

“ Sheel, Sharir, Adhyayan ”
Aundh Shikshan Mandal, Aundh



Raja Shripatrao Bhagawantrao
Mahavidyalaya, Aundh. (Satara)

Experiential Learning

Case Study

B.Sc. Part 2

Subject: Statistics

2019-2020



**RAJA SHRIPATRAO BHAGAWANTRAO MAHAVIDYALAYA,
AUNDH (SATARA)**

DEPARTMENT OF STATISTICS

Case Study Report 2019-20

OBJECTIVES:

1. Understand the basic concepts of discrete distributions, continuous univariate and bivariate distributions, transformation of univariate continuous random variable.
2. The basic concepts of Multiple Linear Regression, Multiple and Partial Correlation, Sampling Theory and Demography.
3. Know some standard continuous probability distributions.
4. Understand the concepts of Time Series, Statistical Quality Control, Testing of Hypothesis.

Sr. No.	Name of Students	Case Study
1	* Bhokare Anjali Anil	Variation of population with yearly percentage change per year for 2019 & 2020
2	Dabade Shubham Prakash	
3	Gharge Abhishek Santosh	
4	Gharge Raturaj Shivaji	
5	* Ghadge Aparna Madhukar	Analysis of milk and fat
6	Jadhav Rohit Jagannath	
7	* Jadhav Pratiksha Ashok	
8	* Mane Poonam Netaji	Analysis of number of defective invoice
9	Magar Tukaram Akaram	
10	Nikam Akshay Ashok	
11	* Nikam Nikita Pratap	

12	* Shaikh Fiza Harun	Analysis of independence of attributes of gender & preference for educational side
13	* Vedpathak Sonali Himmat	
14	Yadav Shubham Krishna	
15	* Yadav Payal Vijay	
16	* Yadav Rupali Maruti	

OUTCOMES:

- Know the concept and use of time series, sampling theory, the need of vital statistics and concept of mortality and fertility.
- Understand the meaning, purpose and use of Statistical Quality Control, construction and working of control charts for variables and attributes.
- Apply the small sample tests and large sample tests in various situations.
- Know some standard continuous probability distributions with real life situations.
- Distinguish between various continuous distributions.

Shw
(Momin S.M.)



Shardar
I/C PRINCIPAL
Raja Shrinivas Bhagwanrao Mahavidyalaya
(Rajahmundry, Andhra Pradesh)

" Sheel, Sharir, Adhyayan "



Aundh Shikshan Mandal, Aundh

Raja Shripatrao Bhagwantrao Mahavidyalaya, Aundh

'B' Accredited

Department of Statistics

CERTIFICATE

Exam no.

Date:-25/02/2020

This is to certify that she / He Tadav Payal Vijay
has satisfactorily completed the submission as per required in
Statistics course prescribed by Shivaji University, Kolhapur for
BSc./II Statistics practical examination under my supervision in
the year 2019-20.

Teacher in charge

Head

HEAD

DEPARTMENT OF STATISTICS

R.S.B.M. AUNDH

MOMIN SHAHNAZ MOINUDDIN

Examiner

Case study of correlⁿ coefficient betⁿ height & weight of girls and boys.

Correlⁿ coefficient betⁿ height and weight of girls

Number of girls	Height	Weight
1	165	45
2	159	52
3	156	43
4	149	41
5	149	48
6	158	55

Formulae :-

$$\text{Correl}^n \text{ coefficient } (r) = \frac{\text{Cov}(x, y)}{\sigma_x \sigma_y}$$

$$\text{Cov}(x, y) = \frac{1}{n} \sum x_i y_i - \bar{x} \bar{y}$$

$$\sigma_x = \sqrt{\frac{\sum x_i^2}{n} - \bar{x}^2}$$

$$\sigma_y = \sqrt{\frac{\sum y_i^2}{n} - \bar{y}^2}$$

Observation table:-

Sr no	x	$u_i = x - 149$	u^2	y	$v_i = y - 41$	v^2	$u_i v_i$
1	165	-16	256	45	4	16	-64
2	159	10	100	52	11	121	110
3	156	7	49	43	2	4	14
4	149	0	0	41	0	0	0
5	158	9	81	48	7	49	63
6	163	14	196	55	14	196	196
	950	56	682	284	38	386	447

Calculation:-

$$\bar{u} = \frac{\sum u_i}{n} = \frac{56}{6}$$

$$= 9.3333$$

$$\bar{v} = \frac{\sum v_i}{n} = \frac{38}{6}$$

$$= 6.3333$$

$$\text{Cov}(u, v) = \frac{1}{n} \sum u_i v_i - \bar{u} \bar{v}$$

$$= \frac{1}{6} 447 - (9.3333 \times 6.3333)$$

$$= 74.5 - 59.1105$$

$$= 15.3895$$

$$G_u = \sqrt{\frac{\sum u_i^2}{n} - \bar{u}^2}$$

$$= \sqrt{\frac{682}{6} - (9.3333)^2}$$

$$= \sqrt{113.6666 - 87.1104}$$

$$\begin{aligned}
 & \sqrt{26 \cdot 5561} \\
 & = 5.1532 \\
 6v & = \sqrt{\frac{\sum Vi^2}{n} - \bar{V}^2} \\
 & = \sqrt{\frac{386}{6} - (6.3333)^2} \\
 & = \sqrt{64.3333 - 40.1106} \\
 & = \sqrt{24.2226} \\
 & = 4.9219
 \end{aligned}$$

$$\text{Correlation coefficient } (r) = \frac{\text{Cov (height)}}{6u \cdot 6v}$$

$$= \frac{15.3895}{5.1532 \times 4.9219}$$

$$= \frac{15.3895}{25.3625}$$

$$= 0.6068$$

Result! Correlation coefficient of girls $(r) = 0.6068$

The height and weight of girl positively correlated,

Correlⁿ coefficient betⁿ height and weight of boy's

Number of boy's	Height	Weight
1	168	56
2	173	69
3	178	65
4	178	65
5	172	55
6	175	66
7	170	58
8	176	61
9	172	66

Formulae :-

$$\text{Correl}^n \text{ coefficient } (r) = \frac{\text{Cov}(x, y)}{s_x \cdot s_y}$$

$$\text{Cov}(x, y) = \frac{1}{n} \sum x_i y_i - \bar{x} \bar{y}$$

$$s_x = \sqrt{\frac{\sum x_i^2}{n} - \bar{x}^2}$$

$$s_y = \sqrt{\frac{\sum y_i^2}{n} - \bar{y}^2}$$

Calculation!-

X	$u_i = X - 172$	u^2	Y	$V_i = Y - 55$	V_i^2	$\sum u_i v_i$
168	-4	16	56	1	1	-4
173	1	1	69	14	196	14
178	6	36	65	10	100	60
178	6	36	65	10	100	60
172	0	0	55	0	0	0
175	3	9	66	11	121	33
170	-2	4	58	3	9	-6
176	4	16	61	6	36	24
172	0	0	66	11	121	0
	14	118		66	684	181

Calⁿ:-

$$\bar{u} = \frac{\sum u_i}{n}$$

$$= \frac{14}{9}$$

$$= 1.5556$$

~~$$\bar{v} = \frac{\sum v_i}{n}$$~~

$$= \frac{66}{9}$$

$$= 7.3333$$

Correlⁿ coefficient = $\frac{\text{COV}(u, v)}{64.64}$

$$\text{COV}(u, v) = \frac{1}{n} \sum u_i v_i - \bar{u} \bar{v}$$

$$= \frac{1}{9} 181 - (1.5556 \times 7.8333)$$

$$= \frac{1}{9} 181 - 11.4077$$

$$= 8.7084$$

$$G_u = \sqrt{\frac{\sum u_i^2}{n} - \bar{u}^2}$$

$$= \sqrt{\frac{118}{9} - 2.4199}$$

$$= \sqrt{10.6912}$$

$$= 3.2697$$

$$G_v = \sqrt{\frac{\sum v_i^2}{n} - \bar{v}^2}$$

$$= \sqrt{\frac{684}{9} - 53.7773}$$

$$= \sqrt{22.2227}$$

$$= 4.7141$$

$$\text{Correlation coefficient } (r) = \frac{\text{Cov}(u, v)}{G_u \cdot G_v}$$

$$= \frac{8.7084}{3.2697 \times 4.7141}$$

$$= \frac{8.7084}{15.4137}$$

$$r = 0.5647$$

Result :- Correlation coefficient of boy's (r) = 0.5647
Height & weight of boy's positively correlated.

A report on,

Case study of analysis of mark in math and stat using test based on 1- distribution.

Data :-

Math	Stat
23	11
20	27
35	49
38	26
40	23
66	84
50	64
44	71
86	93
68	48
60	67
60	68
39	82

Observation table :-

$$\sqrt{\frac{(6-16)^2}{1-11}} = 2$$

$$\sqrt{\frac{450 \cdot 510}{51}} =$$

$$\sqrt{\frac{850 \cdot 250}{1500 \cdot 21}} =$$

Marks of math (x_1)	Marks of stat (x_2)	d_i	$(d_i - \bar{d})^2$
23	11	12	337.9935
20	27	-7	0.3787
35	49	-14	67.9943
38	26	12	337.9935
40	23	17	546.8895
66	84	-17	112.6867
50	64	-14	67.9943
44	71	-27	424.9947
86	93	-7	0.3787
68	48	20	696.1477
60	67	-7	0.3787
60	68	-8	2.6095
39	82	-43	1340.6815
		-83	3917.0767

$$\bar{d} = \frac{\sum d_i}{n}$$

$$= \frac{-83}{13}$$

$$= -6.3846$$

$$s = \sqrt{\frac{1}{n-1} \sum (d_i - \bar{d})^2}$$

$$= \sqrt{\frac{3917.0767}{12}}$$

$$= \sqrt{326.4230}$$

$$= 18.0671$$

Here we want to test following null hypothesis $H_0: \mu_1 = \mu_2$

vs $H_1: \mu_1 \neq \mu_2$

$$t = \frac{\bar{d}}{s/\sqrt{n}}$$

$$= \frac{-6.3846}{18.0671 / (3.6055)}$$

$$= \frac{-6.3846}{5.0109}$$

$t = -1.2741$

tab $t_{13-1} 0.05$

tab $t_{12, 0.05} = 2.179$

cal $t <$ tab t

i.e H_0 is accepted at 5%.

marks of math & stat are averagly equal

A Report on

Analysis of use of specs for boys & girls using test of independence of attributes.

Specs students	yes	No
Boys	3	57
Girls	5	55

Given

$N =$ total no of student $= 120$

$A =$ no of boys $= 60$

$\alpha =$ no of girls $= 60$

$\beta =$ no of persons using specs $= 8$

$B =$ no of person n of using specs $= 112$

A \ B	B	β	total
A	$(AB)a = 3$	$(AB)b = 57$	60
α	$(\alpha B)c = 5$	$(\alpha B)d = 55$	60
total	8	112	120

$$\begin{aligned} \chi^2_{\text{cal}} &= \frac{N(ad-bc)^2}{(a+b)(a+c)(b+d)(c+d)} \\ &= \frac{120 [(3 \times 55) - (57 \times 5)]^2}{(3+57)(3+5)(5+55)(57+55)} \\ &= \frac{120 [165 - 285]^2}{60 \times 8 \times 60 \times 112} \\ &= \frac{120 [120]^2}{3225600} \\ &= 0.9357 \end{aligned}$$

$$\begin{aligned} \chi^2_{\text{tab}} &= \chi^2_{(m-1)(n-1)0.05} \\ &= \chi^2_1(0.05) \\ &= 3.841 \end{aligned}$$

$$\chi^2_{\text{cal}} < \chi^2_{\text{tab}}$$

Conclusion :- Here $\chi^2_{\text{cal}} < \chi^2_{\text{tab}}$ hence we accepted H_0 at 5% level of significance i.e. two attributes students & use of specs are independent.