

The data set (and description) can be downloaded here:

<http://stat.ethz.ch/Teaching/Datasets/uscrime.dat>

**Description:**

TITLE : US crime  
KEYWORDS (statist) : multiple regression, structural models  
APPLICATION AREA : sociology

SHORT DESCRIPTION :

Crime rate and social variables for 47 States  
of the USA, 1960.

Variables:

- crime rate: number of offences known to the police  
per 1000000 population;
- age distribution: number of males aged 14-24 per 1000  
of total state population;
- binary variable distinguishing southern states (= 1)  
from the rest;
- educational level: mean number of years of schooling  
multiplied with 10 of the population 25 years old  
and over;
- police expenditure: per capita expenditure on police  
protection by state and local government in 1960;
- police expenditure (as before), but in 1959;
- labour force participation rate per 1000 civilian urban  
males in the age group 14-24;
- number of males per 1000 females;
- state population size in hundred thousands;
- number of non-whites per 1000;
- unemployment rate of urban males per 1000 in the age  
group 14-24;
- unemployment rate of urban males per 1000 in the age  
group 35-39;
- wealth as measured by the median value of transferable  
goods and assets or family income (unit 10 dollars);
- income inequality: number of families per 1000 earning  
below one half of the median income;

DIM. (VAR./OBS.) : 14 / 47

/ LITERATURE : /

Hand, Daly, McConway, Lunn, Ostrowski (1994): A Handbook of Small Data Sets (Chapman & Hall Statistics Text).

**Descriptive statistics:**

Dataset= us-crime\_svsN : n= 47 , d= 13

Class1: n= 16

**Covariance matrix:**

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]
[1,]	729.9510	-131.5263	167.1029	464.3550	447.0883	316.7879	49.6183	249.4333	-703.8983
[2,]	-131.5263	173.5625	-67.8625	-151.6833	-143.1500	216.0208	3.0167	25.9333	713.9167
[3,]	167.1029	-67.8625	75.6292	143.3500	138.8167	33.5458	48.9167	32.3333	-360.8500
[4,]	464.3550	-151.6833	143.3500	516.8667	485.0000	76.6167	70.0667	138.2667	-405.9333
[5,]	447.0883	-143.1500	138.8167	485.0000	459.2667	93.9500	64.5333	109.8000	-340.2000
[6,]	316.7879	216.0208	33.5458	76.6167	93.9500	1256.5958	99.9833	123.4000	665.7500
[7,]	49.6183	3.0167	48.9167	70.0667	64.5333	99.9833	164.6000	27.6667	-600.4000
[8,]	249.4333	25.9333	32.3333	138.2667	109.8000	123.4000	27.6667	405.4667	-180.5333
[9,]	-703.8983	713.9167	-360.8500	-405.9333	-340.2000	665.7500	-600.4000	-180.5333	11197.4000
[10,]	-185.0229	-96.8708	-41.1625	-86.8167	-88.6167	-379.8125	-77.2500	-97.2667	-200.7500
[11,]	-49.6371	-49.7292	-17.5708	-13.6500	-17.5167	-177.1208	-25.4167	-40.7333	-187.5167
[12,]	1178.6550	-658.4167	608.0833	1543.6000	1449.4000	-93.6500	547.5333	79.7333	-4967.3333
[13,]	-434.1700	239.9000	-225.6333	-571.5333	-543.6667	-45.4333	-169.6667	4.5333	1194.4667

	[,10]	[,11]	[,12]	[,13]
[1,]	-185.0229	-49.6371	1178.6550	-434.1700
[2,]	-96.8708	-49.7292	-658.4167	239.9000
[3,]	-41.1625	-17.5708	608.0833	-225.6333
[4,]	-86.8167	-13.6500	1543.6000	-571.5333
[5,]	-88.6167	-17.5167	1449.4000	-543.6667
[6,]	-379.8125	-177.1208	-93.6500	-45.4333
[7,]	-77.2500	-25.4167	547.5333	-169.6667
[8,]	-97.2667	-40.7333	79.7333	4.5333
[9,]	-200.7500	-187.5167	-4967.3333	1194.4667
[10,]	289.8958	125.1708	-48.0833	104.7667
[11,]	125.1708	64.1625	26.2833	35.9667
[12,]	-48.0833	26.2833	8352.8667	-2635.0000
[13,]	104.7667	35.9667	-2635.0000	986.6667

Correlation matrix:

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]	[,13]
[1,]	1.0000	-0.3695	0.7112	0.7560	0.7722	0.3308	0.1431	0.4585	-0.2462	-0.4022	-0.2294	0.4773	-0.5116
[2,]	-0.3695	1.0000	-0.5923	-0.5064	-0.5070	0.4626	0.0178	0.0978	0.5121	-0.4319	-0.4712	-0.5468	0.5797
[3,]	0.7112	-0.5923	1.0000	0.7250	0.7448	0.1088	0.4384	0.1846	-0.3921	-0.2780	-0.2522	0.7651	-0.8260
[4,]	0.7560	-0.5064	0.7250	1.0000	0.9955	0.0951	0.2402	0.3020	-0.1687	-0.2243	-0.0750	0.7429	-0.8003
[5,]	0.7722	-0.5070	0.7448	0.9955	1.0000	0.1237	0.2347	0.2544	-0.1500	-0.2429	-0.1020	0.7400	-0.8076
[6,]	0.3308	0.4626	0.1088	0.0951	0.1237	1.0000	0.2198	0.1729	0.1775	-0.6293	-0.6238	-0.0289	-0.0408
[7,]	0.1431	0.0178	0.4384	0.2402	0.2347	0.2198	1.0000	0.1071	-0.4422	-0.3536	-0.2473	0.4670	-0.4210
[8,]	0.4585	0.0978	0.1846	0.3020	0.2544	0.1729	0.1071	1.0000	-0.0847	-0.2837	-0.2525	0.0433	0.0072
[9,]	-0.2462	0.5121	-0.3921	-0.1687	-0.1500	0.1775	-0.4422	-0.0847	1.0000	-0.1114	-0.2212	-0.5136	0.3594
[10,]	-0.4022	-0.4319	-0.2780	-0.2243	-0.2429	-0.6293	-0.3536	-0.2837	-0.1114	1.0000	0.9178	-0.0309	0.1959
[11,]	-0.2294	-0.4712	-0.2522	-0.0750	-0.1020	-0.6238	-0.2473	-0.2525	-0.2212	0.9178	1.0000	0.0359	0.1429
[12,]	0.4773	-0.5468	0.7651	0.7429	0.7400	-0.0289	0.4670	0.0433	-0.5136	-0.0309	0.0359	1.0000	-0.9179
[13,]	-0.5116	0.5797	-0.8260	-0.8003	-0.8076	-0.0408	-0.4210	0.0072	0.3594	0.1959	0.1429	-0.9179	1.0000

Median: 86.6736 150.5595 94.1414 68.7955 64.6667 531.4557 969.5485 36.9184 210.5643 88.1562 33.5863 434.2686 236.4836

Mean: 85.6812 148.6875 94.8125 69.75 65.75 533.0625 970.25 34 209.75 91.1875 34.8125 440.75 234.5

MCD-estimated:

0.975-Mean: 84.9733 150.1333 93.7333 68.9333 64.8667 534 969.4667 36 214.4667 90.8 34.6 428.8 238.9333  
 0.750-Mean: 84.9733 150.1333 93.7333 68.9333 64.8667 534 969.4667 36 214.4667 90.8 34.6 428.8 238.9333  
 0.500-Mean: 84.9733 150.1333 93.7333 68.9333 64.8667 534 969.4667 36 214.4667 90.8 34.6 428.8 238.9333

Class2: n= 31

Covariance matrix:

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]
[1,]	1909.8247	38.5533	88.3700	920.1600	825.4700	184.4400	299.1600	627.0033	974.7300
[2,]	38.5533	72.7032	8.1505	-89.0860	-86.4935	-3.3269	86.6419	-197.4548	-69.7570
[3,]	88.3700	8.1505	59.3140	41.0301	43.3344	126.0011	84.5903	-50.3258	-41.4817
[4,]	920.1600	-89.0860	41.0301	907.7828	844.8946	-161.4387	-147.1849	811.6290	541.0086
[5,]	825.4700	-86.4935	43.3344	844.8946	799.5462	-192.1538	-152.9828	753.0903	477.7860
[6,]	184.4400	-3.3269	126.0011	-161.4387	-192.1538	1236.0129	597.2505	-412.9763	-36.3806
[7,]	299.1600	86.6419	84.5903	-147.1849	-152.9828	597.2505	1117.2452	-747.2129	-98.7742
[8,]	627.0033	-197.4548	-50.3258	811.6290	753.0903	-412.9763	-747.2129	2014.1656	891.3022
[9,]	974.7300	-69.7570	-41.4817	541.0086	477.7860	-36.3806	-98.7742	891.3022	1073.8624
[10,]	21.8333	5.4849	-11.2914	-45.2763	-45.7968	-163.7301	281.0710	-0.5441	31.6215
[11,]	116.8833	-21.8011	-15.1613	88.3398	79.7978	-112.6688	14.1860	155.4516	128.2634
[12,]	1605.6700	-224.6237	173.2849	1646.0086	1569.9194	-116.5473	-364.7075	1517.4022	939.3957
[13,]	-48.3967	40.2978	-58.6892	-361.0871	-362.5043	276.6957	201.8720	-210.6968	106.1602

	[,10]	[,11]	[,12]	[,13]
[1,]	21.8333	116.8833	1605.6700	-48.3967
[2,]	5.4849	-21.8011	-224.6237	40.2978
[3,]	-11.2914	-15.1613	173.2849	-58.6892
[4,]	-45.2763	88.3398	1646.0086	-361.0871
[5,]	-45.7968	79.7978	1569.9194	-362.5043
[6,]	-163.7301	-112.6688	-116.5473	276.6957
[7,]	281.0710	14.1860	-364.7075	201.8720
[8,]	-0.5441	155.4516	1517.4022	-210.6968
[9,]	31.6215	128.2634	939.3957	106.1602
[10,]	338.6258	114.4495	-149.2452	17.3989
[11,]	114.4495	76.7226	158.9634	-37.1882
[12,]	-149.2452	158.9634	4307.8624	-1128.9065
[13,]	17.3989	-37.1882	-1128.9065	620.9570

Correlation matrix:

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]	[,13]
[1,]	1.0000	0.1035	0.2626	0.6988	0.6680	0.1200	0.2048	0.3197	0.6806	0.0271	0.3053	0.5598	-0.0444
[2,]	0.1035	1.0000	0.1241	-0.3468	-0.3587	-0.0111	0.3040	-0.5160	-0.2497	0.0350	-0.2919	-0.4014	0.1897
[3,]	0.2626	0.1241	1.0000	0.1768	0.1990	0.4654	0.3286	-0.1456	-0.0797	-0.2247	-0.2247	0.3428	-0.3058
[4,]	0.6988	-0.3468	0.1768	1.0000	0.9917	-0.1524	-0.1461	0.6002	0.5479	-0.0817	0.3347	0.8324	-0.4809
[5,]	0.6680	-0.3587	0.1990	0.9917	1.0000	-0.1933	-0.1619	0.5934	0.5156	-0.0880	0.3222	0.8459	-0.5145
[6,]	0.1200	-0.0111	0.4654	-0.1524	-0.1933	1.0000	0.5082	-0.2617	-0.0316	-0.2531	-0.3659	-0.0505	0.3158
[7,]	0.2048	0.3040	0.3286	-0.1461	-0.1619	0.5082	1.0000	-0.4981	-0.0902	0.4570	0.0485	-0.1662	0.2424
[8,]	0.3197	-0.5160	-0.1456	0.6002	0.5934	-0.2617	-0.4981	1.0000	0.6060	-0.0007	0.3954	0.5151	-0.1884
[9,]	0.6806	-0.2497	-0.1644	0.5479	0.5156	-0.0316	-0.0902	0.6060	1.0000	0.0524	0.4469	0.4368	0.1300
[10,]	0.0271	0.0350	-0.0797	-0.0817	-0.0880	-0.2531	0.4570	-0.0007	0.0524	1.0000	0.7101	-0.1236	0.0379
[11,]	0.3053	-0.2919	-0.2247	0.3347	0.3222	-0.3659	0.0485	0.3954	0.4469	0.7101	1.0000	0.2765	-0.1704
[12,]	0.5598	-0.4014	0.3428	0.8324	0.8459	-0.0505	-0.1662	0.5151	0.4368	-0.1236	0.2765	1.0000	-0.6902
[13,]	-0.0444	0.1897	-0.3058	-0.4809	-0.5145	0.3158	0.2424	-0.1884	0.1300	0.0379	-0.1704	-0.6902	1.0000

Median: 89.9066 133.9618 111.9554 89.2231 84.3789 578.5077 989.428 32.3099 40.7454 96.6972 32.4546 568.2658 173.2669

Mean: 93 133.3548 111.2258 92.871 87.7097 575.7097 989.6129 37.9677 45.0645 97.6774 33.5484 569.0645 173.0968

MCD-estimated:

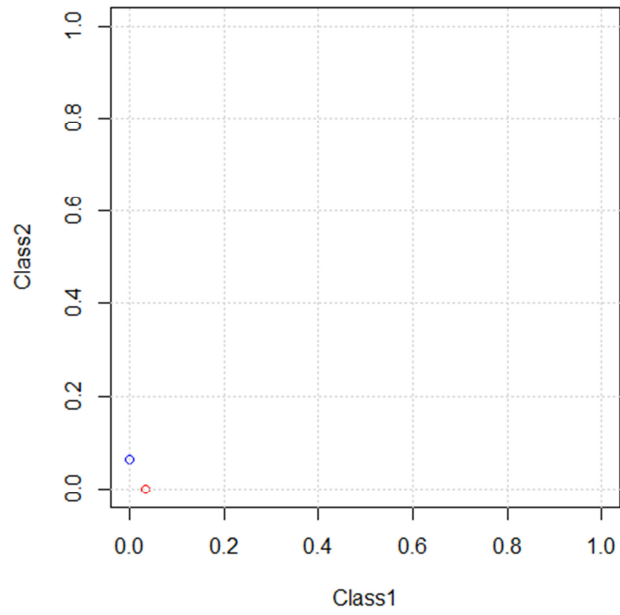
0.975-Mean: 86.2455 134.1818 112.6364 83 78.5 581.1818 990.0909 30.0909 42.2273 99.5909 33.4091 551.9091 178.8182

0.950-Mean: 92.15 134.1364 112.3182 85.6818 80.1818 583.6818 993.8636 27.8636 42.1364 99.9545 34.1818 555.0455 176.7727

0.500-Mean: 77.2182 134.2273 111.3182 81.5455 77.7273 576.7727 989.6364 23.3182 33.5909 96.8182 31 550.3182 177.0455

Measures:  
Mah. Dist: 4.0898  
Mah. Dist-MCD-0.975: 3.1523  
Mah. Dist-MCD-0.750: 3.1936  
Mah. Dist-MCD-0.500: 2.6403

**DD-Plot (zonoid): us-crime\_SvsN**



**DD-Plot (random Tukey): us-crime\_SvsN**

