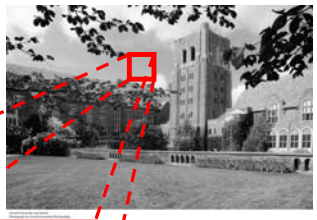
Basic Mathematical Operations on Arrays

A picture as an matrix

1458-by-2084



```
150  149  152  153  152  155
151  150  153  154  153  156
153  151  155  156  155  158
154  153  156  157  156  159
156  154  158  159  158  161
157  156  159  160  159  162
```

A color picture is made up of RGB matrices


```
For each row index i
   For each column index j
      M(i,j)= .3*R(i,j) + .59*G(i,j) + .11*B(i,j)
```

scalar operation

A color picture is made up of RGB matrices


```
For each row index i
   For each column index j
      M(i,j)= .3*R(i,j) + .59*G(i,j) + .11*B(i,j)
```

scalars scalars scalars

A color picture is made up of RGB matrices


```
M= .3*R + .59*G + .11*B
```

matrices

Vectorized Operation (no loop required!)

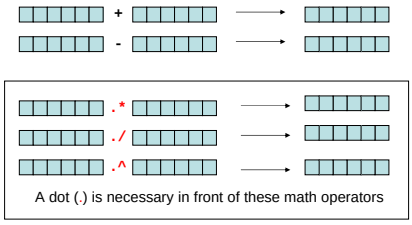
Vectorized addition

	x	2	1	.5	8
+	y	1	2	0	1
=	z	3	3	.5	9

Matlab code: **z= x + y**

means $z(k) = x(k) + y(k)$ for all k

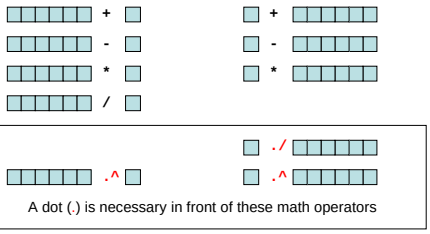
Vectorized
element-by-element arithmetic operations on arrays



Vectorized code
—a Matlab-specific feature

- Code that perform element-by-element arithmetic/relational/logical operations on vector (or array) operands in one step
- Scalar operation: x + y
  where x, y are scalar variables
- Vectorized code: x + y
  where x, y are vectors of same shape and length

Vectorized
element-by-element arithmetic operations between an array and a scalar



The dot in □□.*□ , □.*□□ , □□./□ not necessary but OK