Assignment 1

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ICSE 10 2018

Question: 3 (c)

Using a graph paper draw a histogram for the given distribution showing the number of runs scored by 50 batsmen. Estimate the mode of the data.

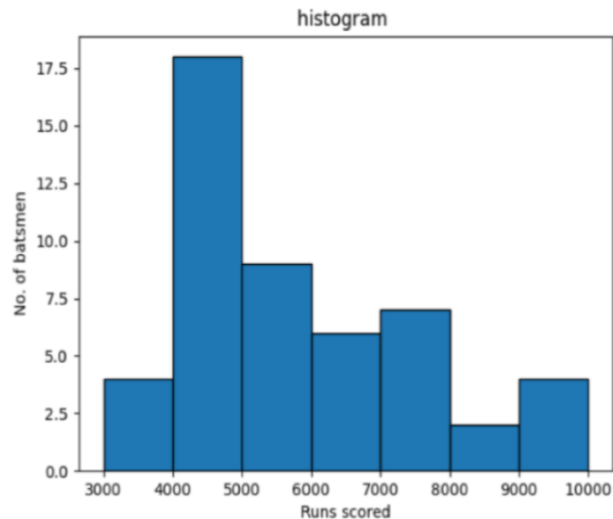| Runs scored	No. of batsmen
3000-4000	4
4000-5000	18
5000-6000	9
6000-7000	6
7000-8000	7
8000-9000	2
9000-10000	4

Table 1.1

Solution:

The Histogram for the data given in Table 1.1 is plotted as shown in Fig: 1.1.
The approach for calculating mode is outlined in Fig: 1.2. The interval corresponding to the maximum number of batsmen is the mode class. The intersection of the lines PQ and RS as shown in Fig 1.2 (Point M) is the mode point. The required mode is the x-coordinate of the Mode point.

$$\mathbf{P} = \begin{pmatrix} 5000 \\ 18 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 4000 \\ 4 \end{pmatrix}, \quad (0.0.1)$$

$$\mathbf{R} = \begin{pmatrix} 4000 \\ 18 \end{pmatrix}, \mathbf{S} = \begin{pmatrix} 5000 \\ 9 \end{pmatrix} \quad (0.0.2)$$

Equations of lines are as follows:

$$PQ : 14x - 1000y = 52000 \quad (0.0.3)$$
$$RS : 9x + 1000y = 54000 \quad (0.0.4)$$
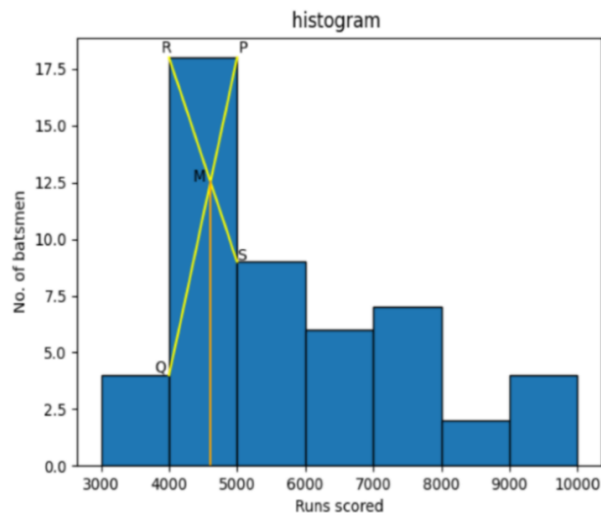
Adding both the equations, we get

Fig. 0: Histogram

Fig. 0: Histogram showing the mode

$$23x = 106000 \quad (0.0.5)$$
$$\implies x = 4068.695 \quad (0.0.6)$$

From this we can get the y-coordinate as follows:

$$1000y = 52000 + 14x \qquad (0.0.7)$$
$$1000y = 52000 + 56961.73 \qquad (0.0.8)$$
$$\implies y = 12.521 \qquad (0.0.9)$$

Mode point is the point of intersection of lines PQ and RS.

Therefore mode point is

$$\mathbf{M} = \begin{pmatrix} 4068.695 \\ 12.521 \end{pmatrix} \qquad (0.0.10)$$

Therefore, the mode is 4068.695.