IIT HYDERABAD

INTRODUCTION TO AI AND ML

ASSIGNMENT

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Linear Algebra and Matrices

Abstract- This document contains the solution to find the coordinates of the ponits of section,given the line joining points is divided into four equal parts.

1 POINTS AND VECTORS

1.1 PROBLEM

The line joining the points (-6,8) and (8,-6) is divided into four equal parts; Find the coordinates of the points of section.

SOLUTION: In Fig 1.1

We will be using matrix approach for calculating the coordinates of the points of section which is divided into four equal parts.

$$\begin{bmatrix} \vec{x1} \\ \vec{y1} \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \end{bmatrix} = \begin{bmatrix} -10/4 \\ 18/4 \end{bmatrix} = \begin{bmatrix} -5/2 \\ 9/2 \end{bmatrix}$$

Points x1,y1 divides line in ratio 3:1

$$\begin{bmatrix} \vec{x2} \\ \vec{y2} \end{bmatrix} = \frac{1}{2} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2/2 \\ 2/2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

Points x2,y2 divides lines in ratio 1:1

$$\begin{bmatrix} \vec{x3} \\ \vec{y3} \end{bmatrix} = \frac{1}{4} \begin{bmatrix} -6 & 8 \\ 8 & -6 \end{bmatrix} \begin{bmatrix} 1 \\ 3 \end{bmatrix} = \begin{bmatrix} 18/4 \\ -10/4 \end{bmatrix} = \begin{bmatrix} 9/2 \\ -5/2 \end{bmatrix}$$

Points x3,y3 divides lines in ratio 1:3

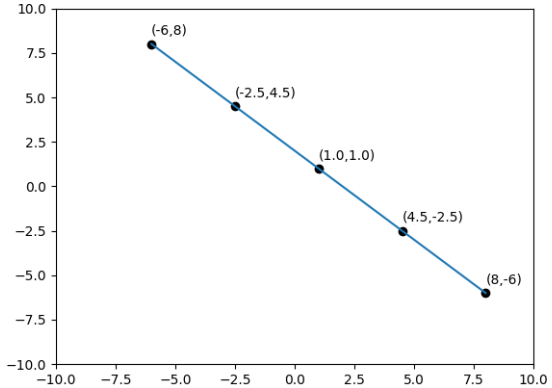

FIG 1.1 PLOT OBTAINED FROM PYTHON CODE

CONCLUSION

The points $(\vec{x1}\vec{y1}), (\vec{x2}\vec{y2}), (\vec{x3}\vec{y3})$divides the lines into four parts in ratio (3:1) (1:1) (1:3). The points $(\vec{x1}\vec{y1}) = (-2.5, 4.5), (\vec{x2}\vec{y2}) = (1, 1), (\vec{x3}\vec{y3}) = (4.5, -2.5)$

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