# Vectors

Vectors are 1-dimentional **Arrays**

Vectors have a **Magnitude** and a **Direction**

## **Vector Notation**

Vectors can be written in many ways. The most common are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| v = | |  |  |  | | --- | --- | --- | | 1 | 2 | 3 | |

or:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| v = | |  | | --- | | 1 | | 2 | | 3 | |

## **Vectors in Geometry**

|  |  |
| --- | --- |
| Vector | The image to the left is a **Vector**.  The **Length** shows the **Magnitude**.  The **Arrow** shows the **Direction**. |

**Machine Learning** experts cannot live without **Linear Algebra**:

* ML make heavy use of **Scalars**
* ML make heavy use of **Vectors**
* ML make heavy use of **Matrices**
* ML make heavy use of **Tensors**

|  |  |
| --- | --- |
| Scalar | Vector(s) |
| 1 | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | 1 | | 2 | | 3 | |  | |  |  |  | | --- | --- | --- | | 1 | 2 | 3 |  |  | | --- | |  | | |
| Matrix | Tensor |
| |  |  |  |  | | --- | --- | --- | --- | | 1 | 2 | 3 |  | | 4 | 5 | 6 |  | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  |  |  | | --- | --- | --- | --- | | 1 | 2 | 3 |  | | 4 | 5 | 6 |  | |  | |  |  |  |  | | --- | --- | --- | --- | | 4 | 5 | 6 |  | | 1 | 2 | 3 |  | |  | |

## **Vectors and Matrices**

**Vectors** and **Matrices** are the languages of data.

## **Scalars**

In linear algebra, a scalar is a **single number**.

## **Tensors**

A Tensor is an **N-dimensional Matrix**.