

14

## a. Percentage table

Percentage tables are used to specify the percentage values such as row percentage, column percentage and overall percentage.

$$\text{Row Percentage} = \frac{\text{Cell Value}}{\text{Row total}} \times 100$$

$$\text{Column Percentage} = \frac{\text{Cell Value}}{\text{Column total}} \times 100$$

$$\text{Overall Percentage} = \frac{\text{cell Value}}{\text{Grand total}} \times 100$$

Example:

Consider the following table,

	C	C++	Java
Male	15	20	30
Female	20	10	50

First we find the Row total  
and Column total.

	C	C++	Java	Row marginal
Male	15	20	30	65
Female	20	10	50	80
Column marginal	35	30	80	145

Row percentage and Column Percentage Calculation.

Row Percentage.

	C	C++	Java
Male	23.08	30.77	46.15
Female	25	12.5	62.5

Row marginal

Col.

### Column Percentage.

	C	C++	Java
Male	42.86	66.67	37.5
Female	57.14	33.33	62.5

### Overall Percentage

	C	C++	Java
Male	10.34	13.79	20.69
Female	13.79	6.90	34.48

Differing from Contingency tables.

It is similar to Contingency table.

Contingency table also calculate row and column marginal and find the Overall percentage only.

Analysis of Contingency table.

Analysis of Contingency table is two-way table (or) two-variable table. It is a bivariate analysis.

It is an example for chi-square test in statistic.

## Chi-Square test.

$$\chi^2 = \frac{\sum_{i=1}^n (O_i - E_i)^2}{E}$$

Here,  $O \Rightarrow$  Observed frequency

$E \Rightarrow$  Expected frequency.

$E$  is calculated by

$$E = \frac{(\text{Row total} \times \text{Column total})}{\text{Grand total}}.$$

Example:

	C	C++	Java	Row total
Male	15	20	30	65
Female	20	10	50	80
Column total	35	30	80	145

Step 1:

To find the expected frequency



	C	C++	Java
Male O	15	20	30
E	15.69	13.45	35.86
Female O	20	10	50
E	19.31	16.55	44.14

Step 2: Find the O-E and  $(O-E)^2$

	C	C++	Java
Male O	15	20	30
E	15.69	13.45	35.86
O-E	-0.69	6.55	-5.86
$(O-E)^2$	0.4761	42.9025	34.3396
Female O	20	10	50
E	19.31	16.55	44.14
O-E	0.69	-6.55	5.86
$(O-E)^2$	0.4761	42.9025	34.3396

$$\begin{aligned}
 \checkmark \sum (O-E)^2 &= 0.4761 + 42.9025 + 34.3396 + \\
 &\quad 0.4761 + 42.9025 + 34.3396 \\
 &= 155.4364.
 \end{aligned}$$

$$\sum E = 145$$

$$\chi^2 = \frac{\sum (O-E)^2}{E}$$

$$= \frac{155.4364}{145}$$

$$\chi^2_{\text{cal.}} = 1.072$$

It has Type I and Type II error.  
That is the value is accepted  
or not.