Multivariate Statistics

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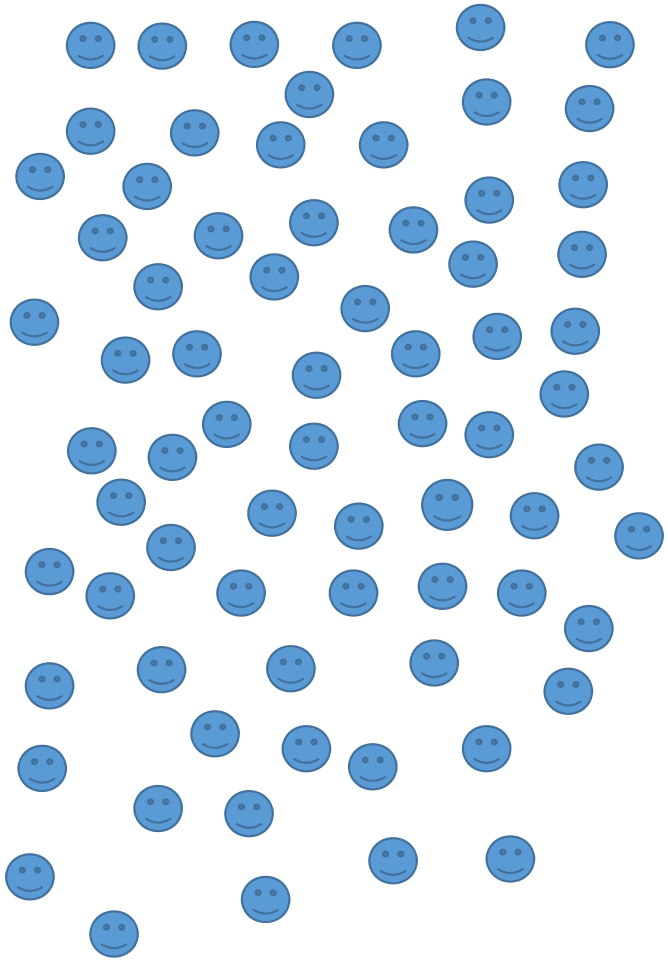
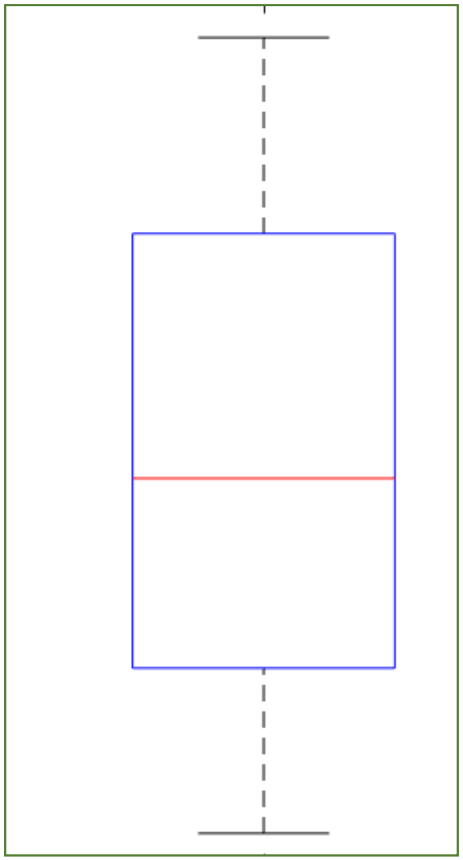


Weights in Kg.

55	84	62	88	90
73	105	57	62	54
53	102	83	81	54
101	86	68	78	71
50	60	53	57	60
72	48	104	107	77
77	67	104	69	52
96	70	60	71	51
53	107	108	82	48
60	68	99	46	47
56	87	93	87	74
81	64	94	57	90
57	69	86	96	50
106	96	77	73	74
65	78	78	98	97
87	69	98	79	94
74	50	60	105	55
99	80	110	50	74
52	108	45	96	98
102	50	71	62	97



Maximum = 110
Median = 74 Kg.
Minimum = 45.
25th Percentile :- 58.5
75th Percentile :- 94

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74	50	60	105	55
99	80	110	50	74
52	108	45	96	98
102	50	71	62	97

Regression Problem

Heights in Cm. (Y)

161.8	157.5	149.3	170.0	169.1
149.7	149.4	169.3	143.4	165.9
169.5	176.0	163.5	154.1	163.5
163.1	172.3	159.7	157.2	172.5
161.4	157.7	161.8	164.2	169.3
165.2	144.9	144.3	143.3	162.4
162.6	155.6	159.2	164.7	153.1
150.6	158.4	176.0	147.9	153.5
158.4	162.8	161.0	160.7	171.9
158.5	157.4	160.4	166.5	143.9
154.7	164.4	152.7	163.3	159.8
176.8	163.9	159.7	170.8	140.5
151.2	147.5	162.3	170.1	170.2
155.2	150.5	164.3	153.5	168.6
152.9	152.6	156.3	162.6	160.0
148.3	154.9	157.6	150.6	159.3
158.1	156.8	180.2	146.8	135.1
157.3	160.1	137.4	169.2	165.8
175.3	129.7	182.3	160.0	138.1
155.4	172.4	163.4	159.5	136.8

Weights in Kg. (X)

55	84	62	88	90
73	105	57	62	54
53	102	83	81	54
101	86	68	78	71
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72	48	104	107	77
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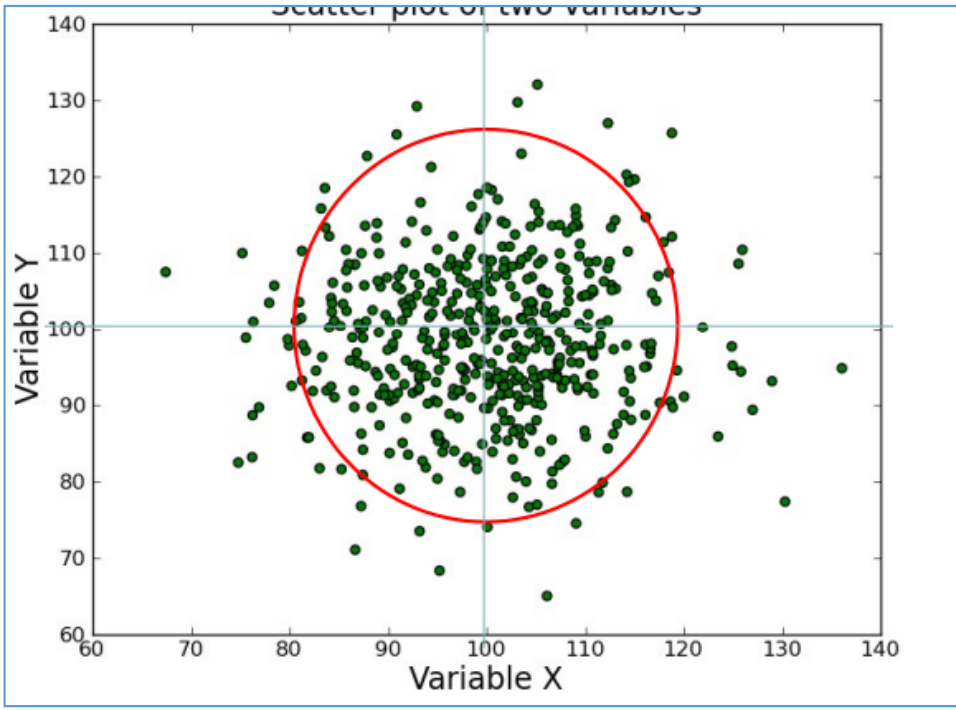
Relationship between variables

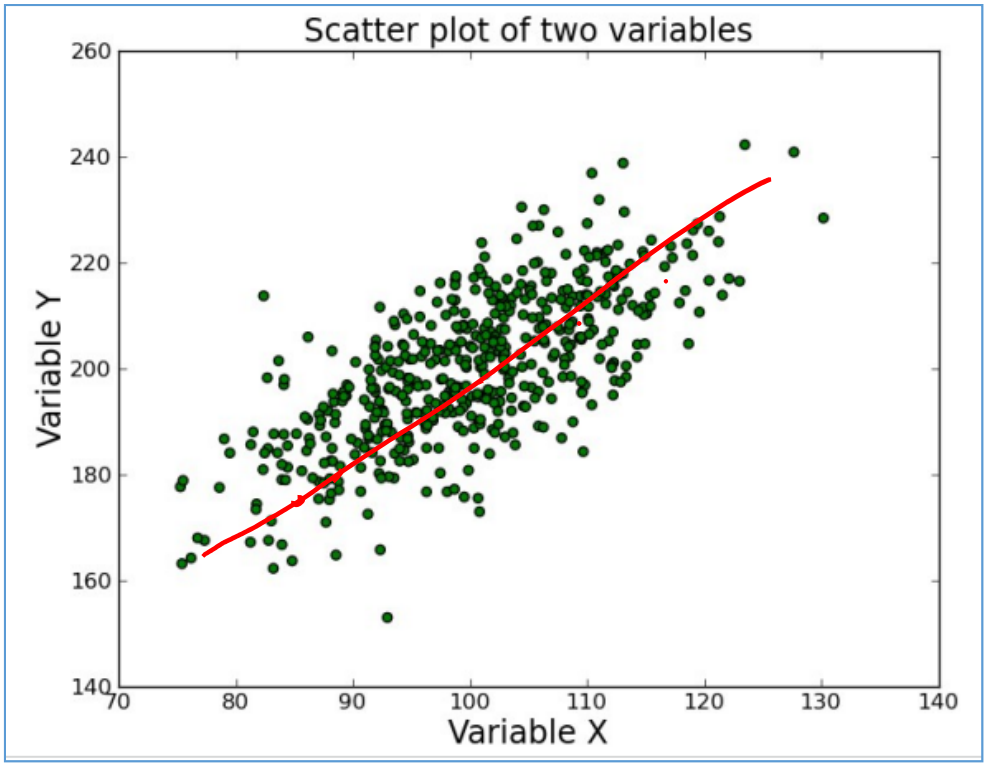
- We are going to need a way of measuring whether one variable changes when another one does.

- Another way of putting it: when we know the value of variable X, how much information do we have about variable Y value?

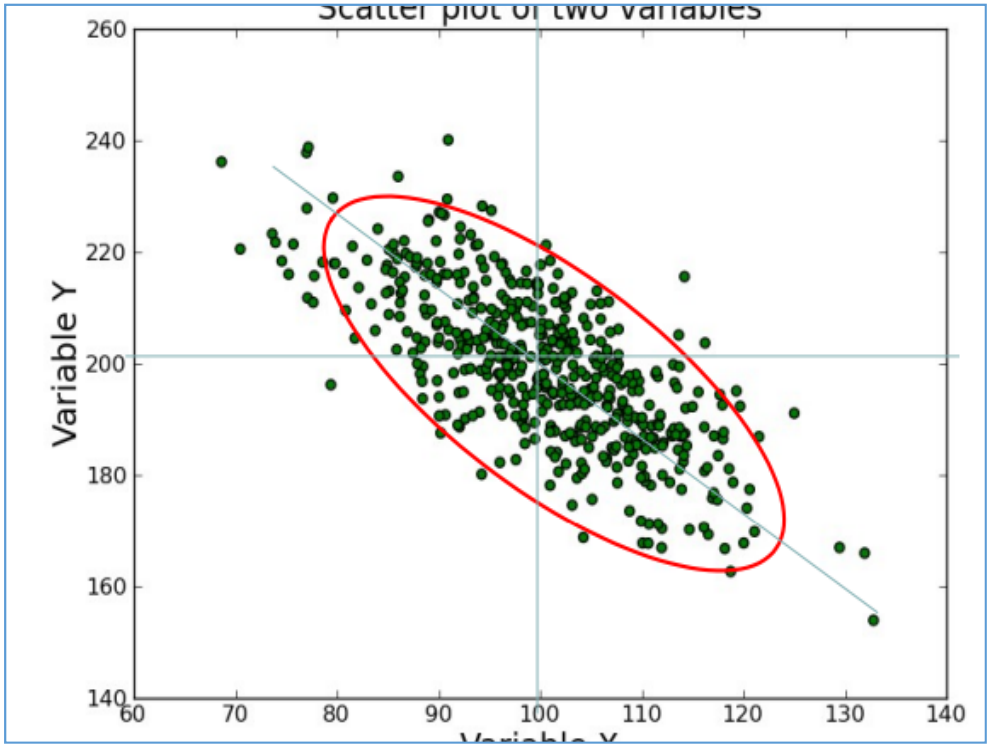
Covariance


Variable Y
Variable X
140
130
120
110
100
90
80
70
60
60
70
80
90
100
110
120
130
140

Covariance


Scatter plot of two variables
Variable Y
Variable X
260
240
220
200
180
160
140
70
80
90
100
110
120
130
140

Covariance


Scatter plot of two variables
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260
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70
80
90
100
110
120
130
140

If X and Y are independent, then $\rho = 0$, but $\rho = 0$ does not imply independence.

The correlation coefficient ρ is a measure of the **linear relationship** between X and Y, and only when the two variables are perfectly related in a linear manner will ρ be as positive or negative as it can be.

Two variables could be uncorrelated yet highly dependent because there is a strong nonlinear relationship, so be careful not to conclude too much from knowing that $\rho = 0$.

178.07	168.80	180.11	144.73	174.44	156.32	183.06	158.66	189.58	173.79
197.51	183.48	159.96	176.20	188.01	170.74	174.96	171.82	184.76	141.34
136.12	172.76	164.00	177.53	186.35	186.17	149.78	147.56	151.23	156.27
182.93	174.36	159.92	171.25	164.62	174.62	193.22	145.31	167.30	184.10
174.78	171.69	178.63	172.37	168.05	174.49	160.75	172.89	158.85	143.85
150.38	176.60	158.33	162.08	181.01	167.04	159.52	150.65	173.50	191.22
163.50	171.52	154.05	180.85	171.80	167.80	148.65	164.00	201.52	162.74
175.14	211.81	178.29	157.25	187.04	168.45	168.36	181.63	156.85	177.92
223.68	152.50	163.65	158.05	159.70	128.02	168.46	183.83	199.23	152.36
211.54	142.19	175.42	180.88	177.08	175.90	165.16	193.17	163.02	181.32
149.75	152.89	164.72	195.30	174.33	184.85	157.41	154.86	160.22	169.98
215.52	153.60	174.04	164.20	190.88	150.54	145.09	182.85	179.14	188.81
180.88	163.50	131.53	162.42	149.82	147.17	215.19	174.88	180.64	161.80
169.05	167.47	176.99	176.12	170.01	179.32	192.51	188.79	174.20	158.97
180.72	166.72	197.80	186.09	170.80	147.39	164.62	173.30	147.99	158.66
166.93	178.12	185.59	184.52	134.87	144.81	168.28	182.23	159.63	199.62
168.14	175.84	183.66	174.05	188.72	181.83	175.38	187.09	156.98	165.05
192.35	181.27	166.40	160.48	212.14	160.19	169.82	163.82	162.31	145.86
191.14	196.67	172.71	179.45	166.52	188.67	161.44	163.08	158.27	184.23

Heights of students in centimeters