How is Sketching Useful?

Turnstile Streaming

- **Implicitly** initialize a sketching matrix S

- Initialize $\mathrm{sk}(x) \leftarrow 0$

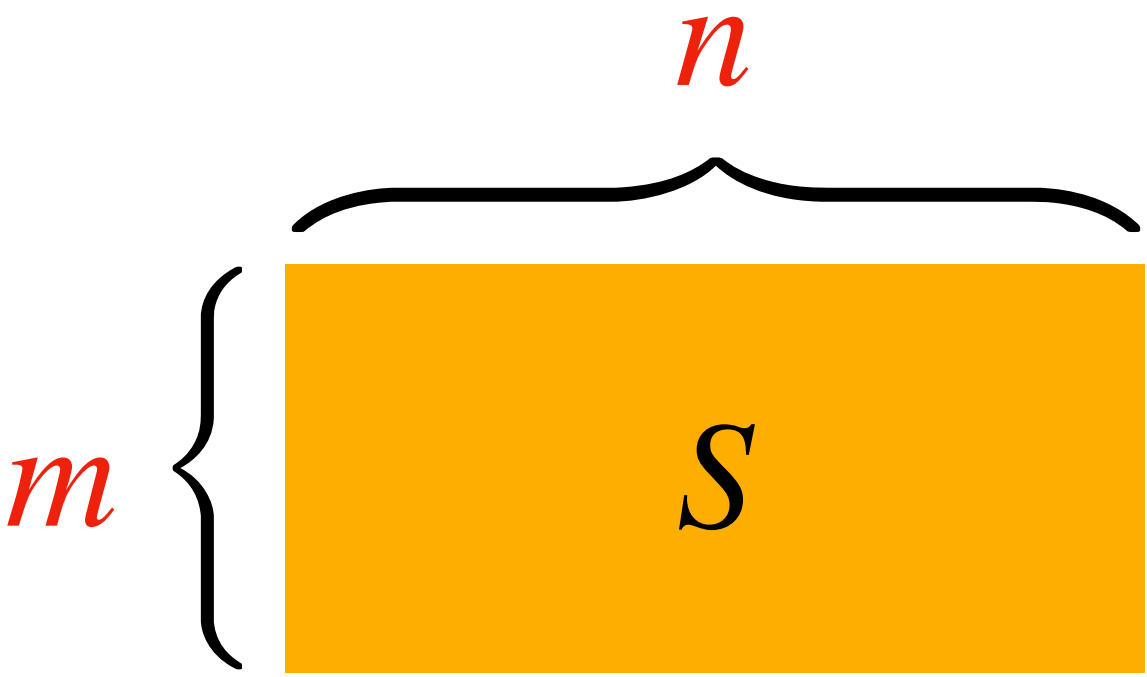
- When $x[i] \leftarrow x[i] + \Delta$

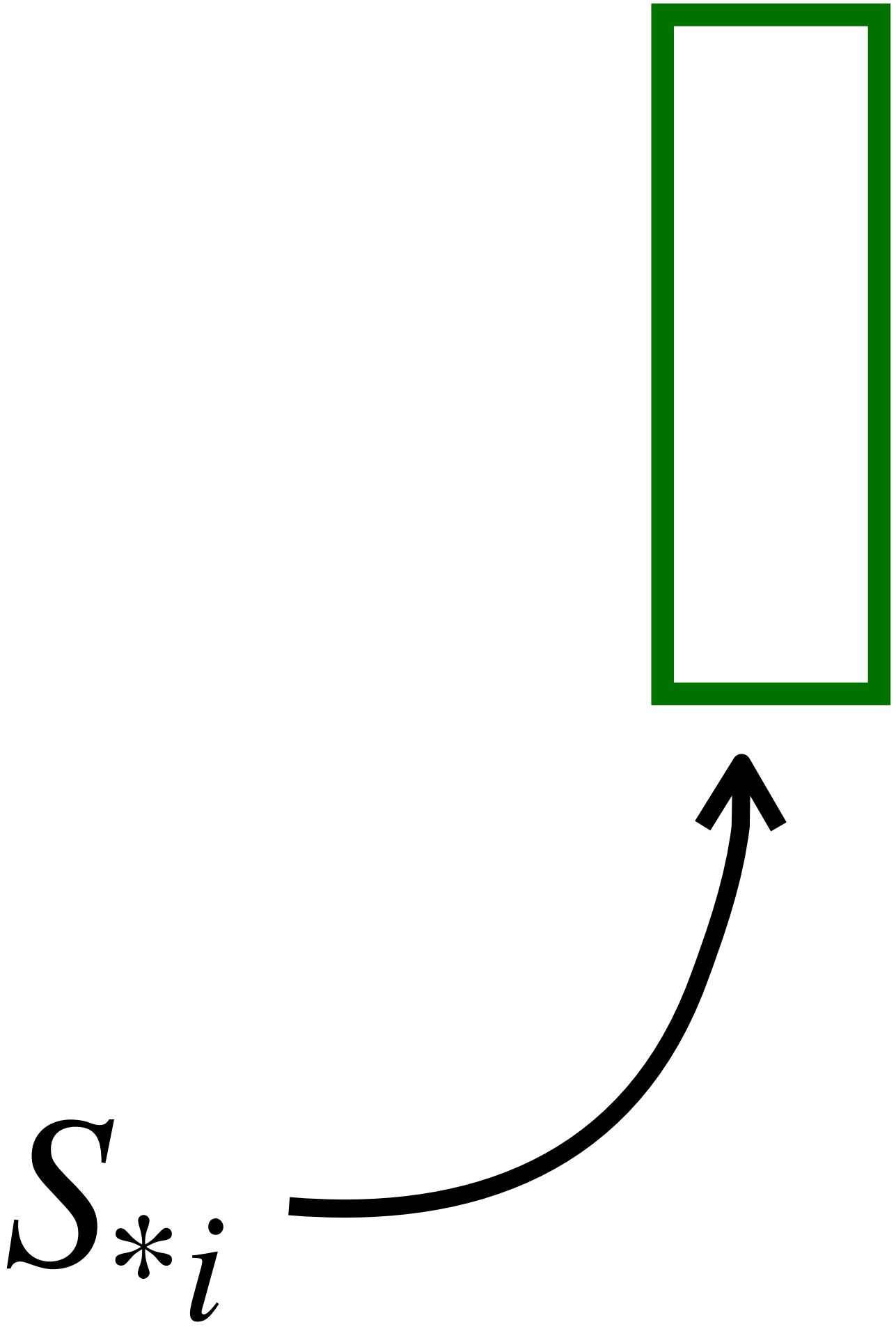
- Retrieve the i-th column S_{*i}

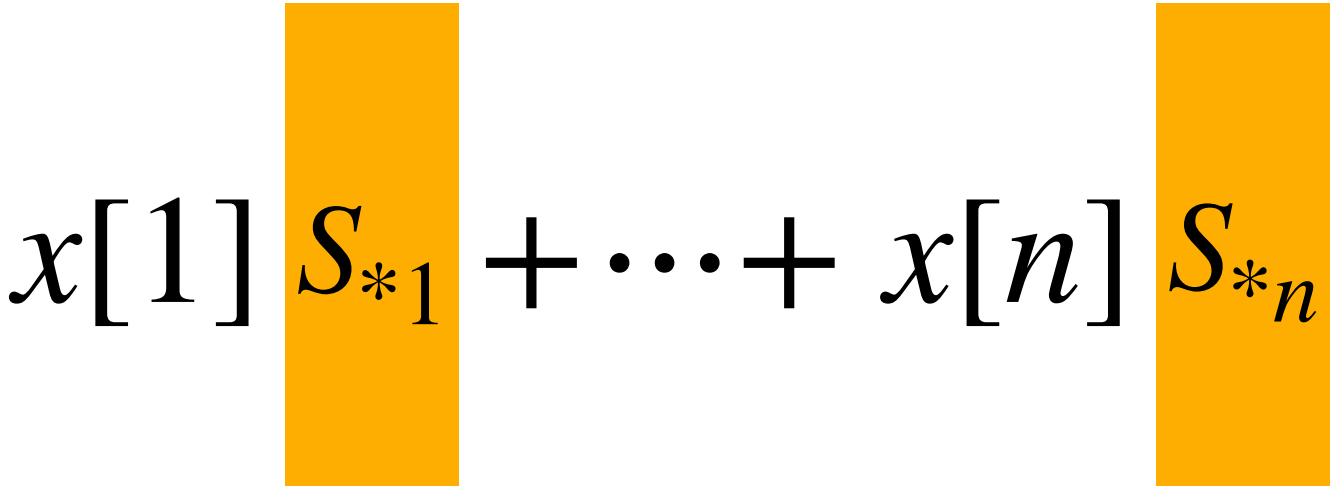
- Update $\mathrm{sk}(x) \leftarrow \mathrm{sk}(x) + (S_{*i}) \cdot \Delta$

- At all times: $\mathrm{sk}(x) = S \cdot x$

- Extract "information" about x from sk(x) at the end


n
m
S

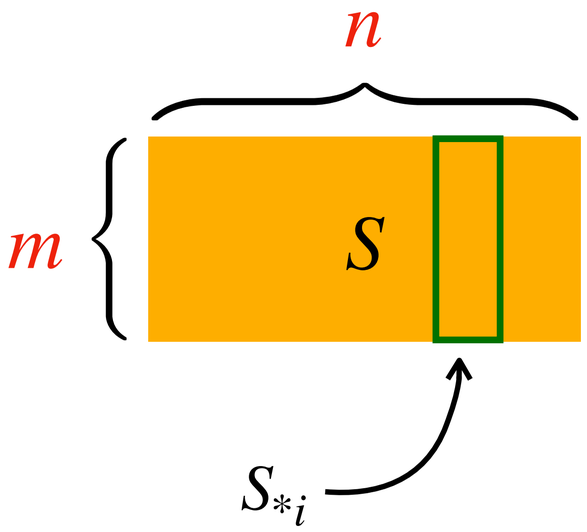

S_{*i}


$x[1]\, S_{*1} + \cdots + x[n]\, S_{*n}$

How is Sketching Useful?

Turnstile Streaming

- **Implicitly** initialize a sketching matrix S
- Initialize $\text{sk}(x) \leftarrow 0$
- When $x[i] \leftarrow x[i] + \Delta$
  - Retrieve the i-th column S_{*i}
  - Update $\text{sk}(x) \leftarrow \text{sk}(x) + (S_{*i}) \cdot \Delta$
- At all times: $\text{sk}(x) = S \cdot x$
- Extract "information" about x from $\text{sk}(x)$ at the end



$$x[1]\, S_{*1} + \cdots + x[n]\, S_{*n}$$

How is Sketching Useful?

Turnstile Streaming