



动手学深度学习 v2

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数据操作

N-dimensional Array Examples



- N-dimensional array, short for ndarray, is the main data structure for machine learning and neural networks

0-d (scalar)



1.0

A class label

1-d (vector)



[1.0, 2.7, 3.4]

A feature vector

2-d (matrix)



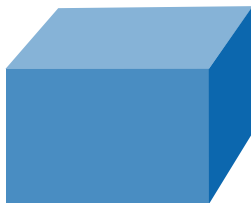
[[1.0, 2.7, 3.4]
[5.0, 0.2, 4.6]
[4.3, 8.5, 0.2]]

A example-by-
feature matrix

ND Array Examples, cont



3-d



```
[[[0.1, 2.7, 3.4]
 [5.0, 0.2, 4.6]
 [4.3, 8.5, 0.2]]
 [[3.2, 5.7, 3.4]
 [5.4, 6.2, 3.2]
 [4.1, 3.5, 6.2]]]
```

A RGB
image
(width x

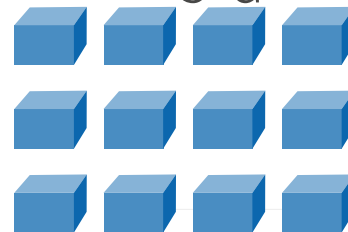
4-d



```
[[[[. . .
     . . .
     . . .]]]]
```

A batch of
RGB images
(batch-size
x width x

5-d



```
[[[[[. . .
      . . .
      . . .]]]]]
```

A batch of videos
(batch-size x
time x width x
height x

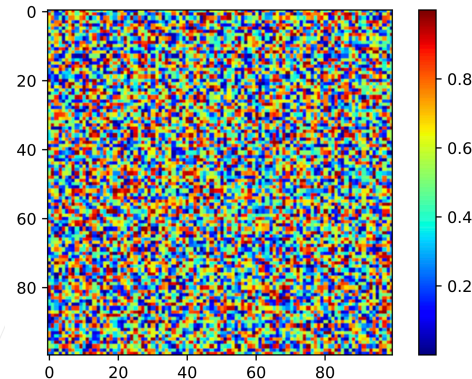
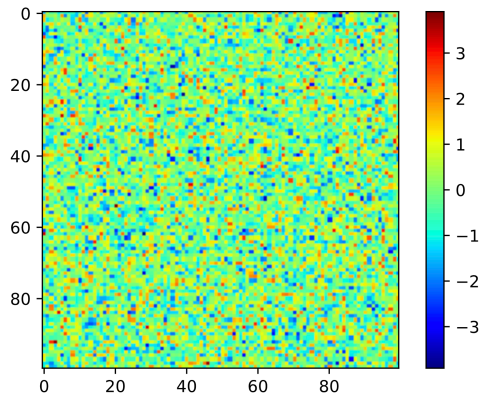
Create Arrays



- Create arrays with
 - A shape, e.g. 3-by-4 matrix
 - Data type for each element, e.g. float
 - Element values, e.g. all 0s, or random values

A normal distribution A uniform distribution

100-by-100
matrix with
elements
generated from



Access Elements



An element: $[1, 2]$

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2				
3	9	10	11	12

A row: $[1, :]$

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2				
3	9	10	11	12

A column: $[1, :]$

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2				
3	9	10	11	12

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2				
3	9	10	11	12

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2				
3	9	10	11	12