MSc in Artificial Intelligence

Batch 17

IT 5845 - Mathematics for Artificial Intelligence

Tutorial 2

1. Determine whether the set of vectors $\left\{ \begin{bmatrix} 3 \\ 2 \end{bmatrix}, \begin{bmatrix} -6 \\ -4 \end{bmatrix} \right\}$ is linearly independent or linearly dependent in $\mathbb{R}^2$.

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2. a) Consider the vector $\boldsymbol{b_1} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$. Write a Python code to visualize this vector.

b) Modify the code above to add another vector $\boldsymbol{b_2} = \begin{bmatrix} 6 \\ 3 \end{bmatrix}$. Visualize the two vectors and comment if they are linearly independent.

c) Add another vector $\boldsymbol{b_3} = \begin{bmatrix} -4 \\ -2 \end{bmatrix}$ and comment if the three vectors are linearly independent.

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3. By plotting the following set of vectors identify if they span a line or a plane.

a) $\boldsymbol{c_1} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$ and $\boldsymbol{c_2} = \begin{bmatrix} -8 \\ -4 \end{bmatrix}$

b) $\boldsymbol{c_1} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $\boldsymbol{c_2} = \begin{bmatrix} -2 \\ 5 \end{bmatrix}$

c) $\boldsymbol{c_1} = \begin{bmatrix} -3 \\ 6 \end{bmatrix}$, $\boldsymbol{c_2} = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ and $\boldsymbol{c_3} = \begin{bmatrix} 4 \\ -8 \end{bmatrix}$

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