Recapitulation

- Boundary extraction
- Region filling
- Extraction of connected components
- Convex hull
- Thinning
- Thickening

A B

$A \otimes B = A - (A \circledast B)$

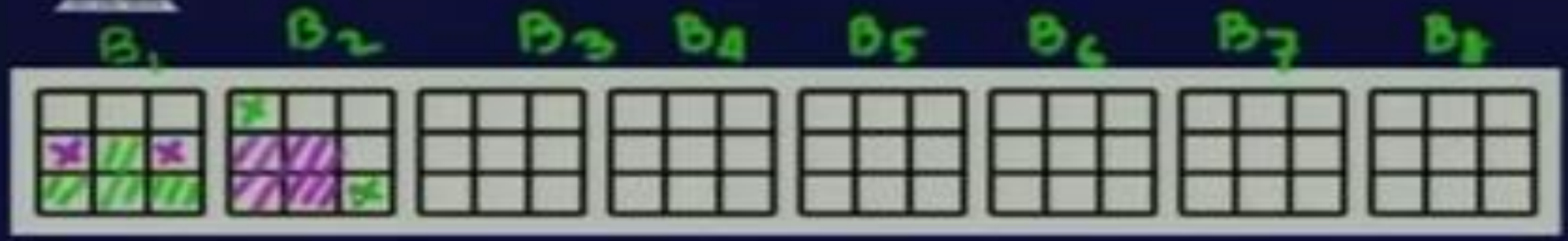
$= A \cap (A \otimes B)$

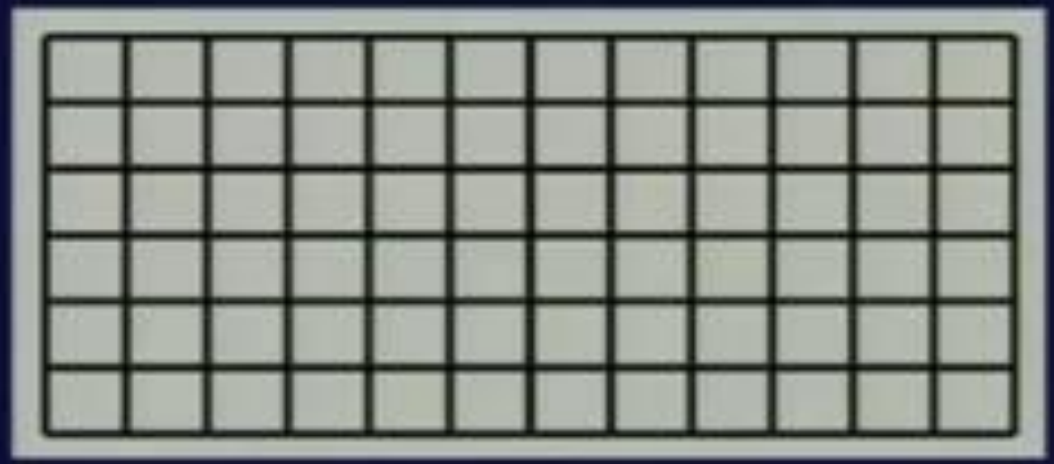
$\{B\} = \{B^1, B^2, B^3, \cdots B^n\}$

$B^i \Rightarrow$ rotated version B^{i-1}

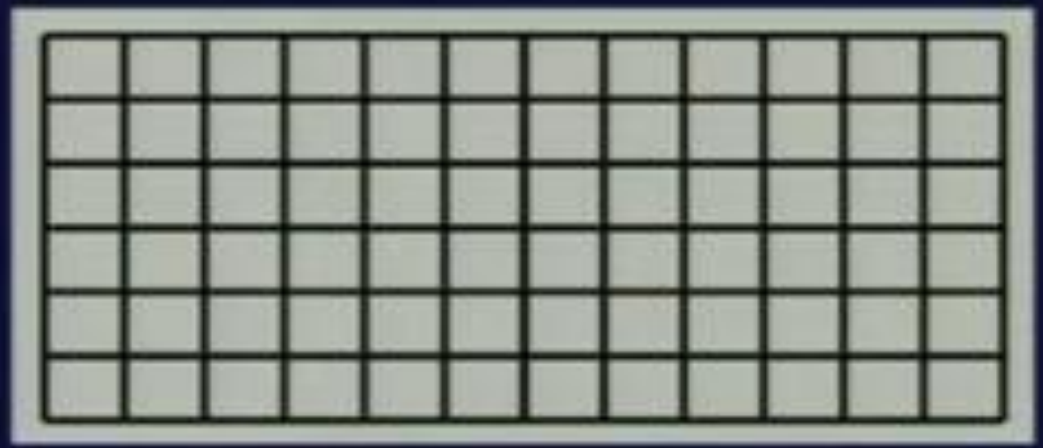
$A \otimes \{B\} = [(\cdots((A \otimes B^1) \otimes B^2) \cdots \otimes B^n)$

Thinning



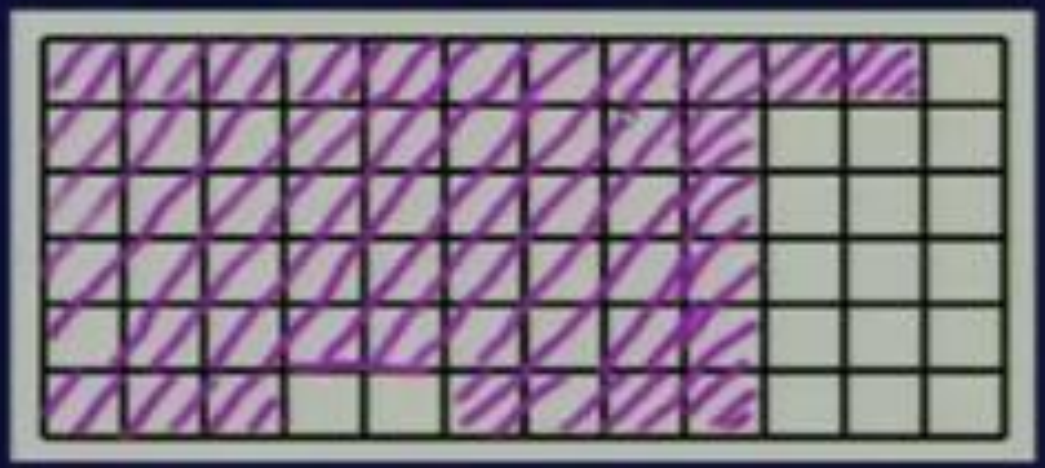


Thinning



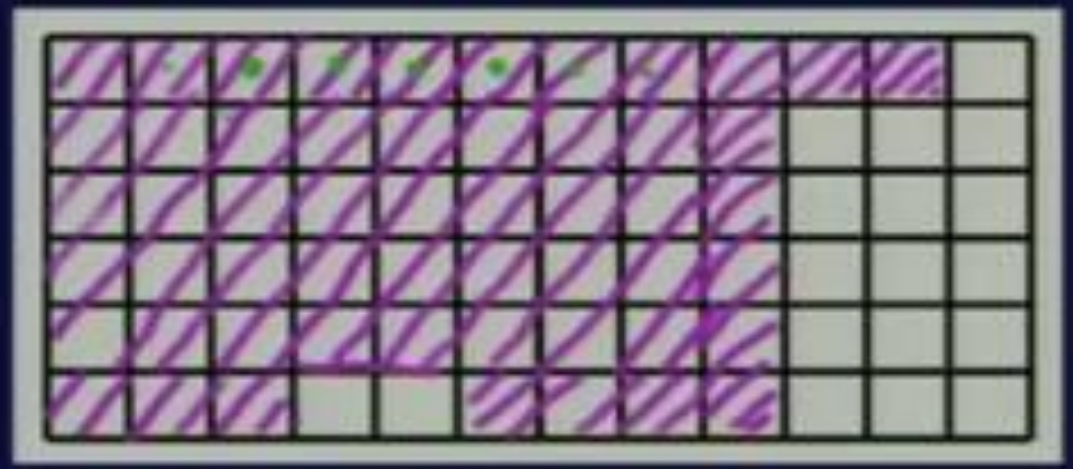
Thinning

A ⇒

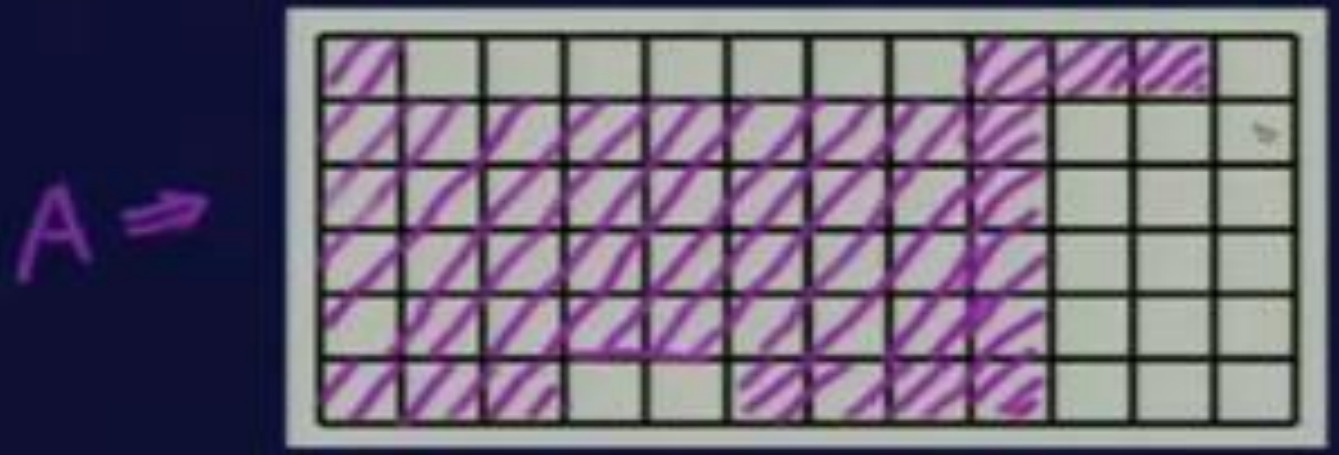


Thinning

A ⇒

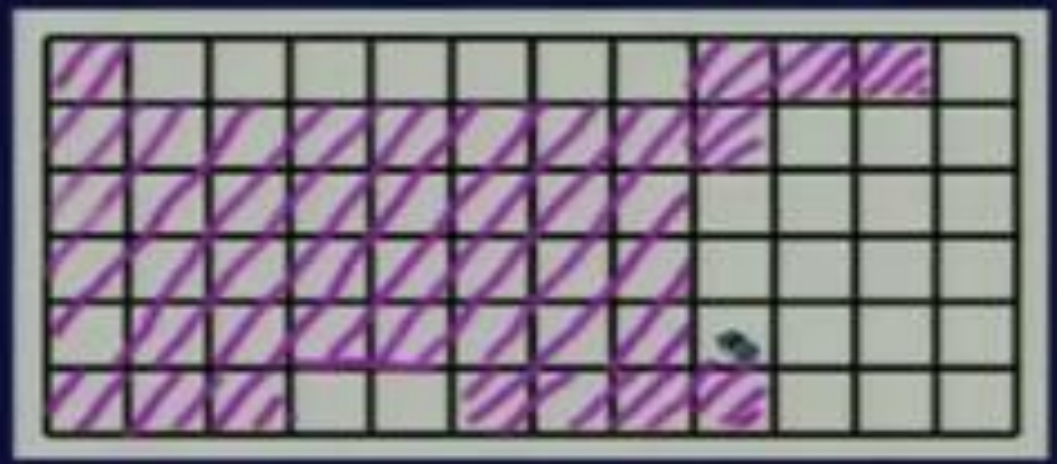


Thinning



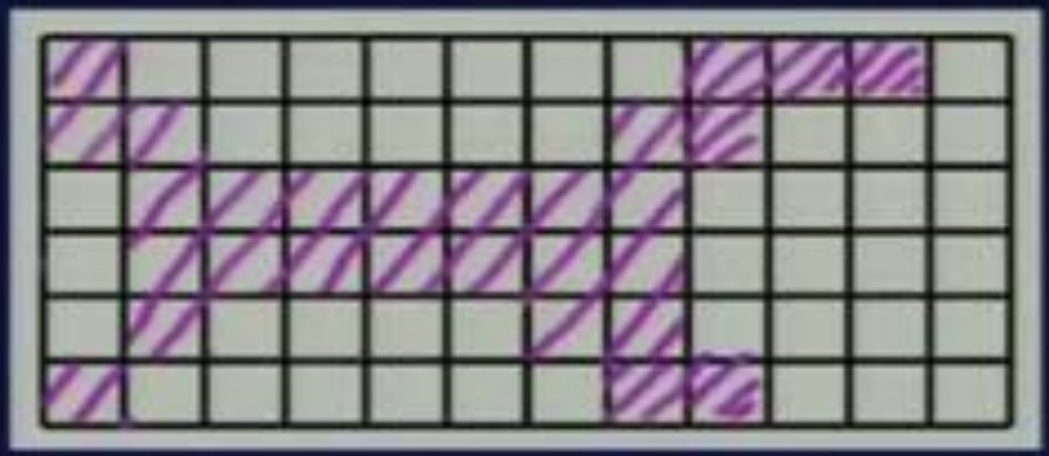
Thinning

A →

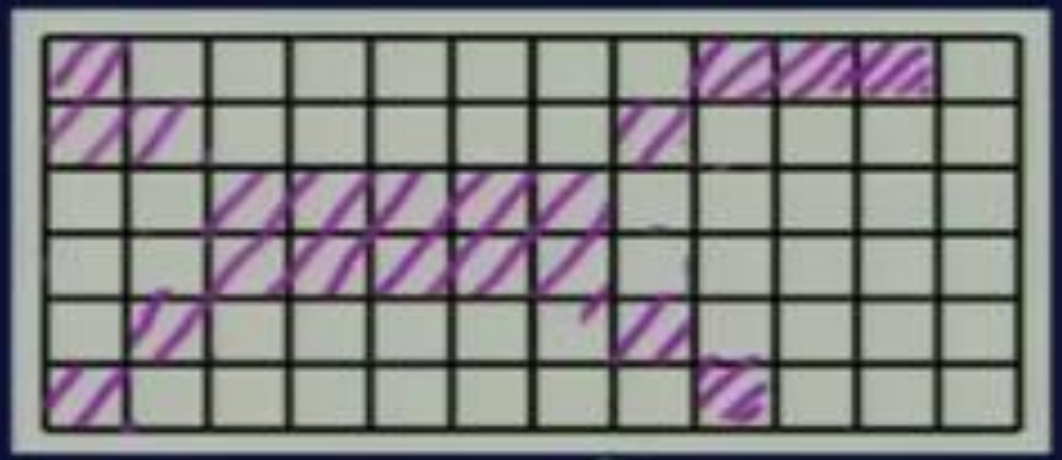


Thinning

A →



Thinning



Thickening

$$A \odot B = A \cup (A \otimes B)$$

$$A \odot \{B\} = \{ \cdots ((A \odot B^1) \odot B^2) \cdots \odot B^n)$$

$$A \Rightarrow A^c$$

$$C = A^c \otimes \{B\}$$

$$A \odot \{B\} = C^c$$

Skeletonization

A

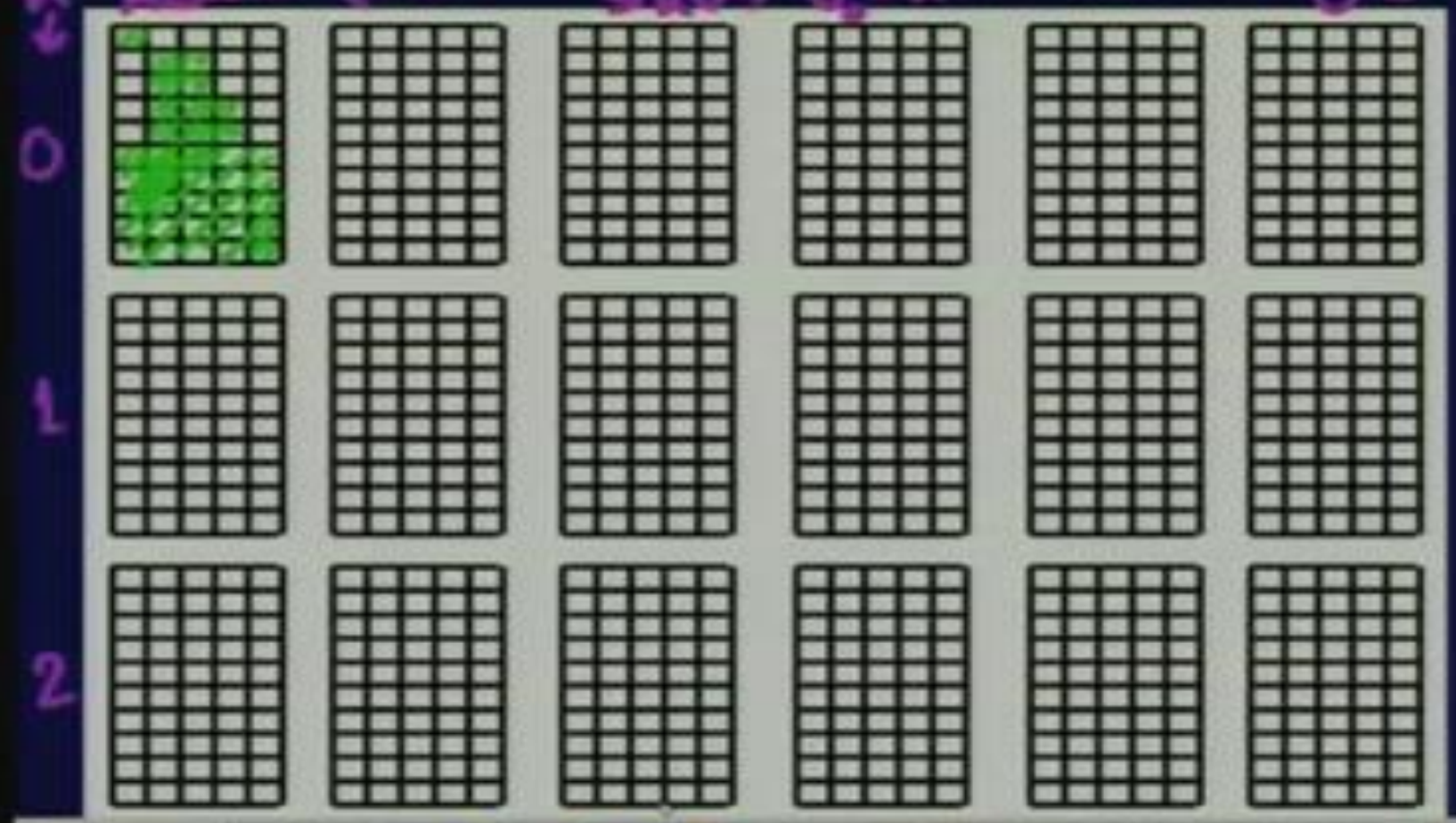
$$S(A) = \bigcup_{k=0}^{M} S_k(A)$$

$$S_k = \{(A \ominus kB) - [(A \ominus kB) \circ B]\}$$

$$M = \max\{k \mid (A \ominus kB) \neq \phi\}$$

$$A = \bigcup_{k=0}^{M} (S_k(A) \oplus kB)$$

Skeletonization



Skeletonization

Skeletonization