

R - Arrays

Arrays are the R data objects which can store data in more than two dimensions. For example – If we create an array of dimension (2, 3, 4) then it creates 4 rectangular matrices each with 2 rows and 3 columns. Arrays can store only data type.

An array is created using the **array()** function. It takes vectors as input and uses the values in the **dim** parameter to create an array.

Example

The following example creates an array of two 3x3 matrices each with 3 rows and 3 columns.

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```
# Create two vectors of different lengths.
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)

# Take these vectors as input to the array.
result <- array(c(vector1,vector2),dim = c(3,3,2))
print(result)
```

When we execute the above code, it produces the following result –

```
, , 1
     [,1] [,2] [,3]
[1,]    5   10   13
[2,]    9   11   14
[3,]    3   12   15

, , 2
     [,1] [,2] [,3]
[1,]    5   10   13
[2,]    9   11   14
[3,]    3   12   15
```

Naming Columns and Rows

We can give names to the rows, columns and matrices in the array by using the **dimnames** parameter.

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```
# Create two vectors of different lengths.
```

```
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)
column.names <- c("COL1","COL2","COL3")
row.names <- c("ROW1","ROW2","ROW3")
matrix.names <- c("Matrix1","Matrix2")

# Take these vectors as input to the array.
result <- array(c(vector1,vector2),dim = c(3,3,2),dimnames = list(row.names,column.names,
matrix.names))
print(result)
```

When we execute the above code, it produces the following result –

```
, , Matrix1

      COL1 COL2 COL3
ROW1     5   10   13
ROW2     9   11   14
ROW3     3   12   15

, , Matrix2

      COL1 COL2 COL3
ROW1     5   10   13
ROW2     9   11   14
ROW3     3   12   15
```

Accessing Array Elements

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```
# Create two vectors of different lengths.
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)
column.names <- c("COL1","COL2","COL3")
row.names <- c("ROW1","ROW2","ROW3")
matrix.names <- c("Matrix1","Matrix2")

# Take these vectors as input to the array.
result <- array(c(vector1,vector2),dim = c(3,3,2),dimnames = list(row.names,
column.names, matrix.names))

# Print the third row of the second matrix of the array.
print(result[3,,2])

# Print the element in the 1st row and 3rd column of the 1st matrix.
print(result[1,3,1])

# Print the 2nd Matrix.
```

```
print(result[, , 2])
```

When we execute the above code, it produces the following result –

```
COL1 COL2 COL3
  3   12   15
[1] 13
      COL1 COL2 COL3
ROW1    5   10   13
ROW2    9   11   14
ROW3    3   12   15
```

Manipulating Array Elements

As array is made up matrices in multiple dimensions, the operations on elements of array are carried out by accessing elements of the matrices.

[Live Demo](#)

```
# Create two vectors of different lengths.
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)

# Take these vectors as input to the array.
array1 <- array(c(vector1,vector2),dim = c(3,3,2))

# Create two vectors of different lengths.
vector3 <- c(9,1,0)
vector4 <- c(6,0,11,3,14,1,2,6,9)
array2 <- array(c(vector1,vector2),dim = c(3,3,2))

# create matrices from these arrays.
matrix1 <- array1[, , 2]
matrix2 <- array2[, , 2]

# Add the matrices.
result <- matrix1+matrix2
print(result)
```

When we execute the above code, it produces the following result –

```
      [,1] [,2] [,3]
[1,]   10   20   26
[2,]   18   22   28
[3,]    6   24   30
```

Calculations Across Array Elements

We can do calculations across the elements in an array using the **apply()** function.

Syntax

```
apply(x, margin, fun)
```

Following is the description of the parameters used –

- **x** is an array.
- **margin** is the name of the data set used.
- **fun** is the function to be applied across the elements of the array.

Example

We use the `apply()` function below to calculate the sum of the elements in the rows of an array across all the matrices.

[Live Demo](#)

```
# Create two vectors of different lengths.
vector1 <- c(5,9,3)
vector2 <- c(10,11,12,13,14,15)

# Take these vectors as input to the array.
new.array <- array(c(vector1,vector2),dim = c(3,3,2))
print(new.array)

# Use apply to calculate the sum of the rows across all the matrices.
result <- apply(new.array, c(1), sum)
print(result)
```

When we execute the above code, it produces the following result –

```
, , 1
     [,1] [,2] [,3]
[1,]    5   10   13
[2,]    9   11   14
[3,]    3   12   15

, , 2
     [,1] [,2] [,3]
[1,]    5   10   13
[2,]    9   11   14
[3,]    3   12   15
```

```
[1] 56 68 60
```