

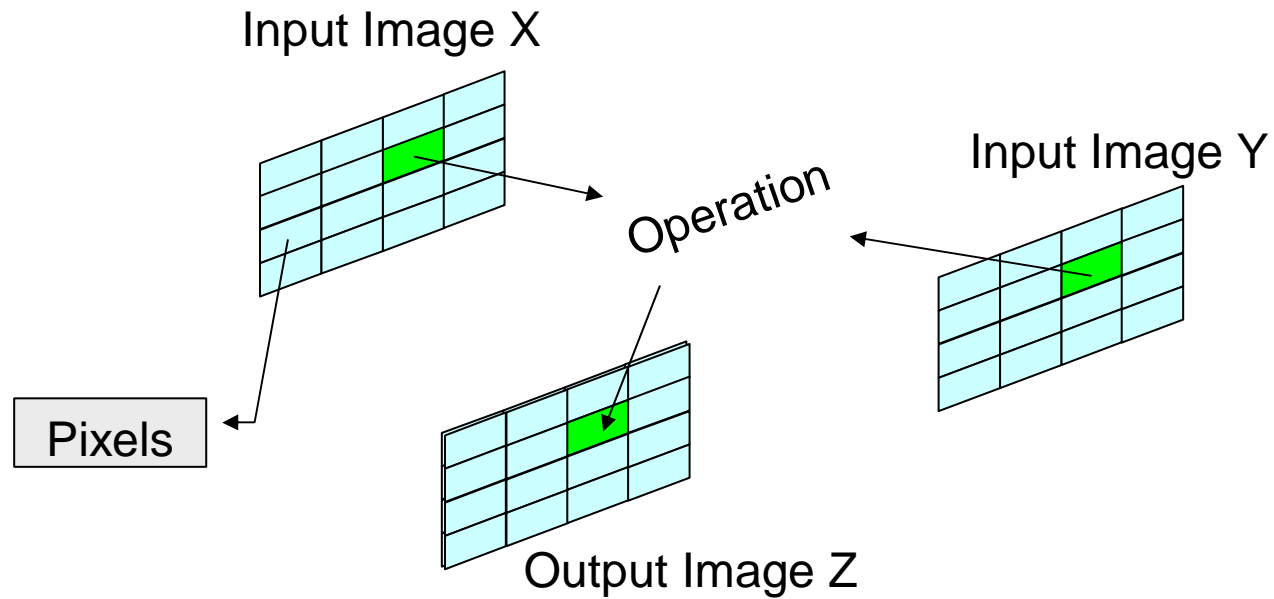
Image Enhancement Using Binomial Point Operations

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Point Operations on Images

- Point operations
 - Monomial
 - Negative Image, Brightness, Contrast, Gamma Correction, Log
 - Histogram
 - Binomial
 - Algebraic (add, subtract, multiply, divide) etc
 - Trinomial
 - Alpha blending, Chroma-Key

Concept of Point Operations



$$Z[i,j] = \text{Operation}(X[i,j], Y[i,j])$$

Image Averaging

- Image Overlapping

$$\begin{array}{c} X_1[i,j] \longrightarrow \\ X_2[i,j] \longrightarrow \end{array} \boxed{Y[i,j] = \frac{X_1[i,j] + X_2[i,j]}{2}} \longrightarrow Y[i,j]$$



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Image Averaging

- Noise reduction

$$\begin{array}{l} X_1[i,j] \rightarrow \\ X_2[i,j] \rightarrow \\ X_n[i,j] \rightarrow \end{array} \boxed{Y[i,j] = \frac{1}{N} \sum_{n=1}^N X_n[i,j]} \rightarrow Y[i,j]$$

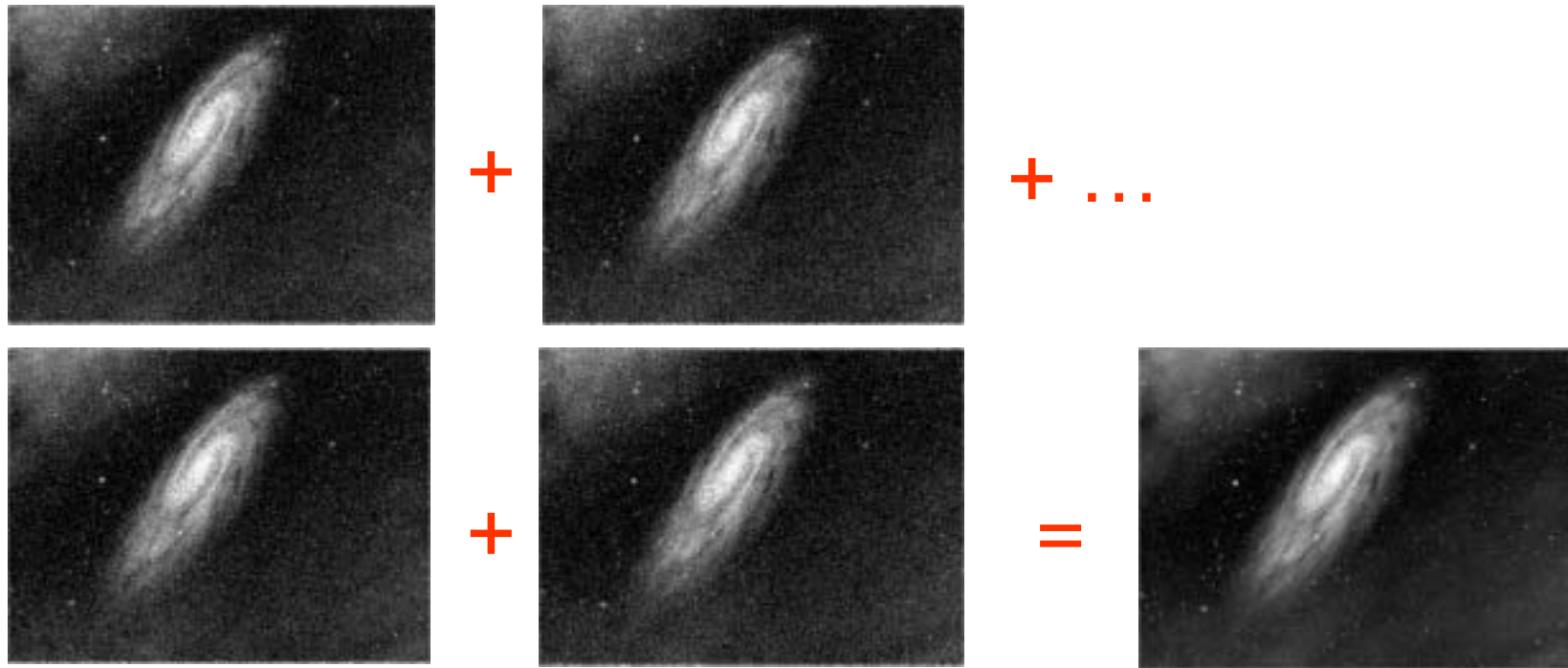
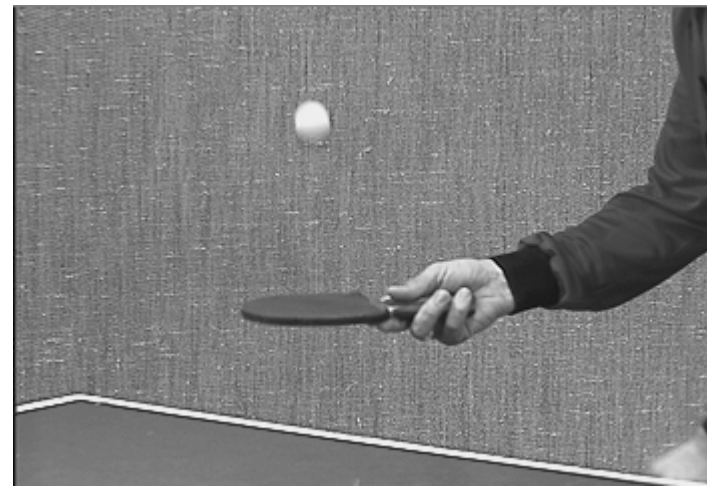
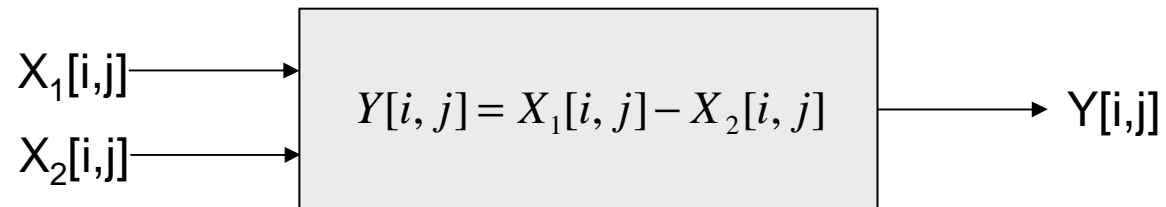


Image Subtraction

- Motion detection



Can you see the differences between two images ?

Image Subtraction

- Motion detection

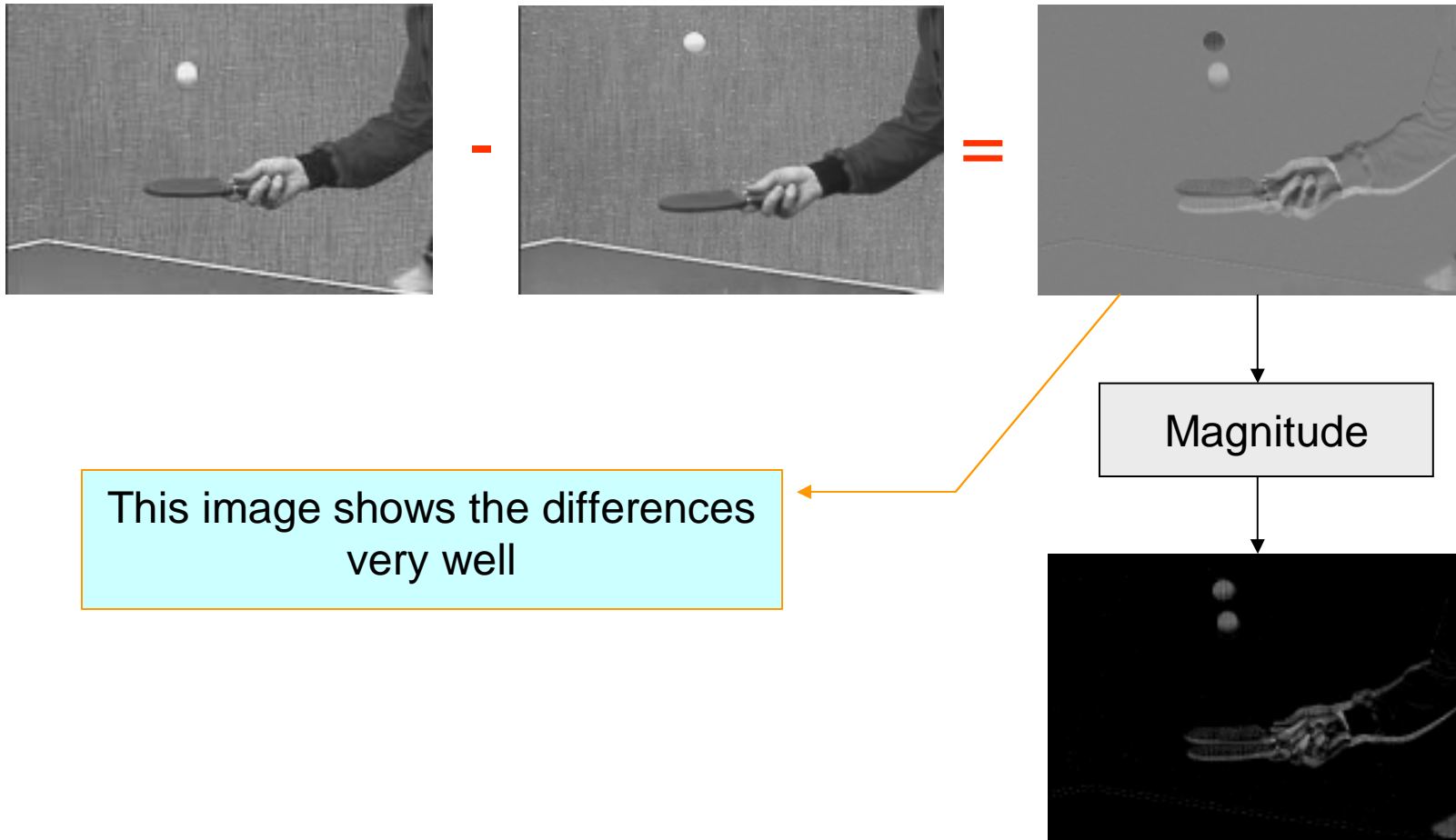


Image Multiplication

- Masking

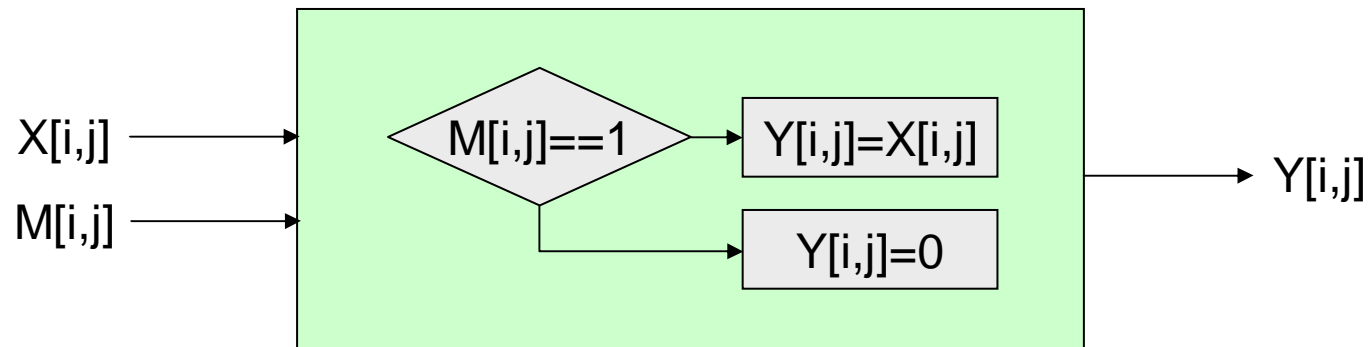
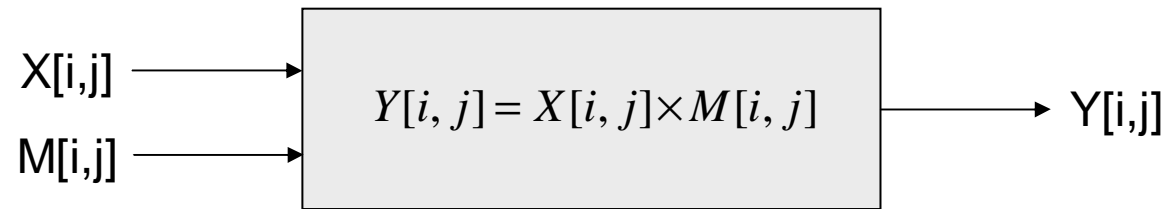


Image Multiplication

- Masking

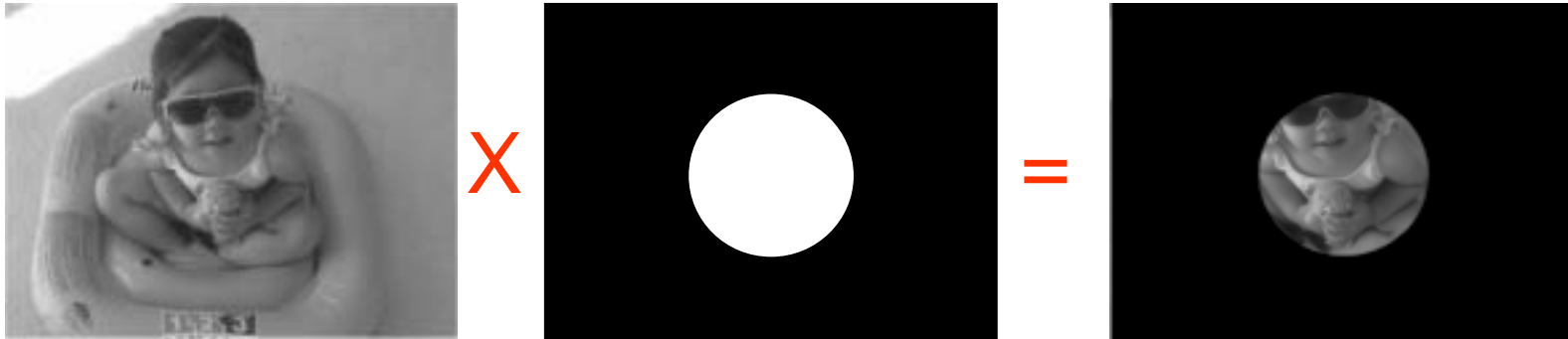
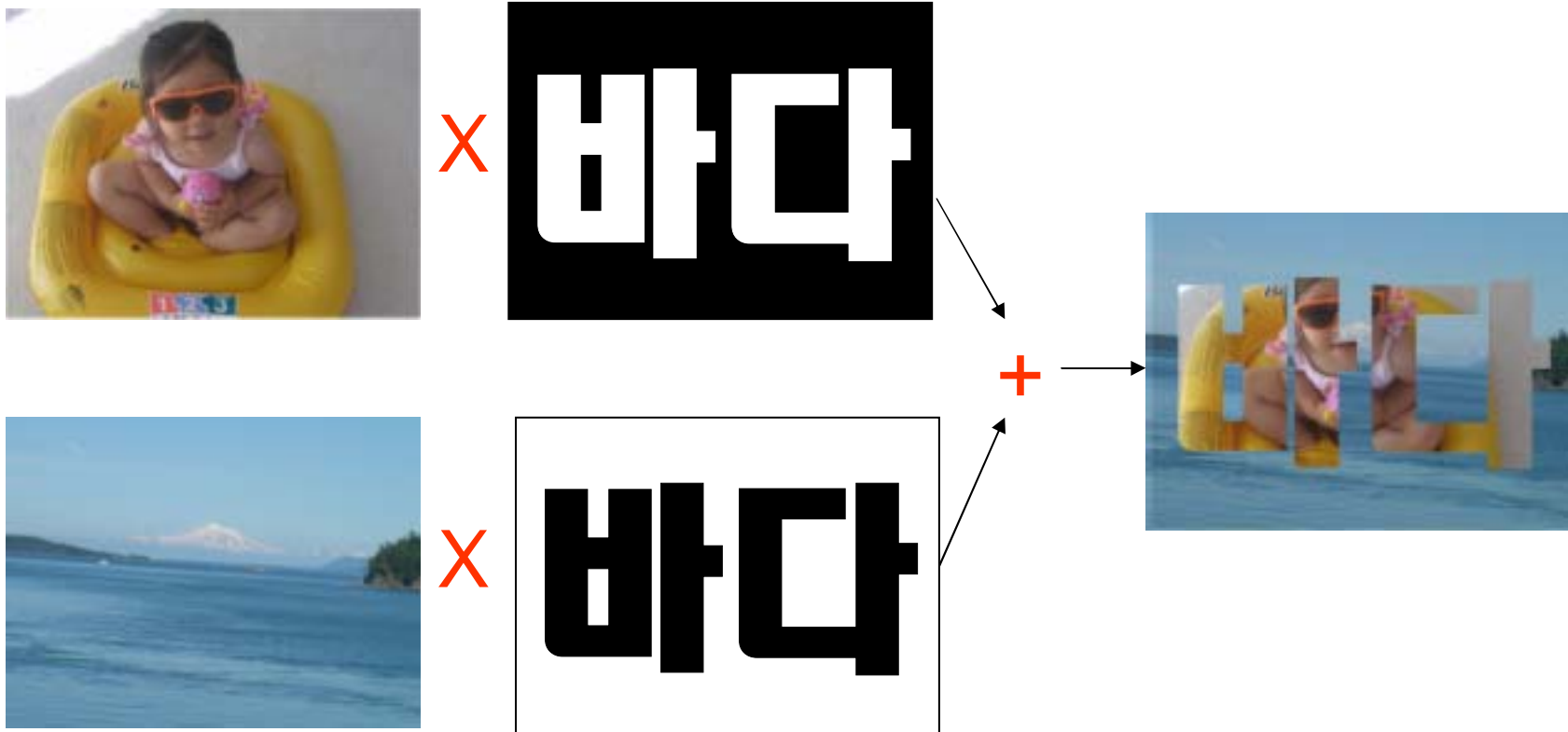


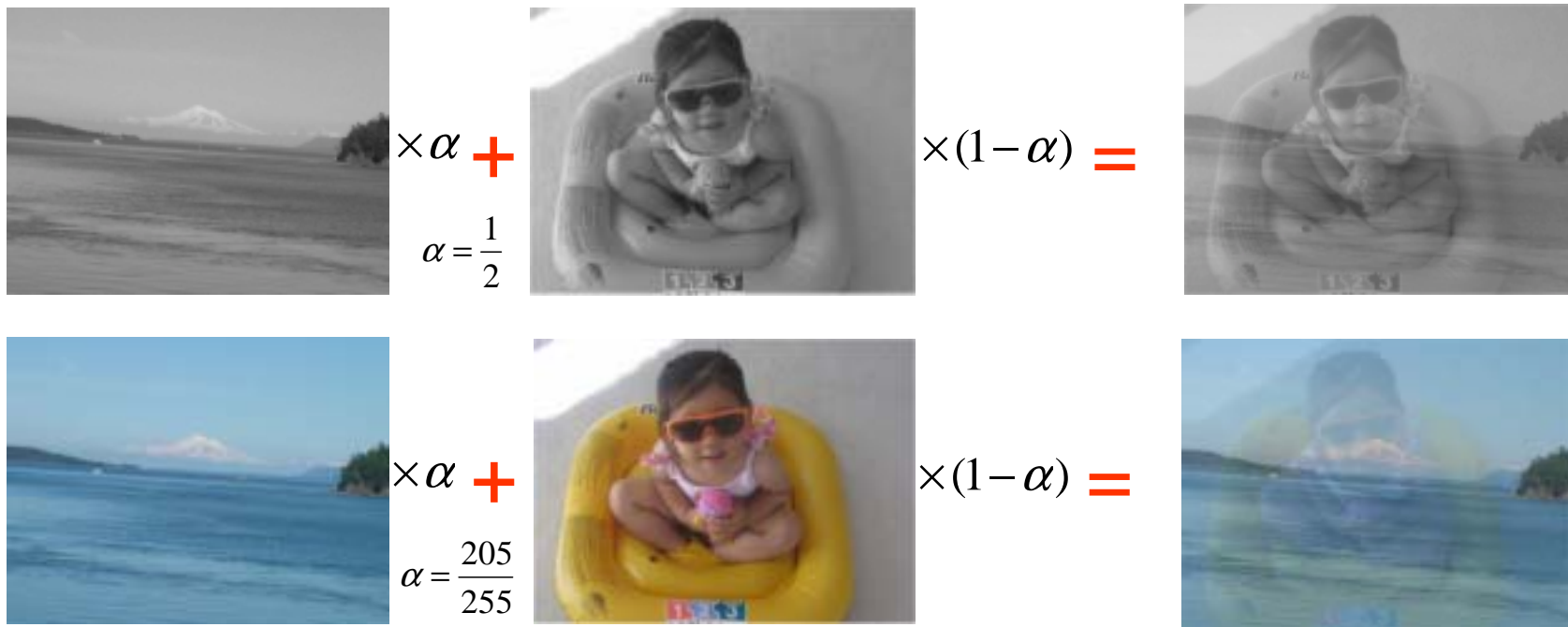
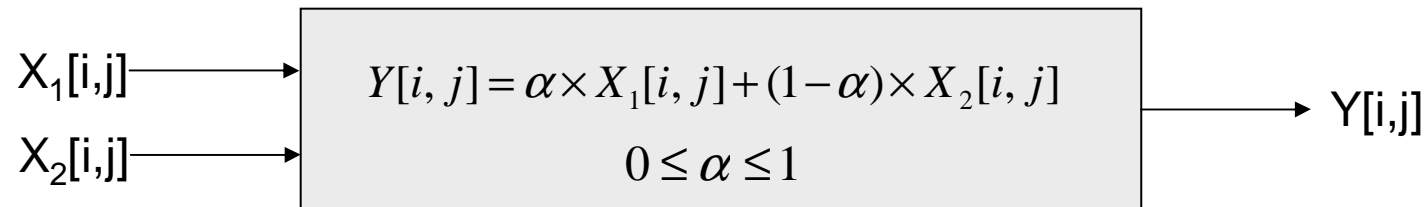
Image Multiplication

- Masking and composition















Alpha Blending

- Image Overlapping

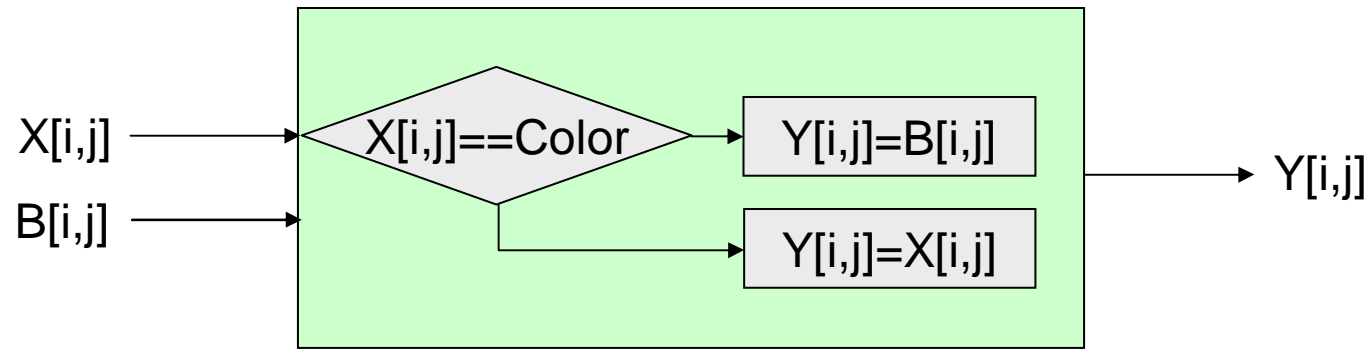


Alpha Blending

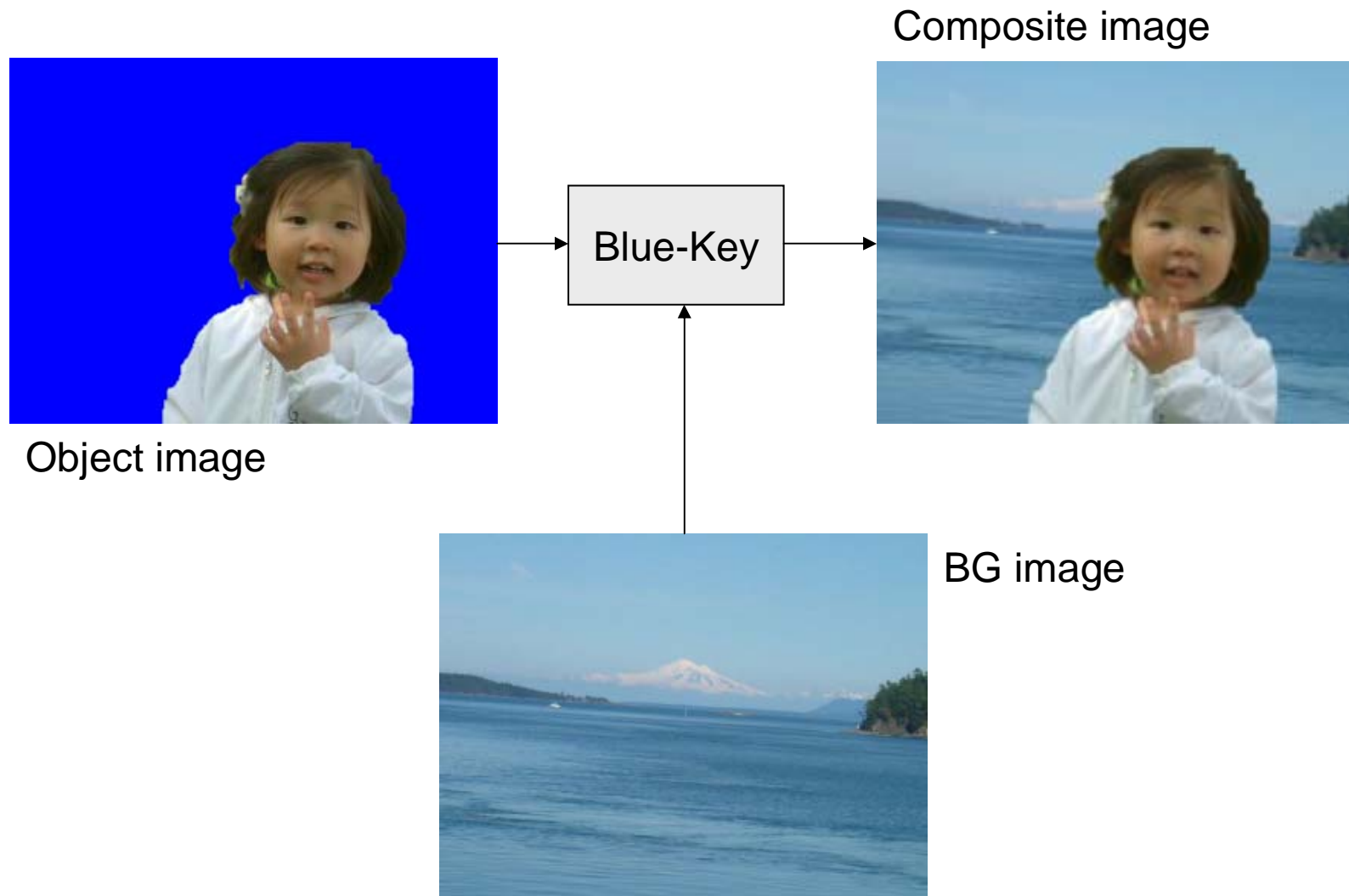
| | | | | |
|---|---|--|-------------------------|---|
|  | $\times \alpha$ + $\alpha = \frac{255}{255}$ |  | $\times (1 - \alpha)$ = |  |
|  | $\times \alpha$ + $\alpha = \frac{205}{255}$ |  | $\times (1 - \alpha)$ = |  |
|  | $\times \alpha$ + $\alpha = \frac{50}{255}$ |  | $\times (1 - \alpha)$ = |  |
|  | $\times \alpha$ + $\alpha = 0$ |  | $\times (1 - \alpha)$ = |  |

Chroma-Key

- Segmentation and composition



Chroma-Key



Summary

- Image averaging
- Image subtraction
- Image masking
- Alpha-blending
- Chroma-Key