

# Meshgrid Arrays in R

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### Mesh Matrix and Vector

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- `r.expand.grid` meshed array to matrix
- `r.meshgrid`
- `r.array` to matrix
- `r.reshape` array to matrix
- `dplyr` permutations rows of matrix and element of array
- `tidyr.expand_grid` mesh matrix and vector

In the example below, we have a matrix that is 5 by 2, and a vector that is 1 by 3. We want to generate a tibble dataset that meshes the matrix and the vector, so that all combinations show up.

Note `expand_grid` is a from `tidyr` 1.0.0.

```
# it_child_count = N, the number of children
it_N_child_cnt = 5
# P fixed parameters, nN is N dimensional, nP is P dimensional
ar_nN_A = seq(-2, 2, length.out = it_N_child_cnt)
ar_nN_alpha = seq(0.1, 0.9, length.out = it_N_child_cnt)
mt_nP_A_alpha = cbind(ar_nN_A, ar_nN_alpha)
```

```
# Choice Grid
it_N_choice_cnt = 3
fl_max = 10
fl_min = 0
ar_nN_alpha = seq(fl_min, fl_max, length.out = it_N_choice_cnt)
```

```
# expand grid with dplyr
expand_grid(x = 1:3, y = 1:2)
```

```
## # A tibble: 6 x 2
##       x     y
##   <int> <int>
## 1     1     1
## 2     1     2
## 3     2     1
## 4     2     2
## 5     3     1
```

```
## 6      3      2
```

```
tb_expanded <- as_tibble(mt_nP_A_alpha) %>% expand_grid(choices = ar_nN_alpha)
```

```
# display
```

```
kable(tb_expanded) %>% kable_styling_fc()
```

ar_nN_A	ar_nN_alpha	choices
-2	0.1	0
-2	0.1	5
-2	0.1	10
-1	0.3	0
-1	0.3	5
-1	0.3	10
0	0.5	0
0	0.5	5
0	0.5	10
1	0.7	0
1	0.7	5
1	0.7	10
2	0.9	0
2	0.9	5
2	0.9	10

**Define Two Arrays and Mesh Them using expand.grid** Given two arrays, mesh the two arrays together.

```
# use expand.grid to generate all combinations of two arrays
```

```
it_ar_A = 5
```

```
it_ar_alpha = 10
```

```
ar_A = seq(-2, 2, length.out=it_ar_A)
```

```
ar_alpha = seq(0.1, 0.9, length.out=it_ar_alpha)
```

```
mt_A_alpha = expand.grid(A = ar_A, alpha = ar_alpha)
```

```
mt_A_meshed = mt_A_alpha[,1]
```

```
dim(mt_A_meshed) = c(it_ar_A, it_ar_alpha)
```

```
mt_alpha_meshed = mt_A_alpha[,2]
```

```
dim(mt_alpha_meshed) = c(it_ar_A, it_ar_alpha)
```

```
# display
```

```
kable(mt_A_meshed) %>%
```

```
kable_styling_fc()
```

-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2

```
kable(mt_alpha_meshed) %>%
  kable_styling_fc_wide()
```

0.1	0.1888889	0.2777778	0.3666667	0.4555556	0.5444444	0.6333333	0.7222222	0.8111111	0.9
0.1	0.1888889	0.2777778	0.3666667	0.4555556	0.5444444	0.6333333	0.7222222	0.8111111	0.9
0.1	0.1888889	0.2777778	0.3666667	0.4555556	0.5444444	0.6333333	0.7222222	0.8111111	0.9
0.1	0.1888889	0.2777778	0.3666667	0.4555556	0.5444444	0.6333333	0.7222222	0.8111111	0.9
0.1	0.1888889	0.2777778	0.3666667	0.4555556	0.5444444	0.6333333	0.7222222	0.8111111	0.9

**Two Identical Arrays, Mesh to Generate Square using `expand.grid`** Two Identical Arrays, individual attributes, each column is an individual for a matrix, and each row is also an individual

*# use `expand.grid` to generate all combinations of two arrays*

```
it_ar_A = 5

ar_A = seq(-2, 2, length.out=it_ar_A)
mt_A_A = expand.grid(Arow = ar_A, Arow = ar_A)
mt_Arow = mt_A_A[,1]
dim(mt_Arow) = c(it_ar_A, it_ar_A)
mt_Acol = mt_A_A[,2]
dim(mt_Acol) = c(it_ar_A, it_ar_A)

# display
kable(mt_Arow) %>%
  kable_styling_fc()
```

-2	-2	-2	-2	-2
-1	-1	-1	-1	-1
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2

```
kable(mt_Acol) %>%
  kable_styling_fc()
```

-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2