CS 1173: MATLAB std function

The std function returns the standard deviation of A along an array dimension. Standard deviation measures how spread out the values are around the mean.

Unbiased estimator of the population standard deviation (assuming A has samples drawn from the population)

```
B = std(A, 0, dim)
```

resulting standard deviation

array to take the standard deviation of

dimension over which to perform the standard deviation

```
B = std(A, 1, dim)
```

Actual standard deviation

Example 1: Different ways to apply std to array A

```
A = [1, 2, 6; 4, -7, 0];
B0 = std(A, 0, 1);
B1 = std(A, 1, 1);
C0 = std(A, 0, 2);
C1 = std(A, 1, 2);
```

dim 1 ↓ dim 2 →

$$A = \begin{bmatrix} 1 & 2 & 6 \\ 4 & -7 & 0 \end{bmatrix}$$

B0 = std(A, 0, 1) = $\begin{bmatrix} 2.1 & 6.4 & 4.2 \end{bmatrix}$

C0 = std(A, 1, 2) = $\begin{bmatrix} 2.6 \\ 5.6 \end{bmatrix}$

B1 = std(A, 1, 1) = $\begin{bmatrix} 1.5 & 4.5 & 3 \end{bmatrix}$

C1 = std(A, 1, 2) = $\begin{bmatrix} 2.2 \\ 4.5 \end{bmatrix}$

CS 1173: MATLAB std function (1 argument)

When you call std with only one argument, std calculates the unbiased estimator of the population standard deviation along the first non-singleton dimension.

$$B = std(A)$$

resulting standard deviation — array to take standard deviation of

Example 1: A has both rows and columns

```
A = [1, 2, 6; 4, -7, 0];
B = std(A);
C = std(A(:));
```

The first non-singleton dimension is 1

dim 1 ↓, dim 2 →

$$A = \begin{bmatrix} 1 & 2 & 6 \\ 4 & -7 & 0 \end{bmatrix}$$

$B = std(A) = std(A, 0) = std(A, 0, 1) = [2.1 \quad 6.4 \quad 4.2]$

$C = std(A(:)) = std(A(:), 0) = std(A(:), 0, 1) = 4.5$

Example 2: A has just one row

$$A = [1 \quad 2 \quad 6]$$

```
A = [1, 2, 6];
B = std(A);
```

$B = std(A) = std(A, 0) = 2.6$

The first non-singleton dimension is 2

Example 3: A has just one column

$$A = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$$

```
A = [1; 4];
B = std(A);
```

$B = std(A) = std(A, 0) = 2.1$

The first non-singleton dimension is 1