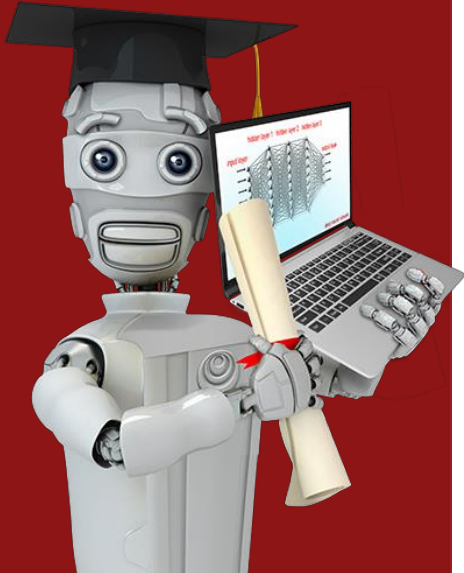




Stanford
ONLINE



TensorFlow implementation

Data in TensorFlow

Feature vectors

temperature (Celsius)	duration (minutes)	Good coffee? (1/0)
200.0	17.0	1
425.0	18.5	0
...

```
x = np.array([[200.0, 17.0]])
```

←

[[200.0, 17.0]]

why?

Note about numpy arrays

2 rows
3 columns
 $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$
2 x 3 matrix

4 rows
2 columns
 $\begin{bmatrix} 0.1 & 0.2 \\ -3 & -4 \\ -0.5 & -0.6 \\ 7 & 8 \end{bmatrix}$
4 x 2 matrix

$x = \text{np.array}(\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix})$
 $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$

$x = \text{np.array}(\begin{bmatrix} 0.1 & 0.2 \\ -3.0 & -4.0 \\ -0.5 & -0.6 \\ 7.0 & 8.0 \end{bmatrix})$
 $\begin{bmatrix} 0.1 & 0.2 \\ -3.0 & -4.0 \\ -0.5 & -0.6 \\ 7.0 & 8.0 \end{bmatrix}$

2D array

2 x 3

4 x 2

1 x 2

2 x 1

Note about numpy arrays

`x = np.array([[200, 17]])` → $\begin{bmatrix} 200 & 17 \end{bmatrix}$ 1 x 2

`x = np.array([200, 17])` → $\begin{bmatrix} 200 \\ 17 \end{bmatrix}$ 2 x 1

→ `x = np.array([200, 17])`

1D
"Vector"

Feature vectors

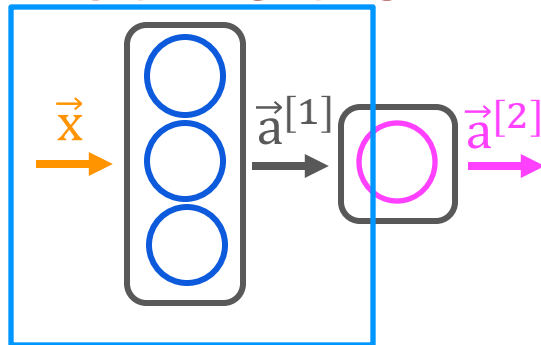
temperature (Celsius)	duration (minutes)	Good coffee? (1/0)
200.0	17.0	1
425.0	18.5	0
...

`x = np.array([[200.0, 17.0]])` ←

`[[200.0, 17.0]]`

→ $\begin{matrix} \downarrow & \downarrow \\ [200.0 & 17.0] \end{matrix}$ 1 x 2

Activation vector



```
x = np.array([[200.0, 17.0]])  
layer_1 = Dense(units=3, activation='sigmoid')  
a1 = layer_1(x)
```

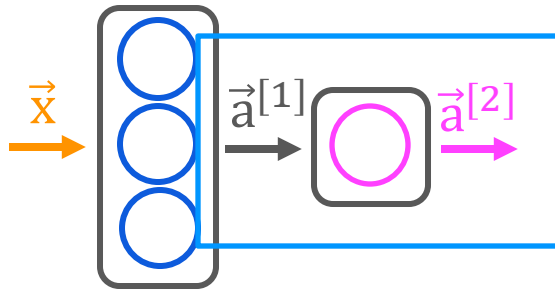
→ $[0.2, 0.7, 0.3]$ 1 x 3 matrix

→ `tf.Tensor([[0.2 0.7 0.3]], shape=(1, 3), dtype=float32)`

→ `a1.numpy()`

`array([[1.4661001, 1.125196 , 3.2159438]], dtype=float32)`

Activation vector



```
→ layer_2 = Dense(units=1, activation='sigmoid')
→ a2 = layer_2(a1)
```

↖ $[[0.8]]$ ↗

```
→ tf.Tensor([[0.8]], shape=(1, 1), dtype=float32)
```

```
→ a2.numpy()
```

```
→ array([[0.8]], dtype=float32)
```

1 x 1