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)

\[ B = \text{std}(A, 0, \text{dim}) \]

resulting standard deviation
array to take the standard deviation of
dimension over which to perform the standard deviation

\[ B = \text{std}(A, 1, \text{dim}) \]

Actual standard deviation

Example 1: Different ways to apply `std` to array `A`

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

\[
B_0 = \text{std}(A, 0, 1); \\
B_1 = \text{std}(A, 1, 1); \\
C_0 = \text{std}(A, 0, 2); \\
C_1 = \text{std}(A, 1, 2);
\]

\[
B_0 = \text{std}(A, 0, 1) = \begin{bmatrix} 2.1 & 6.4 & 4.2 \end{bmatrix} \\
B_1 = \text{std}(A, 1, 1) = \begin{bmatrix} 1.5 & 4.5 & 3 \end{bmatrix} \\
C_0 = \text{std}(A, 1, 2) = \begin{bmatrix} 2.6 \end{bmatrix} \\
C_1 = \text{std}(A, 1, 2) = \begin{bmatrix} 2.2 \end{bmatrix}
\]
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.

\[ B = \text{std}(A) \]

resulting standard deviation array to take standard deviation of

**Example 1: A has both rows and columns**

\[
A = \begin{bmatrix} 1 & 2 & 6; 4 & -7 & 0 \end{bmatrix};
B = \text{std}(A);
C = \text{std}(A(:));
\]

The first non-singleton dimension is 1

\[
B = \text{std}(A) = \text{std}(A, 0) = \text{std}(A, 0, 1) = [2.1 \ 6.4 \ 4.2]
\]

\[
C = \text{std}(A(:)) = \text{std}(A(:), 0) = \text{std}(A(:), 0, 1) = 4.5
\]

**Example 2: A has just one row**

\[
A = \begin{bmatrix} 1 & 2 & 6 \end{bmatrix};
B = \text{std}(A);
\]

The first non-singleton dimension is 2

\[
B = \text{std}(A) = \text{std}(A, 0) = 2.6
\]

**Example 3: A has just one column**

\[
A = \begin{bmatrix} 1; 4 \end{bmatrix};
B = \text{std}(A);
\]

The first non-singleton dimension is 1

\[
B = \text{std}(A) = \text{std}(A, 0) = 2.1
\]