



# *MATLAB for Finance*

## 8

### Advanced Data Type



# Arrays

- ✚ A set of **homogeneous** elements systematically arranged, usually in rows and columns

From [Wikipedia](#):

- ✚ An arrangement of items at equally spaced addresses in computer memory (*array data structure*)
- ✚ Used in programming language to specify a variable that can be indexed (*array data type*)



# *Multidimensional Array*

✚ One-dimension array (vector):

$$\mathbf{x} = [2 \ 3 \ 1 \ 3 \ 4 \ 2] \in \mathbb{R}^6$$

✚ Two-dimension array (matrix):

$$\mathbf{A} = [1 \ 2 \ 3; \ 4 \ 5 \ 6] \in \mathbb{R}^{2 \times 3}$$

✚ Three-dimension array:

$$\mathbf{M} = \text{zeros}(4, 4, 24)$$

$$\mathbf{M}(:, :, 2:3)$$

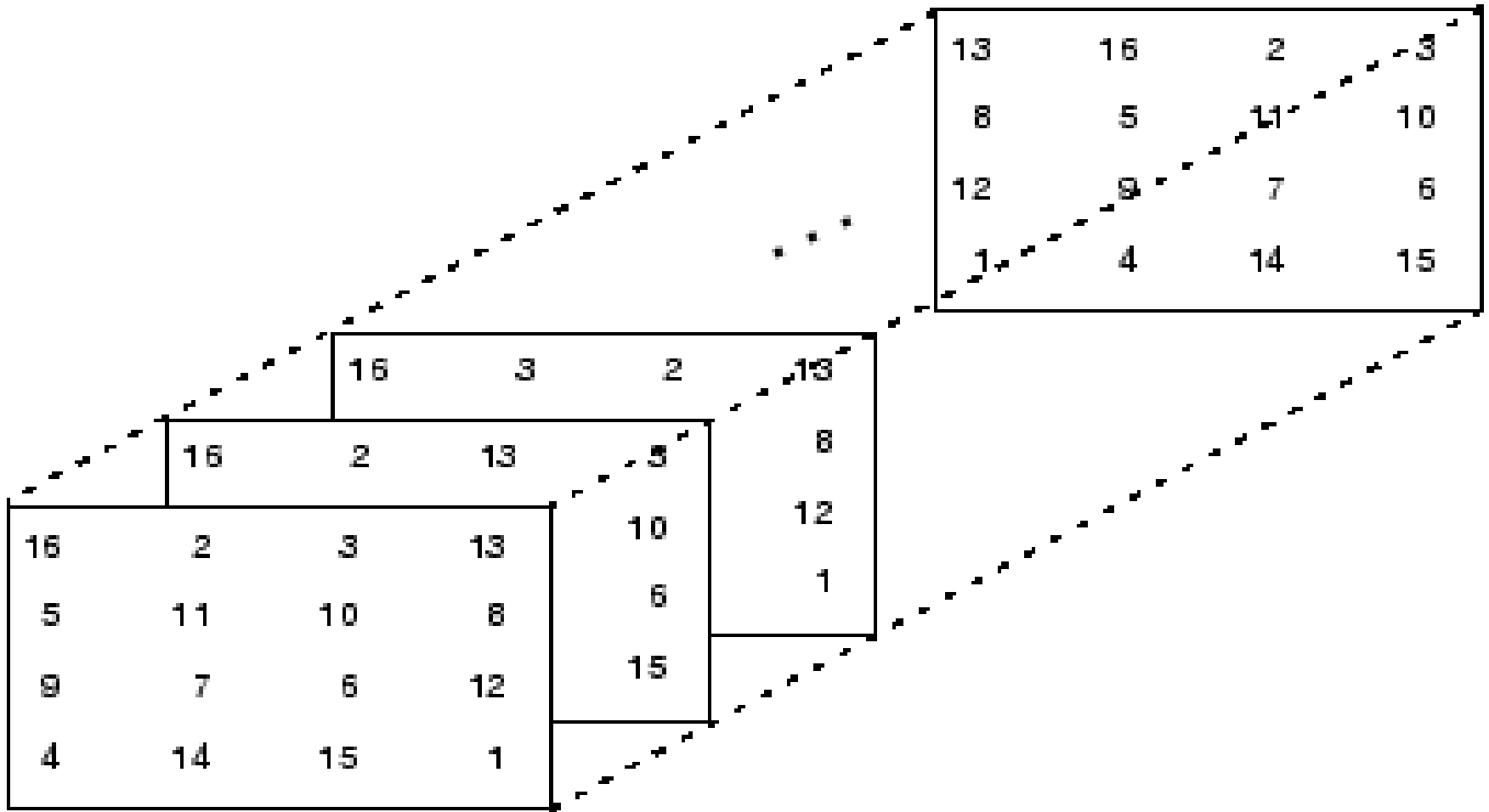
$$\mathbf{M}(:, \text{end}, :)$$

✚ and more

$$\mathbf{M} = \text{zeros}(1, 2, 3, 4, 5, 6, 7, 8, 9, 10);$$



# *Multidimensional Array*



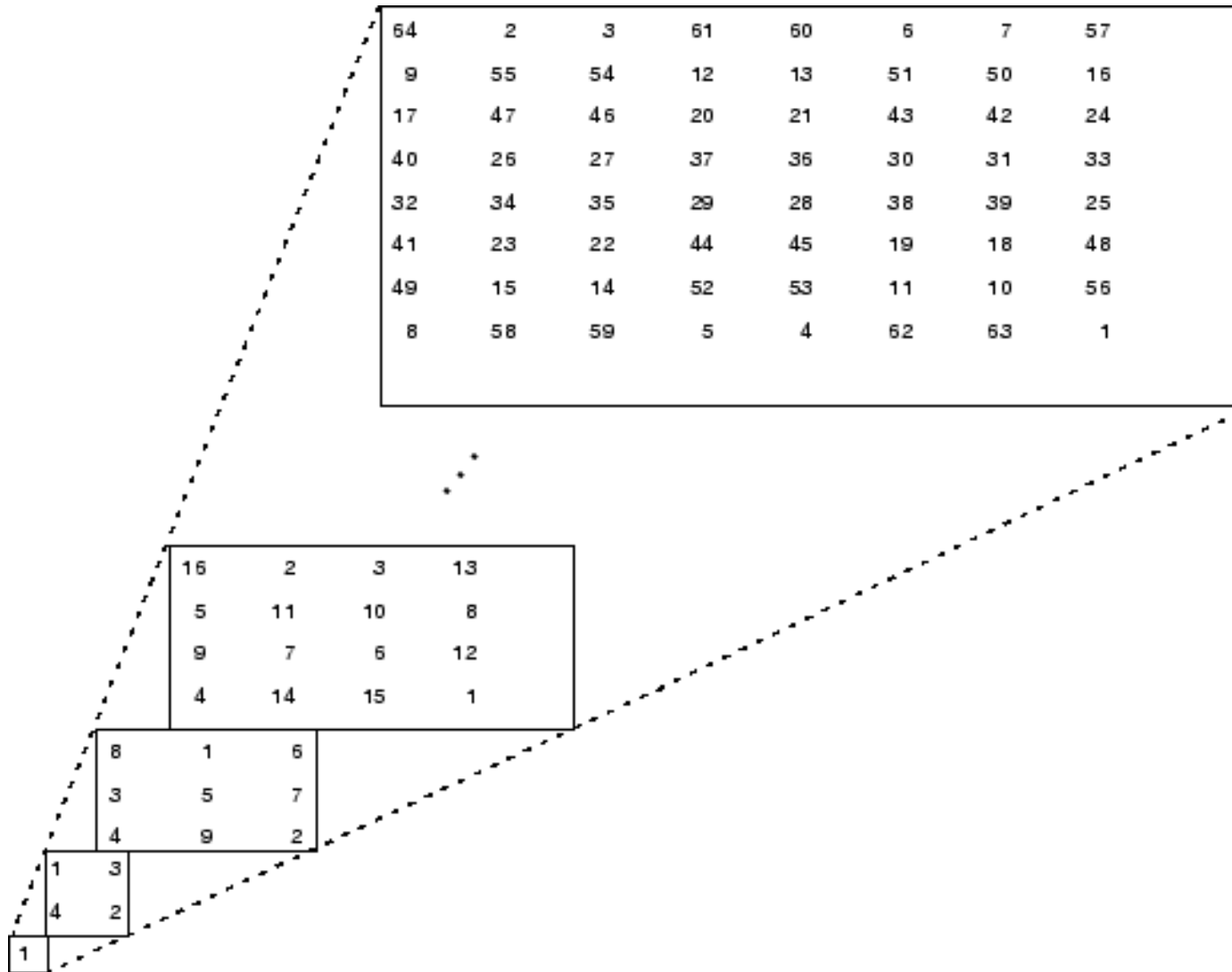


# *Cells*

✚ Storage mechanism for **dissimilar** kinds of data



# Arrays of Cells





# Arrays of Cells

Operator `{ }` gets the  $n$ -th cell

```
C = {A sum(A) prod(prod(A)) }
```

```
M = cell(8,1)
```

```
M{4}
```



# Structures

- ✚ Data collection where the elements have **field names**

```
S.nome = 'Oldani'
```

```
S.voto = 30
```

```
S.data = '24-Apr-2008'
```

- ✚ it differs from

```
C{1} = 'Oldani'
```

```
C{2} = 30
```

```
C{3} = '24-Apr-2008'
```





# Structure

## ✚ Array of structures

- ✚ `S(2).nome = 'Caldara'`
- ✚ `S(2).voto = 30`
- ✚ `S(2).data = '24-Apr-2008'`
- ✚ `S(3) = struct('nome','Moriggia',  
'voto','ins','data','24-Apr-  
2008')`
- ✚ `for k=1:3;S(k),end %for`
- ✚ `[S.voto]`
- ✚ `char(S.nome)`

```
fname = 'nome'  
S(3).(fname)
```



# *In-classroom Exercise*

1. Download from <http://finance.yahoo.com> the historical prices of “Mercedes Benz” (DAI.DE – Daimler AG) for the last year
2. Import data in MATLAB
3. Create field “Dates” in “MB” structure converting date strings in serial numbers
4. Create an array of cells with the column headers of imported data
5. Add all the fields to MB structure. The names are given by the headers in 4

Note that structure field names cannot contain spaces!



# Homework

✚ Try it again downloading the same data series from <http://www.google.com/finance>