Simple Processing - Transpose

- The transpose image $\mathbf{B}$ $(M \times N)$ of $\mathbf{A}$ $(N \times M)$ can be obtained as $B(j,i) = A(i,j)$ $(i = 0, \ldots, N-1,\ j = 0, \ldots, M-1)$.

A

B

```
>> for i = 1 : 512
     for j = 1 : 512
       B(j,i) = A(i,j);
     end
   end
```

OR

```
>> B = A';
```

Simple Processing - Flip Vertical

- The vertical flipped image $\mathbf{B}$ $(N \times M)$ of $\mathbf{A}$ $(N \times M)$ can be obtained as $B(i, M-1-j) = A(i,j)$ $(i = 0, \ldots, N-1,\ j = 0, \ldots, M-1)$.

A

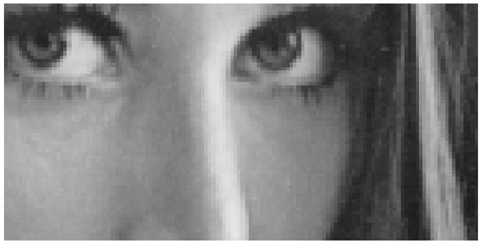
B

```
>> clear B;
>> for i = 1 : 512
     for j = 1 : 512
       B(i, 512 + 1 - j) = A(i, j);
       end
     end
```

Simple Processing - Cropping

- The cropped image $\mathbf{B}$ $(N_1 \times N_2)$ of $\mathbf{A}$ $(N \times M)$, starting from (n_1, n_2), can be obtained as $B(k,l) = A(n_1 + k, n_2 + l)$ $(k = 0, \ldots, N_1 - 1,\ \ l = 0, \ldots, N_2 - 1)$.

A



B

```
>> clear B;
>> for k = 0 : 64 - 1
     for l = 0 : 128 - 1
       B(k + 1, l + 1) = A(255 + k + 1, 255 + l + 1);   % n1=n2=255 N1=64,N2=128
       end
     end
```

Simple Image Statistics - Sample Mean and Sample Variance

- The sample mean (m_A) of an image $\mathbf{A}$ ($N \times M$):

$$m_A = \frac{\sum_{i=0}^{N-1} \sum_{j=0}^{M-1} A(i,j)}{NM} \tag{1}$$

- The sample variance (σ_A^2) of $\mathbf{A}$:

$$\sigma_A^2 = \frac{\sum_{i=0}^{N-1} \sum_{j=0}^{M-1} (A(i,j) - m_A)^2}{NM} \tag{2}$$

- The sample standard deviation, $\sigma_A = \sqrt{\sigma_A^2}$.