', ' Budapest', ' Buenos Aires', ' Buffalo', ' Cairo', ' Calgary', ' Cambridge', ' Cape Town', ' Caracas', ' Cardiff', ' Casablanca', ' Charleston', ' Charlotte', ' Chattanooga', ' Chennai', ' Chiang Mai', ' Chicago', ' Chisinau', ' Christchurch', ' Cincinnati', ' Cleveland', ' Cluj-Napoca', ' Cologne', ' Colorado Springs', ' Columbus', ' Copenhagen', ' Cork', ' Curitiba', ' Dallas', ' Dar es Salaam', ' Delhi', ' Denver', ' Des Moines', ' Detroit', ' D
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	oha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Mumbai', 'Munich', 'Nairobi', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Palo Alto', 'Panama', 'Paris', 'Perth', 'Philadelphia', 'Phnom Penh', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Jose', 'San Juan', 'San Luis Obispo', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Valletta', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb', 'Zurich'
1	'Andorra', 'Belize City', 'Gibraltar', 'La Paz', 'Managua', 'Tashkent'

	Klaster	Bandwidth	Silhouette Score
0	MeanShift	8	0.09
1	MeanShift	9	0.18
2	MeanShift	10	0.31

Spectral Clustering

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Caracas', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Dar es Salaam', 'Delhi', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'La Paz', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Managua', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul'
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1	'Andorra', 'Gibraltar'

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham', 'Bogota', 'Boise', 'Bologna', 'Bordeaux', 'Boston', 'Boulder', 'Bozeman', 'Bratislava', 'Brighton', 'Brisbane', 'Bristol', 'Brno', 'Brussels', 'Bucharest', 'Budapest', 'Buenos Aires', 'Buffalo', 'Cairo', 'Calgary', 'Cambridge', 'Cape Town', 'Caracas', 'Cardiff', 'Casablanca', 'Charleston', 'Charlotte', 'Chattanooga', 'Chennai', 'Chiang Mai', 'Chicago', 'Chisinau', 'Christchurch', 'Cincinnati', 'Cleveland', 'Cluj-Napoca', 'Cologne', 'Colorado Springs', 'Columbus', 'Copenhagen', 'Cork', 'Curitiba', 'Dallas', 'Dar es Salaam', 'Delhi', 'Denver', 'Des Moines', 'Detroit', 'Doha', 'Dresden', 'Dubai', 'Dublin', 'Dusseldorf', 'Edinburgh', 'Edmonton', 'Eindhoven', 'Eugene', 'Florence', 'Florianopolis', 'Fort Collins', 'Frankfurt', 'Fukuoka', 'Galway', 'Gdansk', 'Geneva', 'Glasgow', 'Gothenburg', 'Grenoble', 'Guadalajara', 'Guatemala City', 'Halifax', 'Hamburg', 'Hannover', 'Havana', 'Helsinki', 'Ho Chi Minh City', 'Hong Kong', 'Honolulu', 'Houston', 'Hyderabad', 'Indianapolis', 'Innsbruck', 'Istanbul', 'Jacksonville', 'Jakarta', 'Johannesburg', 'Kansas City', 'Karlsruhe', 'Kathmandu', 'Kiev', 'Kingston', 'Knoxville', 'Krakow', 'Kuala Lumpur', 'Kyoto', 'Lagos', 'La Paz', 'Las Palmas de Gran Canaria', 'Las Vegas', 'Lausanne', 'Leeds', 'Leipzig', 'Lille', 'Lima', 'Lisbon', 'Liverpool', 'Ljubljana', 'London', 'Los Angeles', 'Louisville', 'Luxembourg', 'Lviv', 'Lyon', 'Madison', 'Madrid', 'Malaga', 'Malmo', 'Managua', 'Manchester', 'Manila', 'Marseille', 'Medellin', 'Melbourne', 'Memphis', 'Mexico City', 'Miami', 'Milan', 'Milwaukee', 'Minneapolis-Saint Paul', 'Minsk', 'Montevideo', 'Montreal', 'Moscow', 'Mumbai', 'Munich', 'Nairobi', 'Nantes', 'Naples', 'Nashville', 'New Orleans', 'New York', 'Nice', 'Nicosia', 'Oklahoma City', 'Omaha', 'Orlando', 'Osaka', 'Oslo', 'Ottawa', 'Oulu', 'Oxford', 'Panama', 'Paris', 'Perth', 'Philadelphia', 'Phnom Penh', 'Phoenix', 'Phuket', 'Pittsburgh', 'Portland', 'Portland', 'Porto', 'Porto Alegre', 'Prague', 'Providence', 'Quebec', 'Quito', 'Raleigh', 'Reykjavik', 'Richmond', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Rochester', 'Rome', 'Rotterdam', 'Saint Petersburg', 'Salt Lake City', 'San Antonio', 'San Diego', 'San Francisco Bay Area', 'San Jose', 'San Juan', 'San Luis Obispo', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Saskatoon', 'Seattle', 'Seoul', 'Seville', 'Shanghai', 'Singapore', 'Skopje', 'Sofia', 'St. Louis', 'Stockholm', 'Stuttgart', 'Sydney', 'Taipei', 'Tallinn', 'Tampa Bay Area', 'Tampere', 'Tartu', 'Tashkent', 'Tbilisi', 'Tehran', 'Tel Aviv', 'The Hague', 'Thessaloniki', 'Tokyo', 'Toronto', 'Toulouse', 'Tunis', 'Turin', 'Turku', 'Uppsala', 'Utrecht', 'Valencia', 'Valletta', 'Vancouver', 'Victoria', 'Vienna', 'Vilnius', 'Warsaw', 'Washington', 'Wellington', 'Winnipeg', 'Wroclaw', 'Yerevan', 'Zagreb', 'Zurich'
1	'Andorra', 'Gibraltar'
2	'Palo Alto'

0	'Aarhus', 'Adelaide', 'Albuquerque', 'Almaty', 'Amsterdam', 'Anchorage', 'Ankara', 'Asheville', 'Asuncion', 'Athens', 'Atlanta', 'Auckland', 'Austin', 'Baku', 'Bali', 'Baltimore', 'Bangkok', 'Barcelona', 'Beijing', 'Beirut', 'Belfast', 'Belgrade', 'Belize City', 'Bengaluru', 'Bergen', 'Berlin', 'Bern', 'Bilbao', 'Birmingham', 'Birmingham'
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1	' Andorra', ' Gibraltar'
2	' Doha', ' Dubai'
3	' Palo Alto'

	Klaster	Broj klastera	Silhouette Score
0	Spectral	2	0.37
1	Spectral	3	0.26
2	Spectral	4	0.11

Gaussian Mixture

0	' Almaty', ' Andorra', ' Ankara', ' Asuncion', ' Athens', ' Baku', ' Bali', ' Bangkok', ' Beirut', ' Belgrade', ' Belize City', ' Bengaluru', ' Bogota', ' Bratislava', ' Brno', ' Bucharest', ' Budapest', ' Buenos Aires', ' Cairo', ' Cape Town', ' Caracas', ' Casablanca', ' Chennai', ' Chiang Mai', ' Chisinau', ' Cluj-Napoca', ' Curitiba', ' Dar es Salaam', ' Delhi', ' Doha', ' Dubai', ' Florianopolis', ' Gdansk', ' Gibraltar', ' Guadalajara', ' Guatemala City', ' Havana', ' Ho Chi Minh City', ' Hyderabad', ' Istanbul', ' Jakarta', ' Johannesburg', ' Kathmandu', ' Kiev', ' Kingston', ' Krakow', ' Kuala Lumpur', ' Lagos', ' La Paz', ' Lima', ' Lviv', ' Managua', ' Manila', ' Medellin', ' Mexico City', ' Minsk', ' Montevideo', ' Moscow', ' Mumbai', ' Nairobi', ' Naples', ' Nicosia', ' Panama', ' Phnom Penh', ' Phuket', ' Porto Alegre', ' Prague', ' Quito', ' Riga', ' Rio De Janeiro', ' Riyadh', ' Saint Petersburg', ' San Jose', ' San Juan', ' San Salvador', ' Santiago', ' Santo Domingo', ' Sao Paulo', ' Sarajevo', ' Skopje', ' Sofia', ' Taipei', ' Tashkent', ' Tbilisi', ' Tehran', ' Thessaloniki', ' Tokyo', ' Toronto', ' Toulouse', ' Tunis', ' Turin', ' Turku', ' Uppsala', ' Utrecht', ' Valencia', ' Valletta', ' Vancouver', ' Victoria', ' Vienna', ' Vinia', ' Warsaw', ' Washington', ' Wellington', ' Winnipeg', ' Wroclaw', ' Yerevan', ' Zagreb', ' Zurich'
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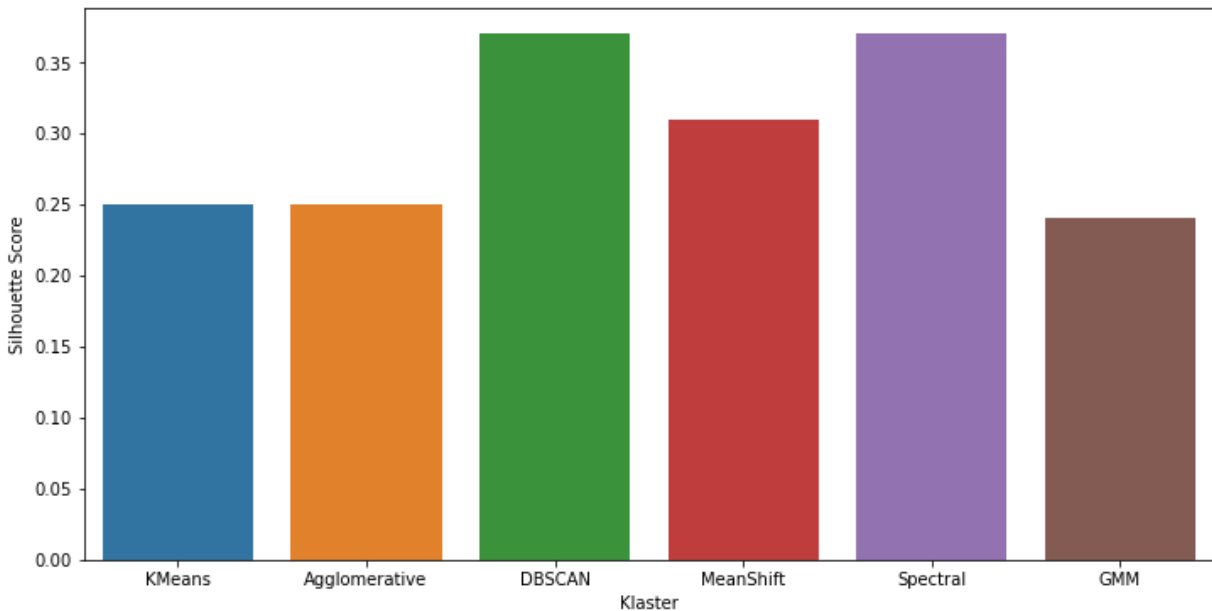
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2	'Almaty', 'Andorra', 'Ankara', 'Asuncion', 'Athens', 'Baku', 'Bali', 'Bangkok', 'Beirut', 'Belgrade', 'Belize City', 'Bengaluru', 'Bogota', 'Bratislava', 'Brno', 'Bucharest', 'Budapest', 'Buenos Aires', 'Cairo', 'Cape Town', 'Caracas', 'Casablanca', 'Chennai', 'Chiang Mai', 'Chisinau', 'Cluj-Napoca', 'Curitiba', 'Dar es Salaam', 'Delhi', 'Florianopolis', 'Gdansk', 'Gibraltar', 'Guadalajara', 'Guatemala City', 'Havana', 'Ho Chi Minh City', 'Hyderabad', 'Istanbul', 'Jakarta', 'Johannesburg', 'Kathmandu', 'Kiev', 'Kingston', 'Krakow', 'Kuala Lumpur', 'Lagos', 'La Paz', 'Lima', 'Lviv', 'Managua', 'Manila', 'Medellin', 'Mexico City', 'Minsk', 'Montevideo', 'Mumbai', 'Nairobi', 'Naples', 'Nicosia', 'Panama', 'Phnom Penh', 'Phuket', 'Porto Alegre', 'Prague', 'Quito', 'Riga', 'Rio De Janeiro', 'Riyadh', 'Saint Petersburg', 'San Jose', 'San Juan', 'San Salvador', 'Santiago', 'Santo Domingo', 'Sao Paulo', 'Sarajevo', 'Skopje', 'Sofia', 'Taipei', 'Tashkent', 'Tbilisi', 'Tehran', 'Thessaloniki', 'Tunis', 'Turin', 'Valletta', 'Warsaw', 'Wroclaw', 'Yerevan', 'Zagreb'

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	Klaster	Broj klastera	Silhouette Score
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1	GMM	3	0.17
2	GMM	4	0.16

Grafički prikaz tačnosti modela za klasterizaciju

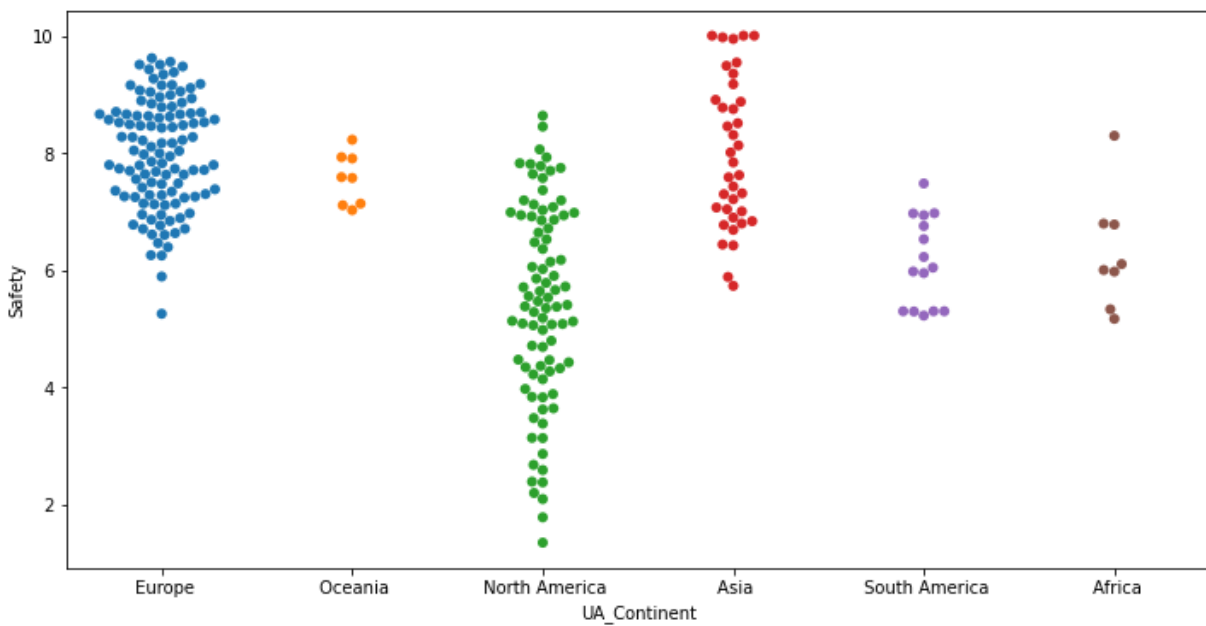
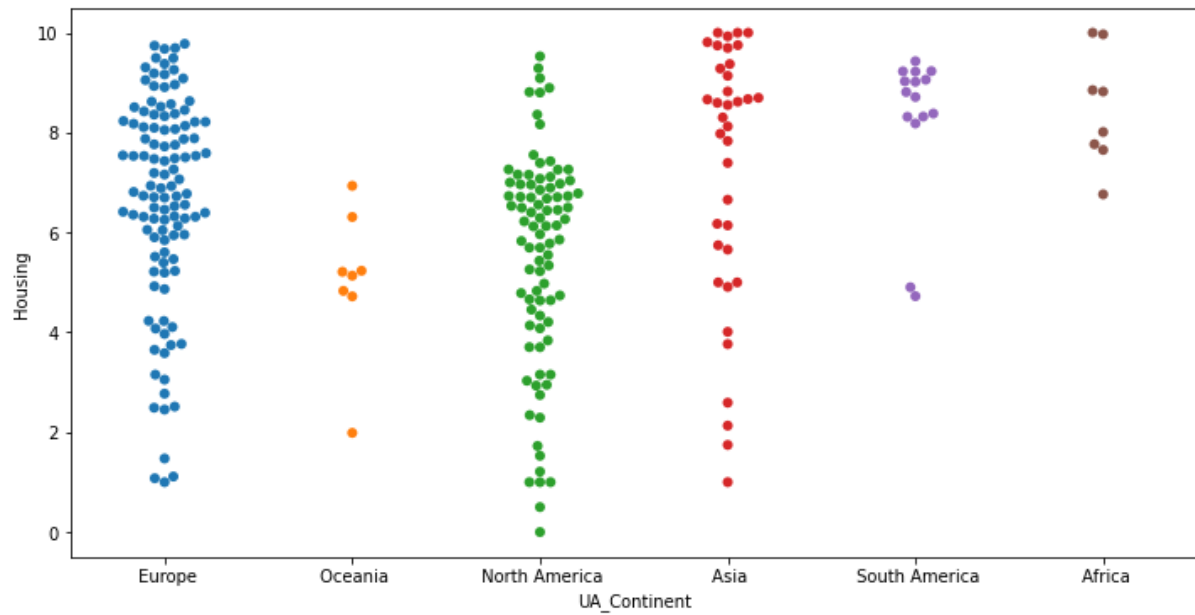
U obzir je uzet najbolji rezultat svakog od modela.

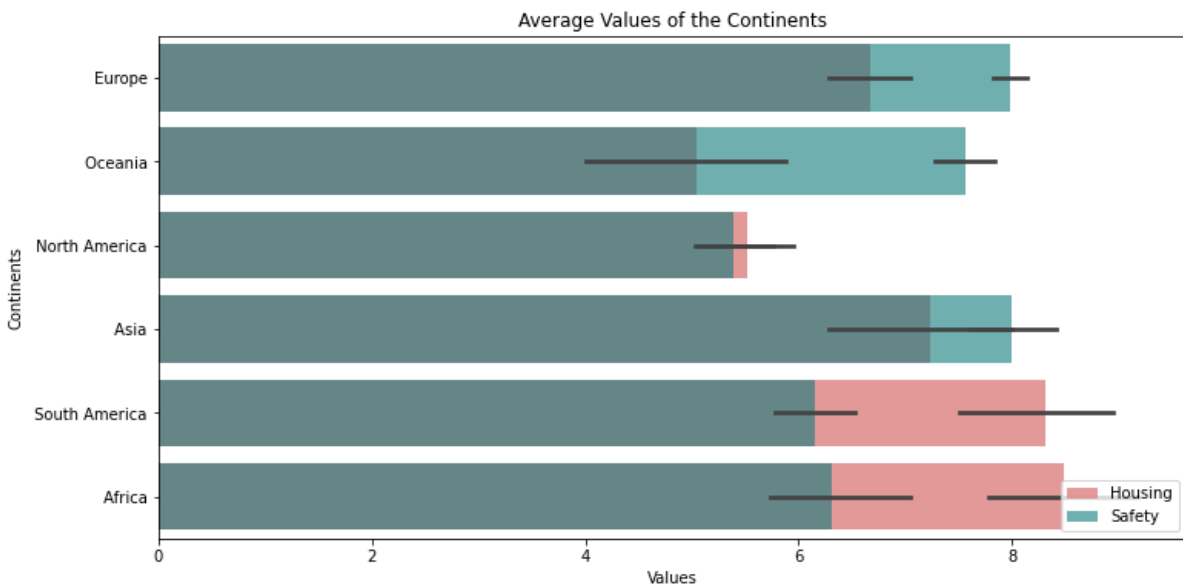


Priprema podataka za grafički prikaz klasterizacije

Za grafički prikaz klasterizacije izabrana su dva atributa koji su u najmanjoj korelaciji, odnosno atributi Housing i Safety, čija korelacija je 0.01.

Grafički prikaz vrijednosti atributa Housing i Safety po kontinentima





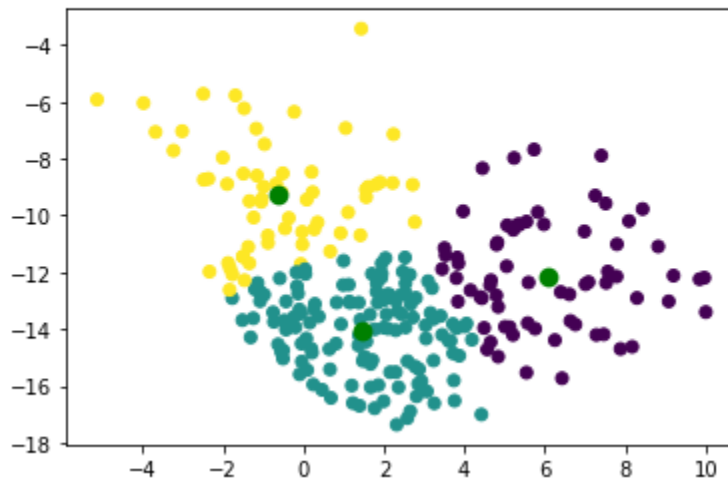
Prikaz nove tabele koja sadrži kolone Housing i Safety

	Housing	Safety
0	6.1315	9.6165
1	6.3095	7.9260
2	7.2620	1.3435
3	9.2820	7.3090
4	3.0530	8.5035
...
261	7.5525	6.0155
262	8.4520	8.1655
263	9.6945	8.8730
264	8.9100	8.6575
265	1.4730	9.0665

Grafik

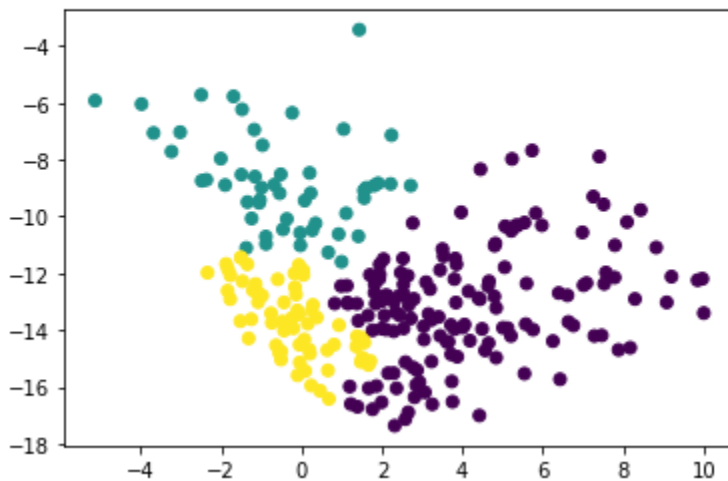
KMeans

Silhouette Score is 0.40961022322496654
Davies Bouldin Score is 0.8338855131031729



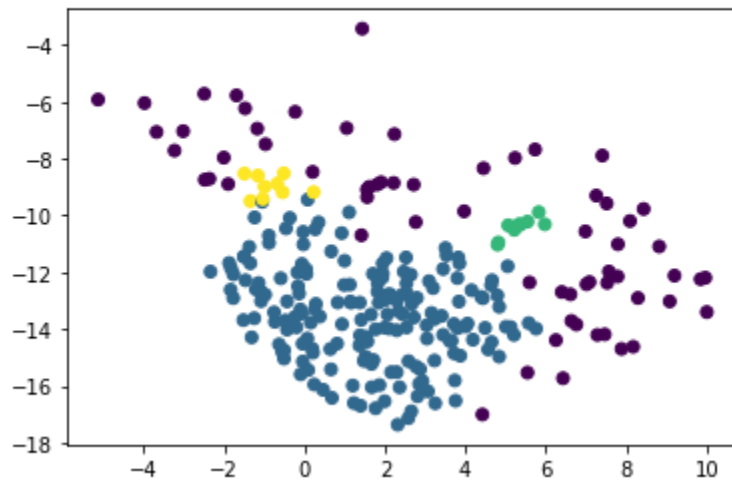
Agglomerative Clustering

Silhouette Score is 0.30502655606279117
Davies Bouldin Score is 0.8731168062196261



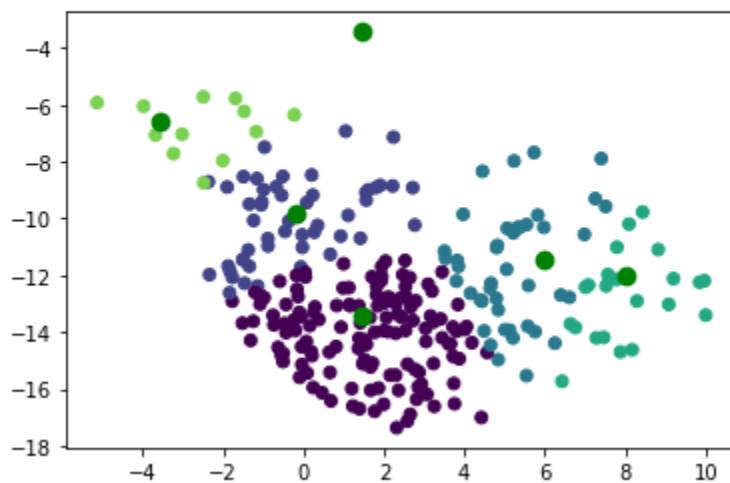
DBSCAN

Silhouette Score is 0.06528306787674713
Davies Bouldin Score is 2.4813802690326012



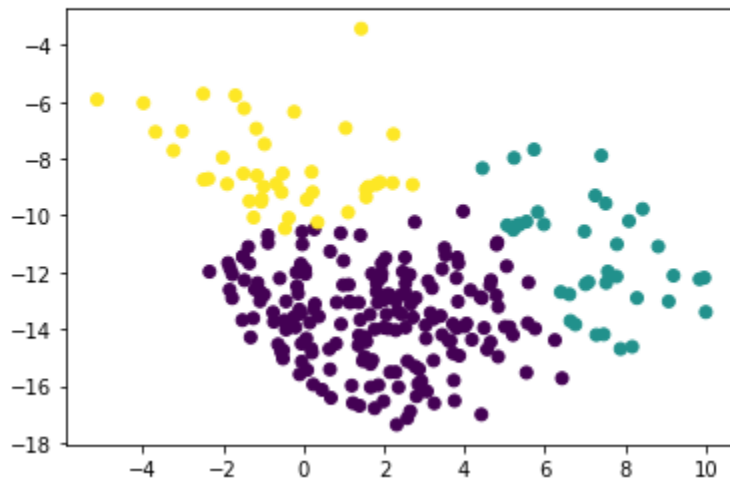
Mean Shift

Silhouette Score is 0.3213218124005732
Davies Bouldin Score is 0.8720611340270034



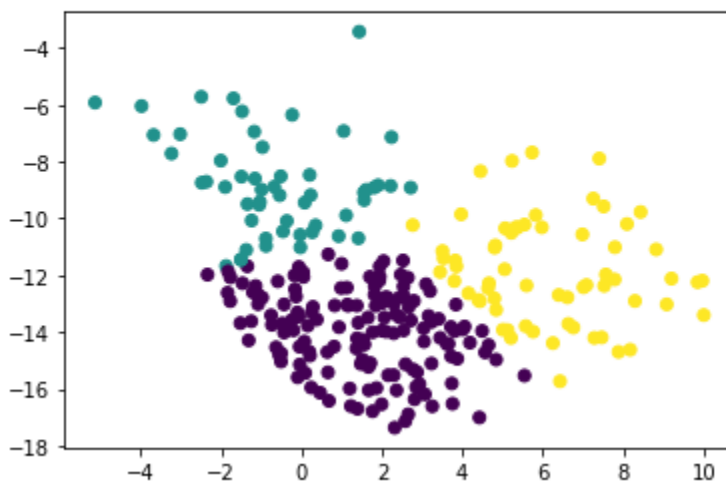
Spectral Clustering

Silhouette Score is 0.3941073109961798
Davies Bouldin Score is 0.7708369702819762

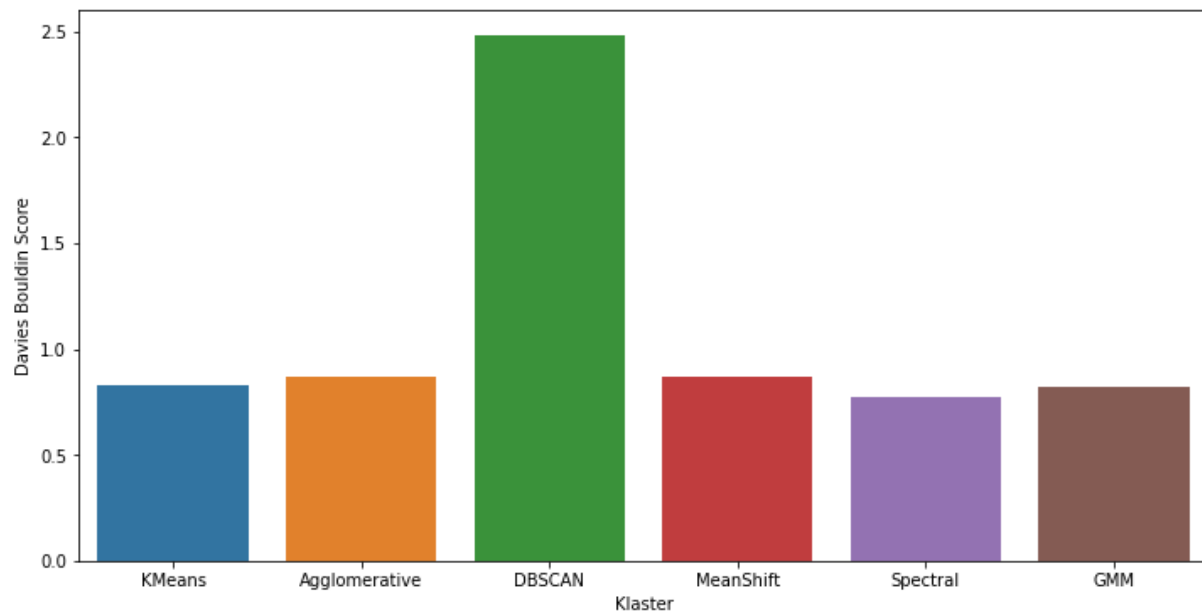
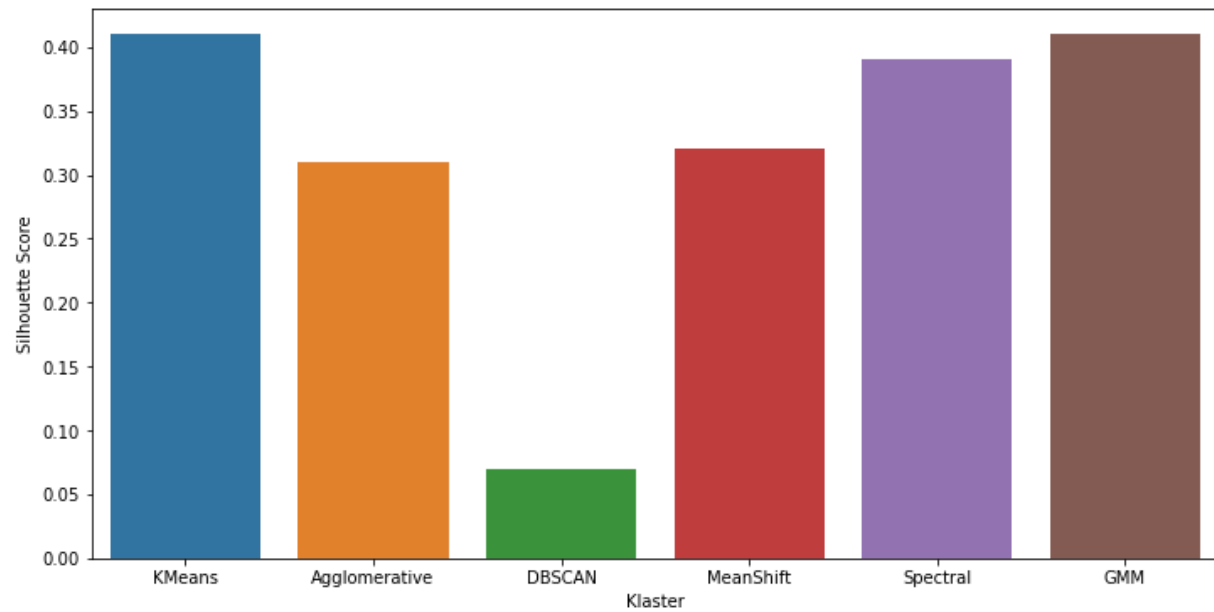


Gaussian Mixture

Silhouette Score is 0.41141525318894956
Davies Bouldin Score is 0.8216313426475592



Grafički prikaz tačnosti modela za klasterizaciju



Linkovi

1. <https://www.kaggle.com/orhankaramancode/city-quality-of-life-dataset>
2. <https://machinelearningmastery.com/clustering-algorithms-with-python/>
3. <https://towardsdatascience.com/performance-metrics-in-machine-learning-part-3-clustering-d69550662dc6>