**Tensor:** a multidimensional array of numbers that can represent data in more complex structures.

· **Scalar (0D Tensor)**: A scalar is a single number, and it can be considered a tensor of rank 0. For example, 555 is a scalar.

· **Vector (1D Tensor)**: A vector is a one-dimensional array of numbers. It can be viewed as a tensor of rank 1. For example, [1,2,3][1, 2, 3][1,2,3] is a 1D tensor.

· **Matrix (2D Tensor)**: A matrix is a two-dimensional array of numbers, and it is a tensor of rank 2.

· **Higher-Dimensional Tensors (nD Tensors)**: A tensor can have more than two dimensions. For example, a 3D tensor can be thought of as a collection of matrices, and it has a shape such as 2×3×42 \times 3 \times 42×3×4. In machine learning, tensors can represent more complex data like images (which are 3D) or videos (which can be 4D). 4D tensors are a collection of 3D tensors stacked together.

### Properties of Tensors:

* **Rank**: The rank (or order) of a tensor refers to the number of dimensions it has. A scalar has rank 0, a vector has rank 1, a matrix has rank 2, and higher-dimensional structures are higher-rank tensors. Tensor.ndim, tf.Rank()
* **Shape**: The shape of a tensor is a tuple that represents the size of each dimension. For example, a 2D tensor with 3 rows and 4 columns has the shape (3,4). Count the number of collections starting with the highest dimension e.g., Depth -> Height -> Length. Tensor.Shape, tf.Shape()
* **Data Type**: Tensors hold numerical values, and their data type can vary (e.g., integer, float)

Functions

Tf.eye -> Create identity matrix with specified row\_no, col\_no, batch\_size, etc.

Tf.fill -> Takes an n-D tensor and populates it with the said value. Specify shape and value.

Tf.ones -> Similar to tf.fill but the value is always one. Tf.zeros also works in a similar manner.

Tf.oneslike -> Takes an existing tensor then creates a new one filled with ones and having the same shape as the passed tensor.

Tf.Random -> Create a tensor and populate it with random values. You should specify the type of distribution.

**Seed:** This is an integer value used to initialize a random number generator. It ensures that the random number generation is deterministic and reproducible.

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