The Mental Health Index in the Italian Regions

Leogrande, Angelo

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In 2020 it averaged 69

Istat BES calculates the value of the mental health index for the Italian regions. The mental health index is a measure of psychological distress obtained from the summary of the scores scored by each individual aged 14 and over with 5 questions extracted from the SF36 (36-Item Short Form Survey) questionnaire. The questions refer to the four main dimensions of mental health, namely: anxiety, depression, loss of behavioral or emotional control and psychological well-being. The index varies between 0 and 100, with better psychological well-being conditions as the value of the index increases.

Ranking of the Italian regions by value of the mental health index in 2020. Trentino-Alto Adige is in first place by value of the mental health index with a value of 71.9, followed by Friuli-Venezia Giulia with a value equal to 71.1 units and from Valle d'Aosta in third place with an amount of 70.3 units. Puglia is in eighth place with a value of 69, followed by Basilicata and Sicily with a value of 68.9 units. Piedmont closes the ranking with a value of 67.7 units, followed by Molise and Campania with a value of 67.6 units. On average, the value of the mental health index in Italy is equal to a value of 69.03. However, only 5 of the 20 Italian regions in 2020 had a mental health index value higher than 69.03.

Ranking of the Italian regions by value of the percentage change in the mental health index between 2016 and 2020. Campania is in first place by value of the percentage change in the mental health index between 2016 and 2020 with an amount equal to 3.68% equal to a value of 2.40 units, followed in second place by Puglia with a value equal to 3.45% equal to 2.30 units and by Valle d'Aosta with a value equal to 3.08% equal to 2.10 units. In the middle of the table there are Calabria with a value of 2.08% equal to an amount of 1.40, followed by Tuscany with a value of 1.48% equal to an amount of 1.00 units and Piedmont with a value of equal to 1.04% equal to an amount of 0.70 units. Emilia-Romagna closes the ranking with an amount of -0.85% equal to an amount of -0.60 units, followed by Lazio with a value equal to -1.00% equal to an amount of -0.70 units and from Trentino-Alto Adige with an amount equal to -2.04 units equal to a value of -1.50%. On average between 2016 and 2020, the value of the mental health index in the Italian regions grew by an amount equal to 1.13% equal to 0.775 units.

Italian macro-regions. The mental health index in Northern Italy grew between 2016 and 2020 from an amount of 68.7 to a value of 68.9 units or equal to a value of 0.20 units equal to a value of 0, 29%. The mental health index in Central Italy has grown from a value of 68.5 units to a value of 68.9 units or equal to a value of 0.40 units equal to a variation of 0.58%. The mental health index in the South has grown from an amount of 66.9 units to a value of 68.9 units or equal to a value of 0.40 units equal to a value of 0.58%. In Italy the mental health index has grown from an amount of 68.1 units up to a value of 68.8 units or equal to an amount of 0.70 units equal to a variation of 1.03%. Overall, at the macro-regional level, it is possible to verify a significant convergence of the mental health index towards the value between 68.6 and 68.9 between 2016 and 2020.

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Clustering with k-Means algorithm. A clustering with k-Means algorithm is presented below. The algorithm is optimized with the use of the Silhouette coefficient. The analysis shows the presence of three clusters indicated below, namely:

- *Cluster 1:* Liguria, Friuli-Venezia Giulia, Lazio, Valle d'Aosta, Emilia-Romagna, Lombardy, Sardinia, Abruzzo, Veneto, Tuscany;
- *Cluster 2:* Trentino-Alto Adige;
- *Cluster 3:* Umbria, Marche, Sicily, Basilicata, Piedmont, Campania, Calabria, Puglia, Molise.

Calculating the value of the median per cluster it follows that the median value of cluster 2 is equal to 71.9, while the value of cluster 1-C1 is equal to 69.35 and the value of cluster 3-C3 is equal to a value of 68.1. The ordering of the clusters is therefore given by C2> C1> C3. As is evident from the analysis of the map of the Italian regions, there is a substantial contrast between a center-north with high mental health index values and a center-south with a lower mental health index value. However, exceptions must be made to this macro-distinction, among which Piedmont stands out, which despite being a northern region shares the mental health cluster with the southern regions and Abruzzo and Sardinia which, although being regions of the South are present in the cluster of Northern regions.

The determinants of the mental health index. A Pooled OLS and WLS model is proposed below for estimating the determinants of the mental health index. The following equations are estimated, that is:

$$\begin{aligned} \boldsymbol{MentalHealthIndex}_{it} &= \boldsymbol{a_1} + \boldsymbol{b_1}(\boldsymbol{HealthyLifeExpectancyAtBirth})_{it} \\ &+ \boldsymbol{b_2}(\boldsymbol{AvoidableMortality})_{it} + \boldsymbol{b_3}(\boldsymbol{InfantMortality})_{it} \\ &+ \boldsymbol{b_4}(\boldsymbol{UnlimitedLifeExpectancyInActivitiesAt65years})_{it} \\ &+ \boldsymbol{b_5}(\boldsymbol{ExcessWeight})_{it} + \boldsymbol{b_6}(\boldsymbol{Smoking})_{it} + \boldsymbol{b_7}(\boldsymbol{Sedentarylifestyle})_{it} \\ &+ \boldsymbol{b_8}(\boldsymbol{Food})_{it} \end{aligned}$$

Where i = 20 and t = [2016; 2020].

From the analysis, therefore, it appears that the mental health index grows together with the following variables, namely:

- *Healthy life expectancy at birth*: where the healthy life expectancy at birth increases, there is also a growth in the mental health index.
- *Avoidable mortality*: this indicator that considers avoidable deaths, including for example the deaths that could have been avoided because of a health-related intervention. This variable is positively associated with the mental health index since there are some regions in the North, such as Friuli-Venezia Giulia and Valle d'Aosta that have a medium-high value of this indicator.
- *Infant mortality:* considers the number of deaths in the first year of life for every 10,000 live births. This value appears to be positively associated with mental health due to the fact that the regions where the mental health index is higher, i.e. the Northern regions, are also those that have higher fertility rates, and therefore, proportionally also higher child mortality.

The mental health index is reduced in connection with the following variables, namely:

- *Unlimited life expectancy in activities at 65:* this indicator considers the active life expectancy that 65-year-olds can experience. This value is negatively associated with the mental health index.
- *Excess weight*: calculates the percentage of obese or overweight people. Excess weight reduces the mental health index.
- *Smoking:* Percentage of people over 14 who report smoking. The presence of smokers reduces the mental health index.
- *Sedentary lifestyle:* people over 14 who do not practice any physical activity. A sedentary lifestyle reduces the mental health index.
- *Food*: percentage of people who consume at least 3 or 4 portions of fruit and vegetables per day. This value appears to be negatively associated with the mental health index.

It therefore follows that the mental health index is sensitive to people's lifestyles. The reduction of obesity, smoking, sedentary lifestyle can help increase the mental health index. Obviously, these factors are not independent of income factors and in fact in the Northern regions, where income is higher and healthy lifestyles are more accessible, there is also an increase in the value of the mental health index.

Conclusions. In summary, the mental health index tends to grow especially in the Northern regions. Trentino-Alto Adige is confirmed as a high-profile region as is the case in almost all socio-economic and health indicators. The value of the mental health index has grown in the Italian macro-regions. Lifestyles have a very significant effect in determining the mental health index.

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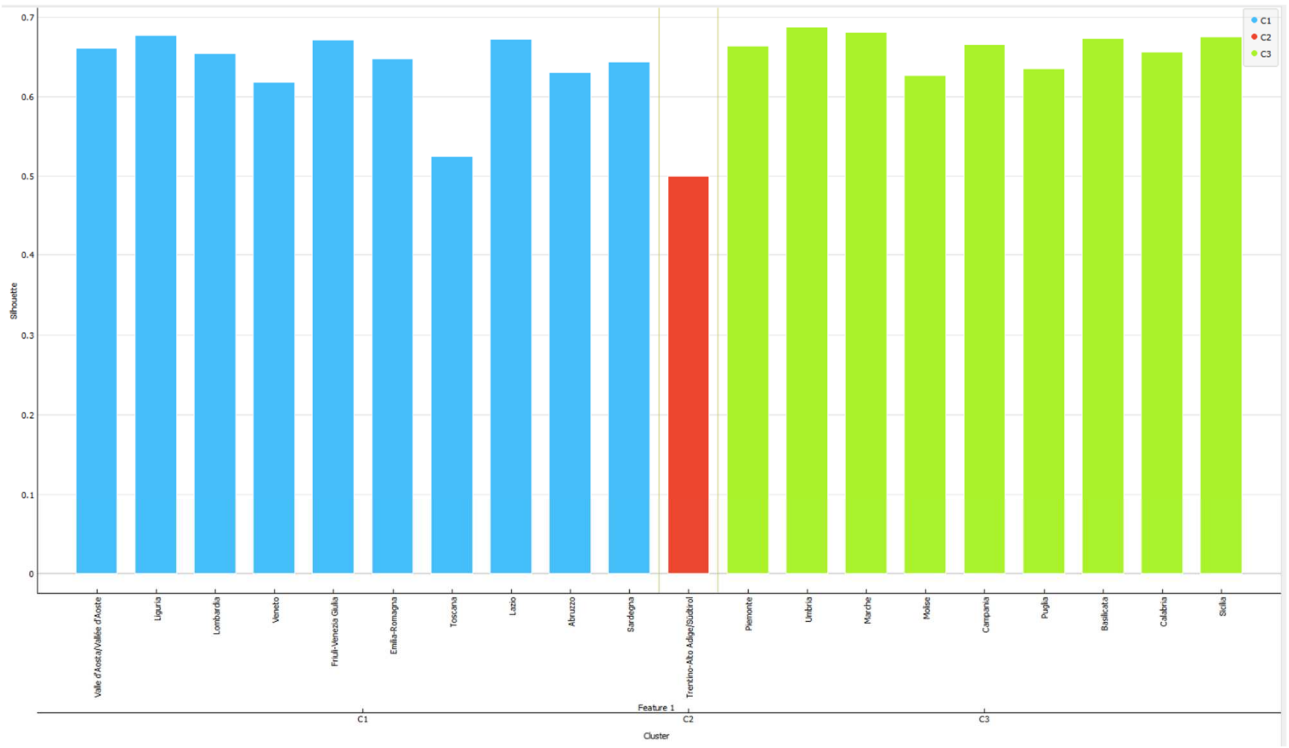
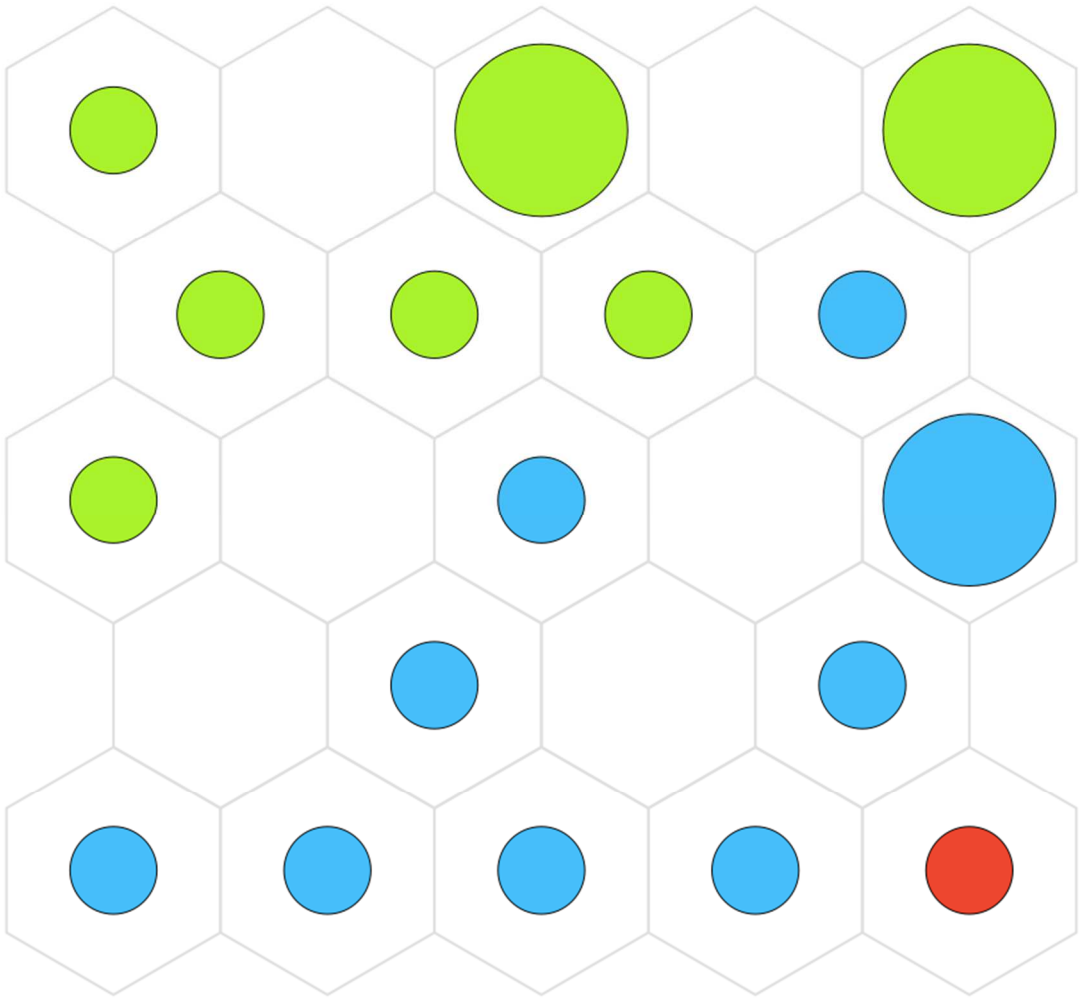
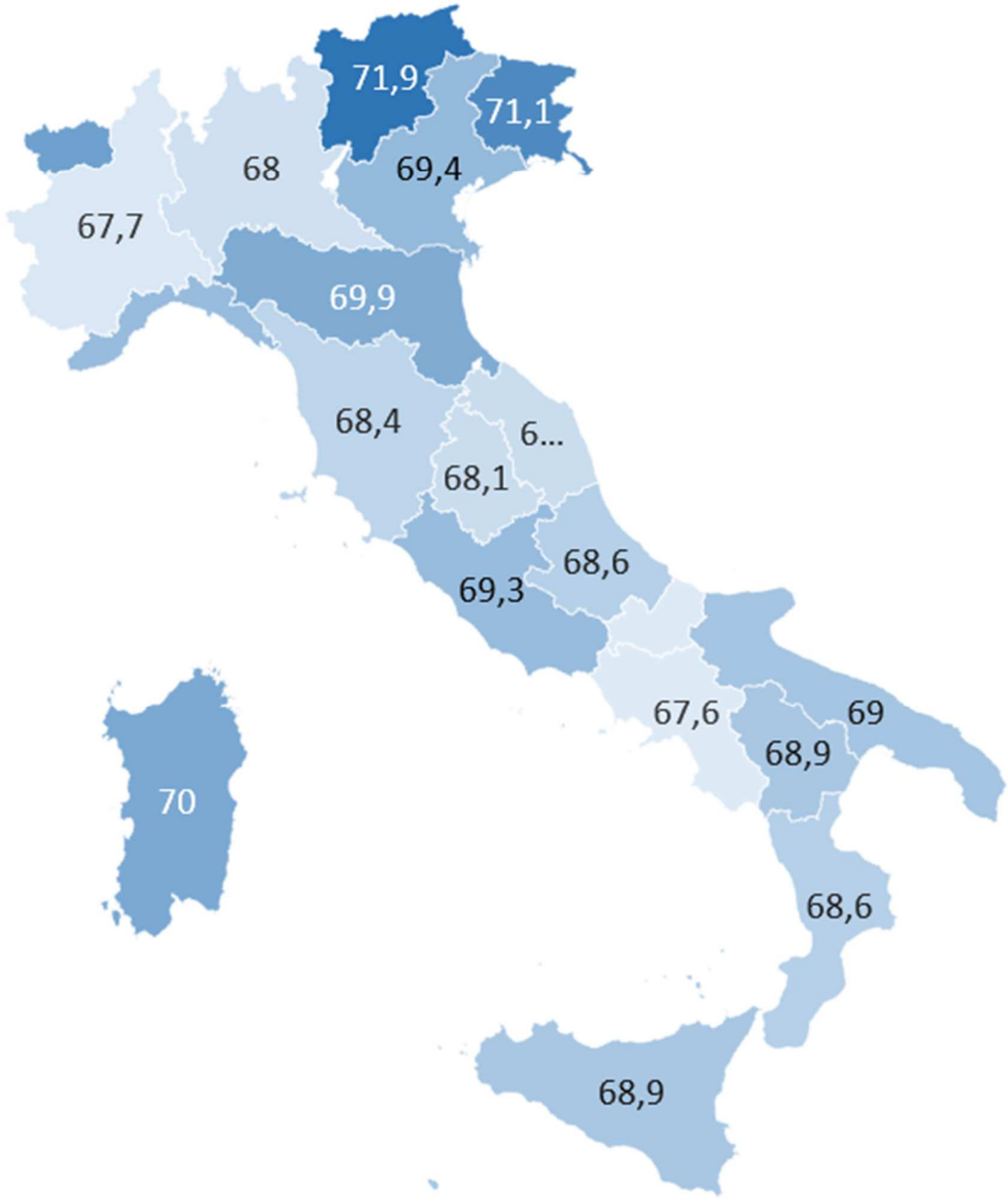
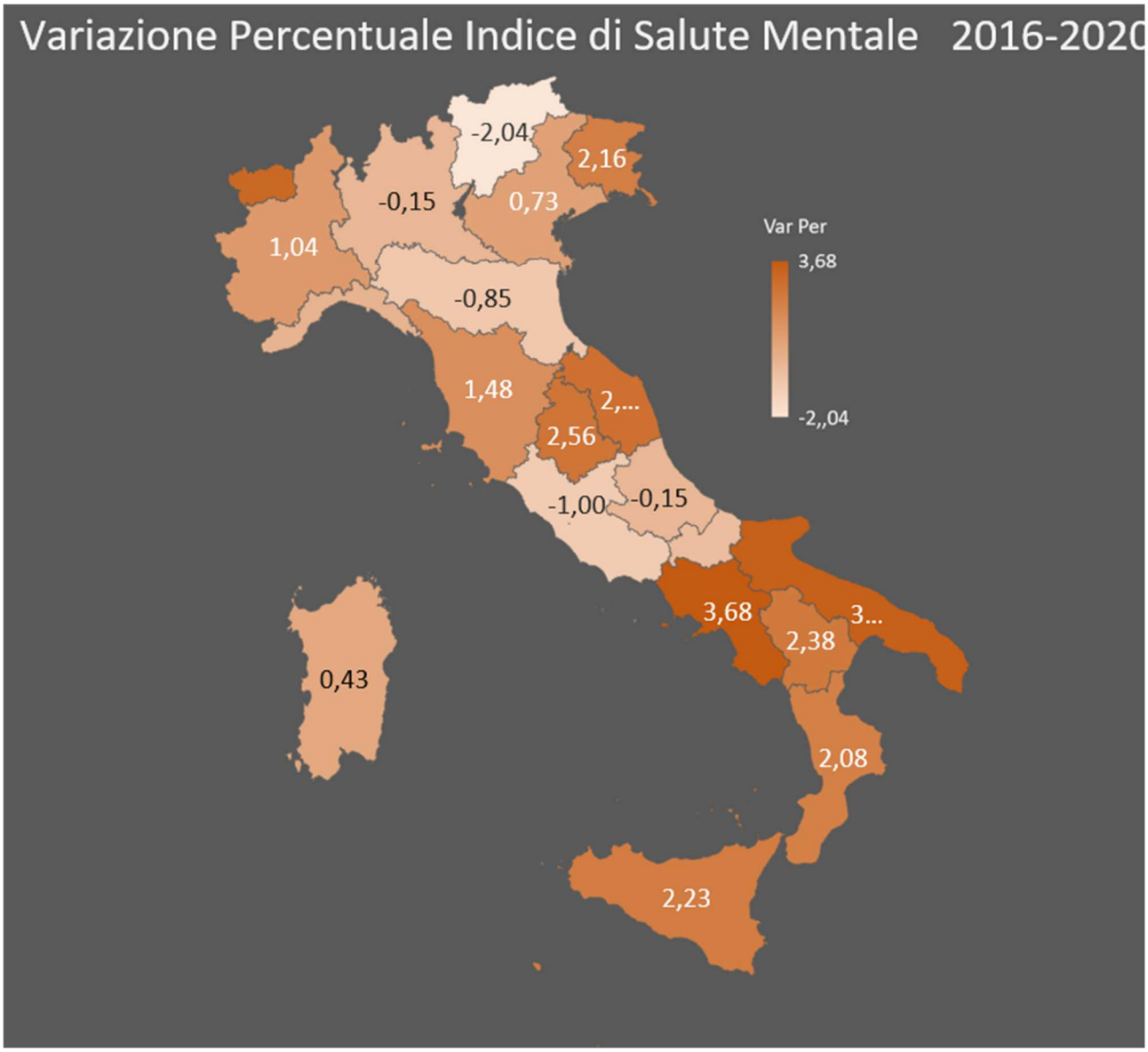

C1
C2
C3
Silhouette
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Valle d'Aosta/Vallée d'Aoste
Liguria
Lombardia
Veneto
Friuli-Venezia Giulia
Emilia-Romagna
Toscana
Lazio
Abruzzo
Sardegna
Trentino-Alto Adige/Südtirol
Piemonte
Umbria
Marche
Molise
Campania
Puglia
Basilicata
Calabria
Sicilia
Feature 1
C1
C2
C3
Cluster



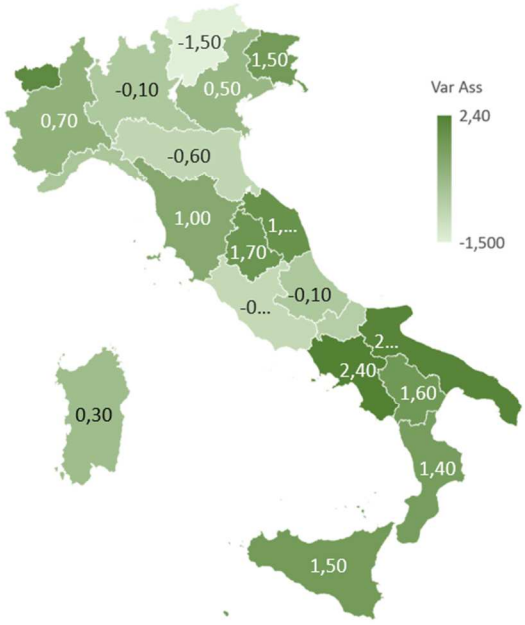
2020	Feature 1	Cluster	Silhouette
68.6	Abruzzo	C1	0.630489
68.9	Basilicata	C3	0.67336
68.6	Calabria	C3	0.65612
67.6	Campania	C3	0.666237
69.9	Emilia-Romagna	C1	0.647564
71.1	Friuli-Venezia G...	C1	0.671478
69.3	Lazio	C1	0.672273
69.3	Liguria	C1	0.677029
68.0	Lombardia	C1	0.654262
68.1	Marche	C3	0.680706
67.6	Molise	C3	0.627083
67.7	Piemonte	C3	0.66374
69.0	Puglia	C3	0.635704
70.0	Sardegna	C1	0.644168
68.9	Sicilia	C3	0.67526
68.4	Toscana	C1	0.524739
71.9	Trentino-Alto A...	C2	0.5
68.1	Umbria	C3	0.68724
70.3	Valle d'Aosta/V...	C1	0.661291
69.4	Veneto	C1	0.618037

Indice di Salute Mentale 2020

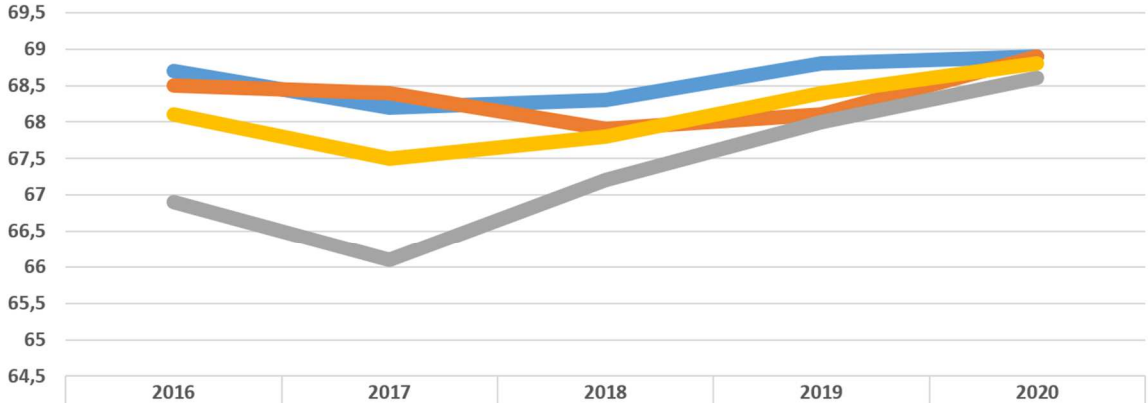




Indice della Salute Mentale. Variazione Assoluta tra il 2016 ed il 2020. Fonte: ISTAT-BES.



Indice di Salute Mentale nelle Macro-Regioni Italiane. Fonte: ISTAT-BES.



	2016	2017	2018	2019	2020
Nord	68,7	68,2	68,3	68,8	68,9
Centro	68,5	68,4	67,9	68,1	68,9
Mezzogiorno	66,9	66,1	67,2	68	68,6
Italia	68,1	67,5	67,8	68,4	68,8

Indice della Salute Mentale. Fonte: ISTAT-BES

Regione	2016	2017	2018	2019	2020
Piemonte	67	66,1	66,1	68,5	67,7
Valle d'Aosta/Vallée d'Aost	68,2	68,9	68,5	68,8	70,3
Liguria	69,3	68,6	69,5	69	69,3
Lombardia	68,1	68,3	68,9	69,2	68
Trentino-Alto Adige/Südtir	73,4	72,6	72,3	72,8	71,9
Veneto	68,9	67,6	68,3	68	69,4
Friuli-Venezia Giulia	69,6	68,8	68,8	69,6	71,1
Emilia-Romagna	70,5	69,4	67,8	68,2	69,9
Toscana	67,4	68,5	67,9	67,6	68,4
Umbria	66,4	65,7	66,8	67,4	68,1
Marche	66,3	66,2	66,9	67,7	68,1
Lazio	70	69,3	68,3	68,6	69,3
Abruzzo	68,7	67,6	68,4	68,3	68,6
Molise	67,9	66,8	66,4	66,5	67,6
Campania	65,2	64,7	66,2	68,2	67,6
Puglia	66,7	66,7	67,3	68,2	69
Basilicata	67,3	65,2	66,4	68,3	68,9
Calabria	67,2	65	66,8	66,3	68,6
Sicilia	67,4	65,7	66,8	67,9	68,9
Sardegna	69,7	70,4	70,5	69,4	70

Modello 4: Pooled OLS, usando 322 osservazioni
Incluse 20 unità cross section
Lunghezza serie storiche: minimo 16, massimo 17
Variabile dipendente: A3

	coefficiente	errore std.	rapporto t	p-value	
const	35,9309	13,4660	2,668	0,0080	***
A1	0,354836	0,148250	2,393	0,0173	**
A2	0,227822	0,0295456	7,711	1,71e-013	***
A4	0,157801	0,0472042	3,343	0,0009	***
A5	0,202077	0,0823993	2,452	0,0147	**
A6	0,260836	0,151583	1,721	0,0863	*
A10	-0,433799	0,0762529	-5,689	2,96e-08	***
A11	-0,126973	0,0226028	-5,618	4,31e-08	***
A12	-0,0682652	0,0300233	-2,274	0,0237	**
A13	0,0342482	0,0182871	1,873	0,0620	*
A14	-0,0551255	0,0122866	-4,487	1,02e-05	***
A15	-0,0692526	0,0199872	-3,465	0,0006	***

Media var. dipendente	68,23624	SQM var. dipendente	1,512317
Somma quadr. residui	295,3951	E.S. della regressione	0,976159
R-quadro	0,597642	R-quadro corretto	0,583365
F(11, 310)	41,85981	P-value(F)	7,75e-55
Log-verosimiglianza	-443,0139	Criterio di Akaike	910,0278
Criterio di Schwarz	955,3224	Hannan-Quinn	928,1109
rho	0,631183	Durbin-Watson	0,685330

Note: SQM = scarto quadratico medio; E.S. = errore standard

Modello 17: WLS, usando 322 osservazioni
Incluse 20 unità cross section
Variabile dipendente: A3
Pesi basati sulle varianze degli errori per unità

	coefficiente	errore std.	rapporto t	p-value	
const	61,1052	2,01581	30,31	3,94e-095	***
A2	0,238825	0,0264537	9,028	1,83e-017	***
A4	0,0958079	0,0216120	4,433	1,29e-05	***
A5	0,203613	0,0646641	3,149	0,0018	***
A10	-0,209887	0,0642118	-3,269	0,0012	***
A11	-0,0600139	0,0185610	-3,233	0,0014	***
A12	-0,0666532	0,0233861	-2,850	0,0047	***
A14	-0,0592817	0,00835030	-7,099	8,45e-012	***
A15	-0,0509261	0,0169813	-2,999	0,0029	***

Statistiche basate sui dati ponderati:

Somma quadr. residui	300,0805	E.S. della regressione	0,979144
R-quadro	0,620056	R-quadro corretto	0,610345
F(8, 313)	63,85061	P-value(F)	2,69e-61
Log-verosimiglianza	-445,5476	Criterio di Akaike	909,0951
Criterio di Schwarz	943,0661	Hannan-Quinn	922,6574

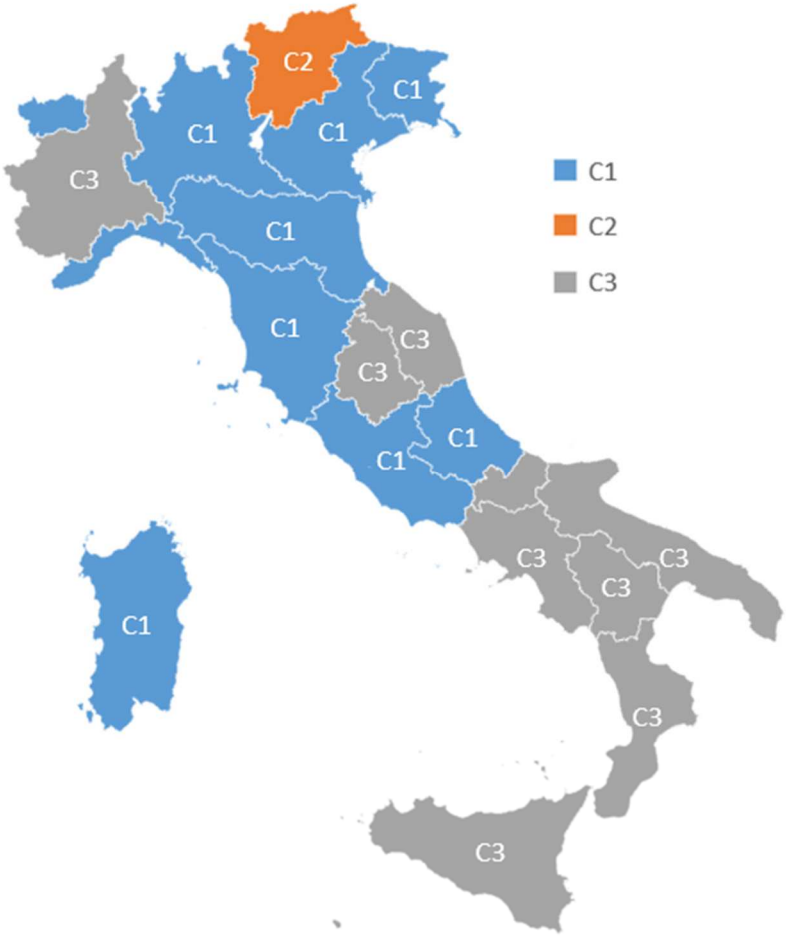
Note: SQM = scarto quadratico medio; E.S. = errore standard

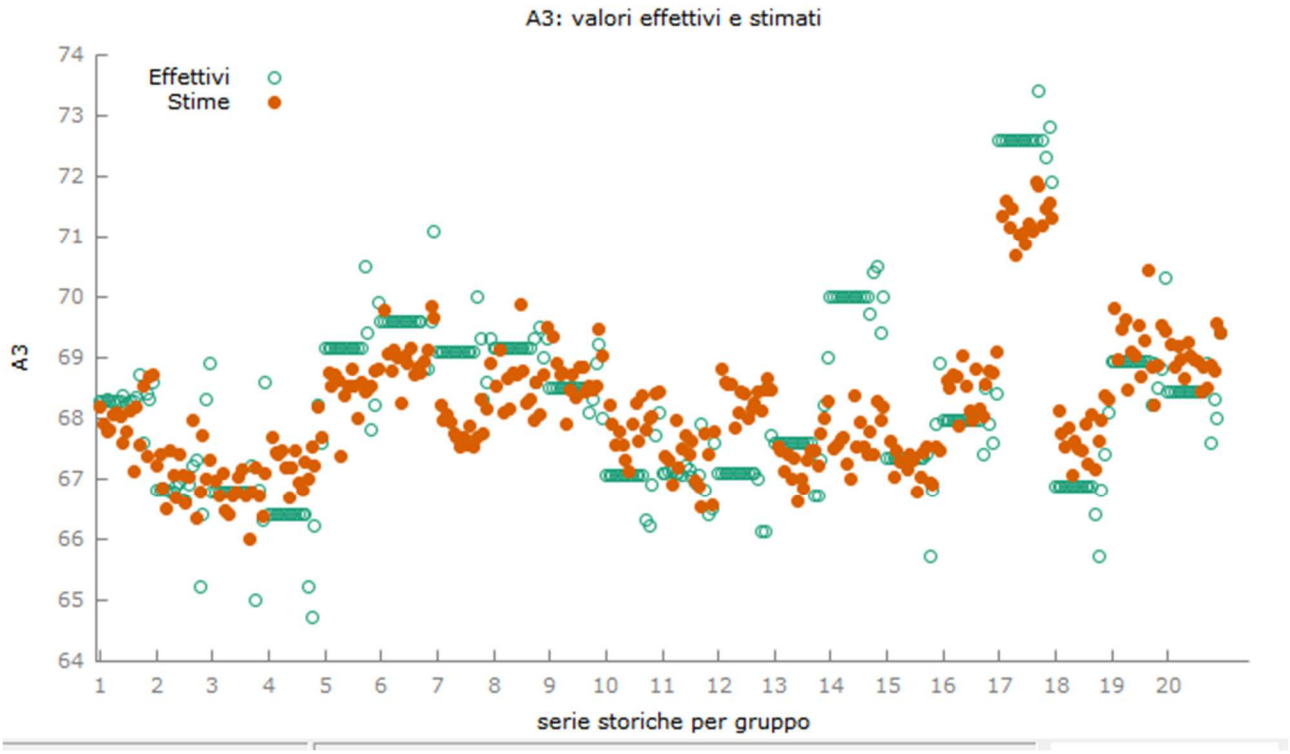
Statistiche basate sui dati originali:

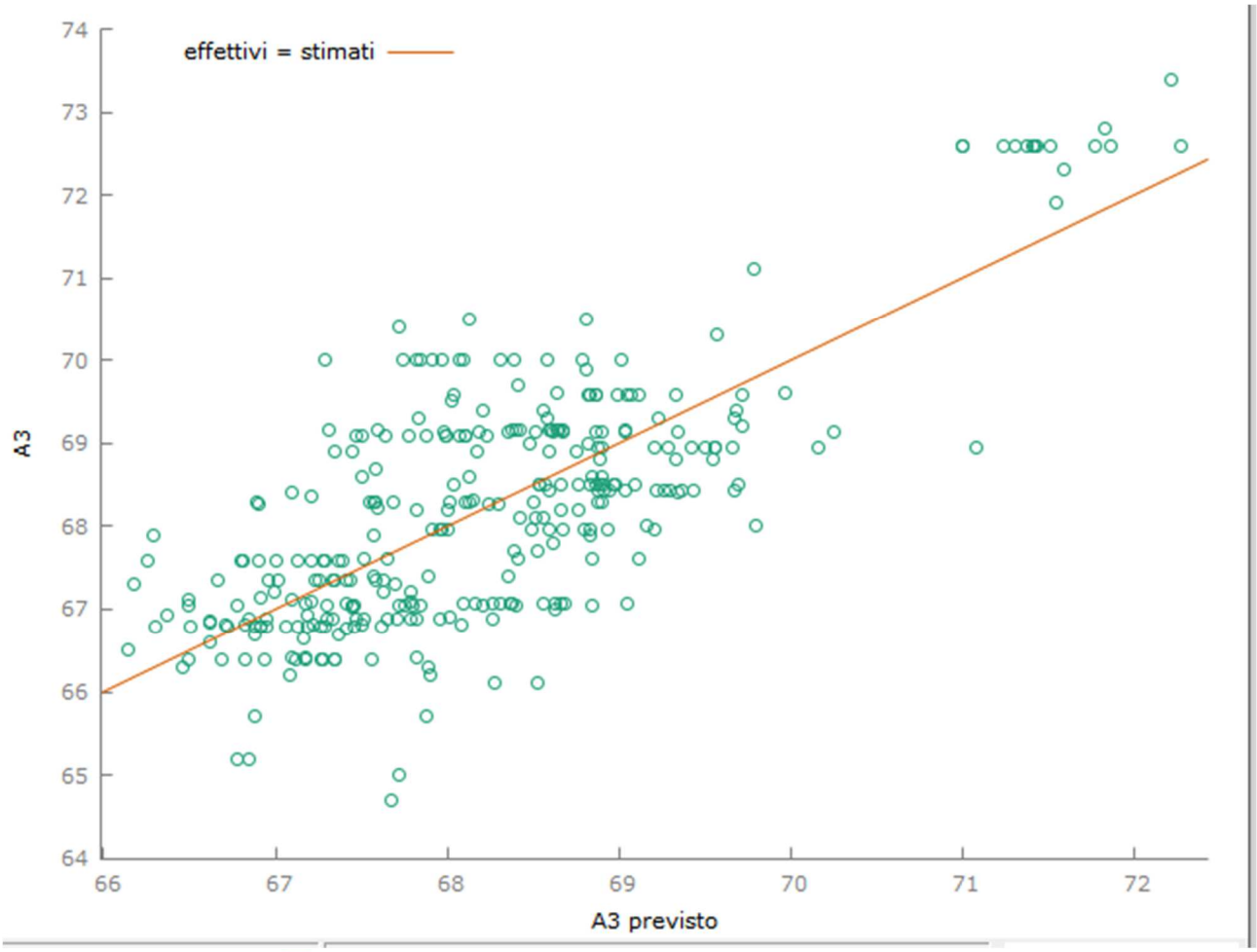
Media var. dipendente	68,23624	SQM var. dipendente	1,512317
Somma quadr. residui	322,2804	E.S. della regressione	1,014717

Note: SQM = scarto quadratico medio; E.S. = errore standard

Clusters per valore dell'indice della salute mentale. C2>C1>C3.



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A3 previsto
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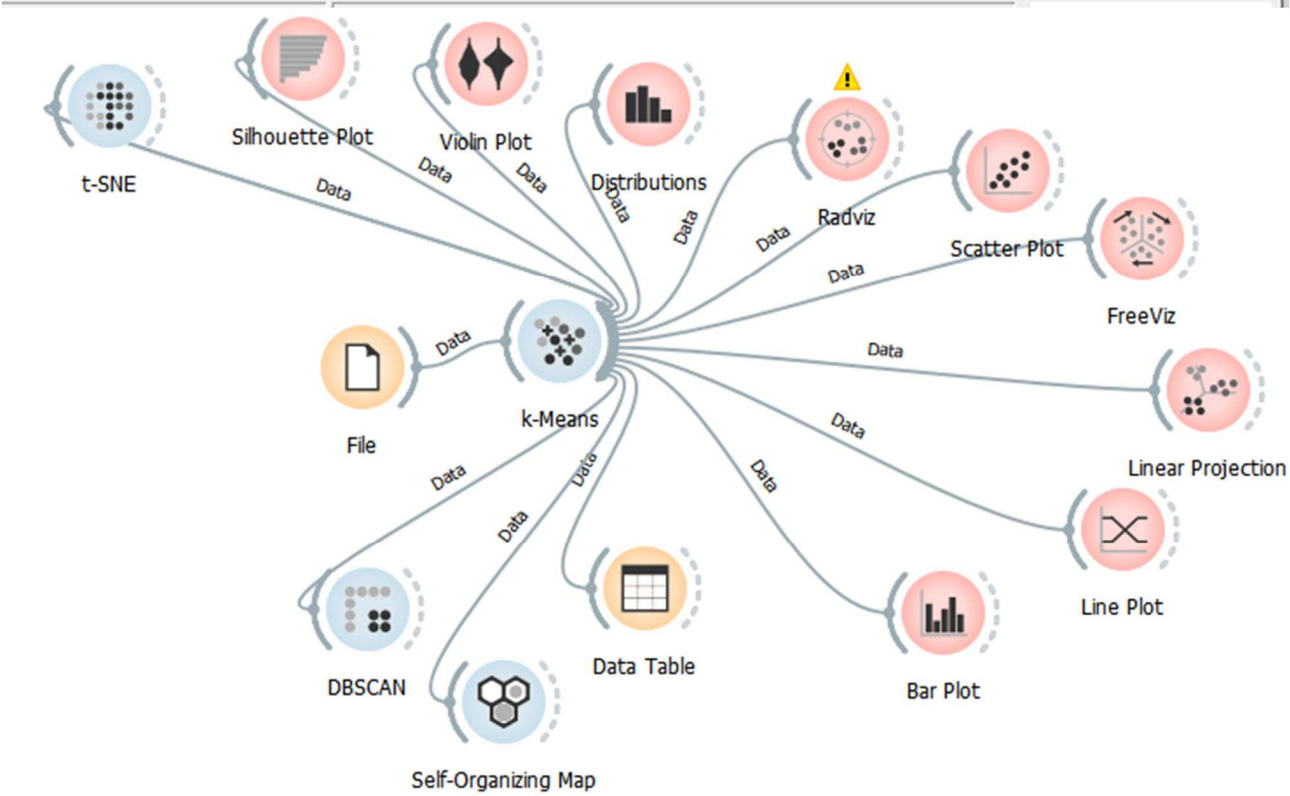
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Violin Plot
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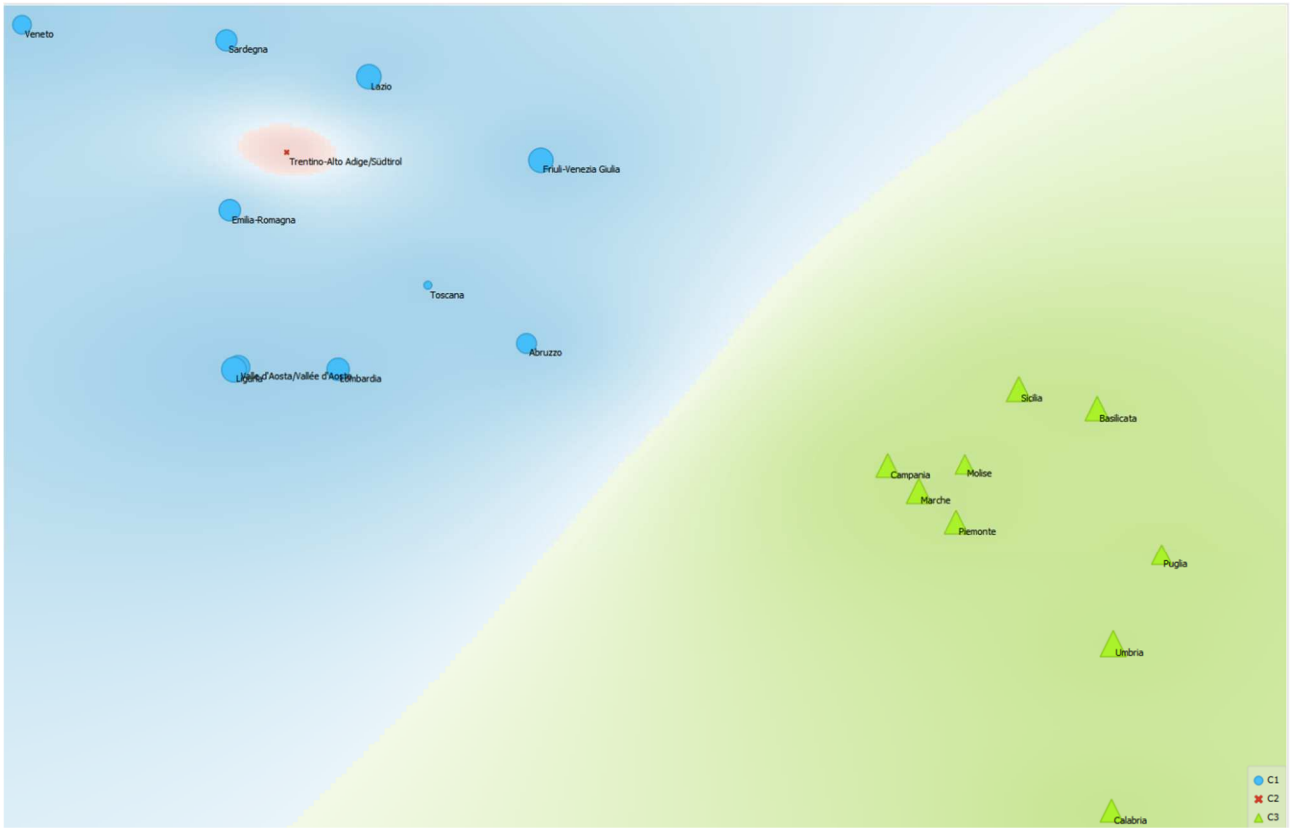
Data Table
DBSCAN
Self-Organizing Map
Data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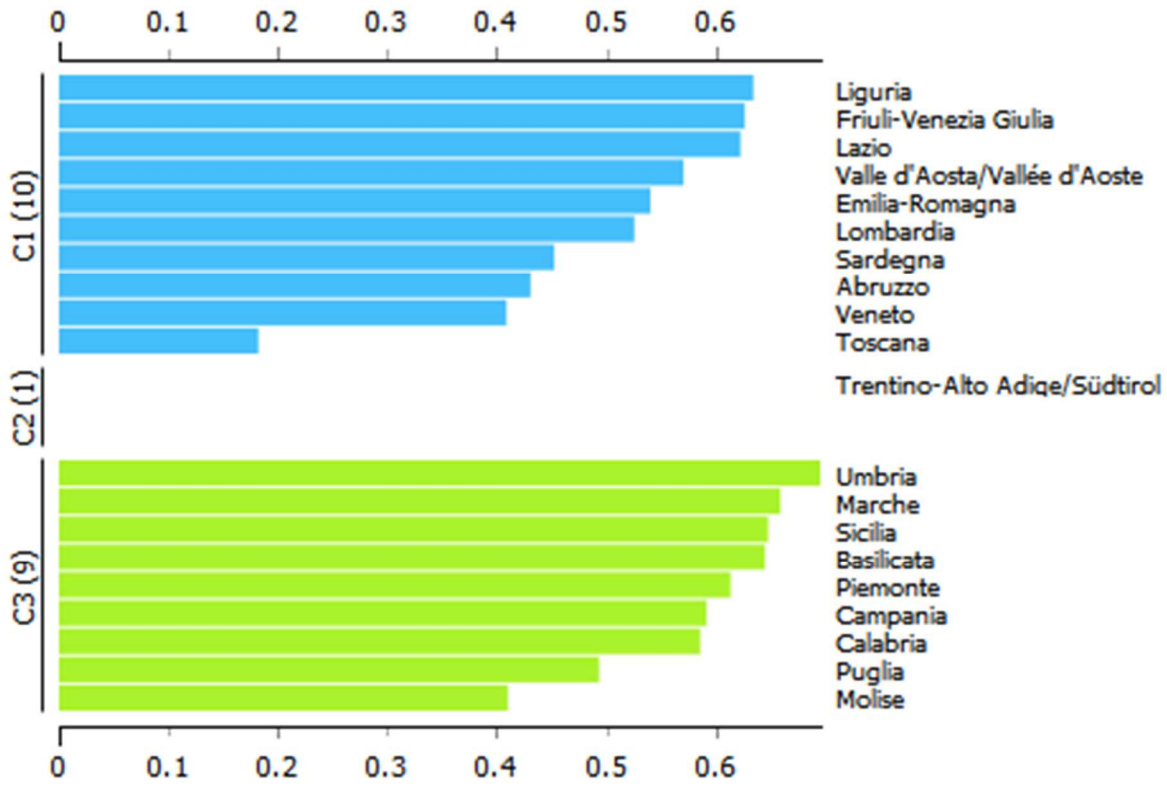
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0.1
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C1 (10)
C2 (1)
C3 (9)
Liguria
Friuli-Venezia Giulia
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Emilia-Romagna
Lombardia
Sardegna
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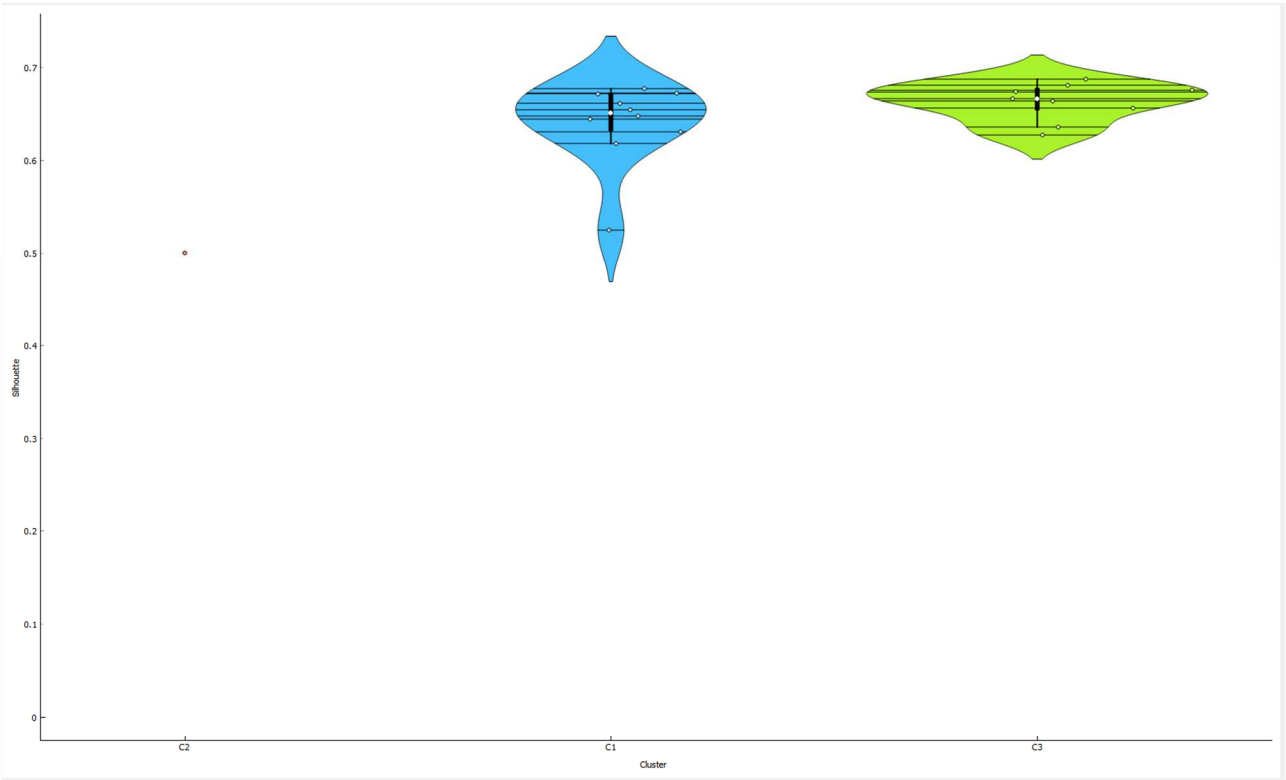
Molise


Silhouette
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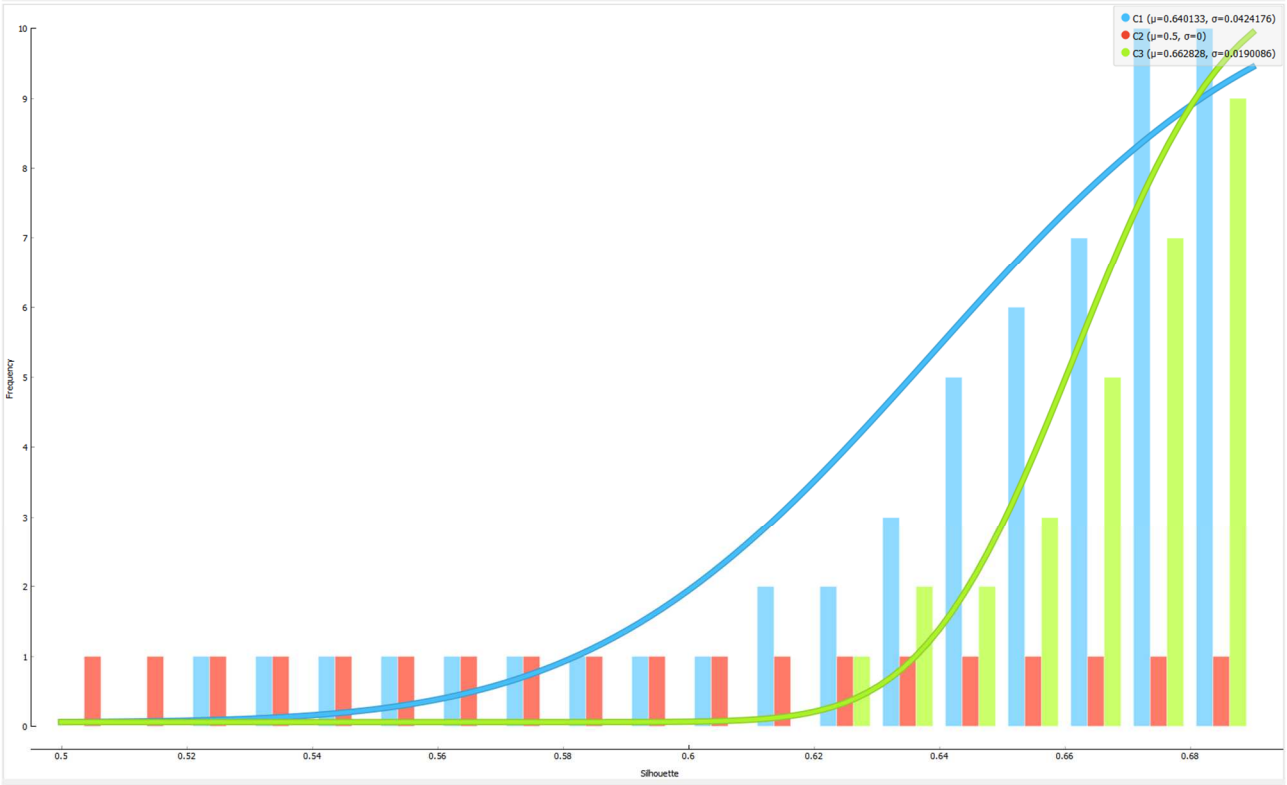
C2
C1
C3
Cluster


C1 (μ=0.640133, σ=0.0424176)
C2 (μ=0.5, σ=0)
C3 (μ=0.662828, σ=0.0190086)
Frequency
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8
7
6
5
4
3
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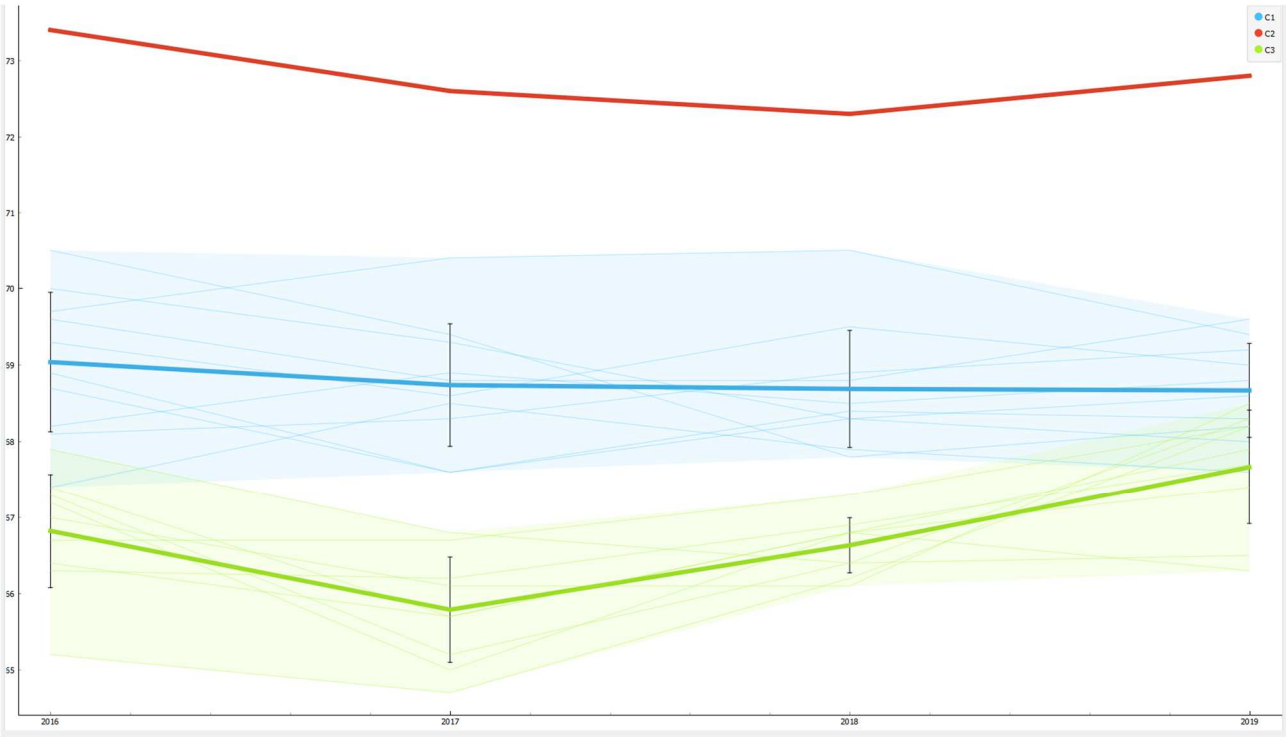
Silhouette


C1
C2
C3
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2016
2017
2018
2019