Digital Image Compression
(Quantization, Entropy Coders)

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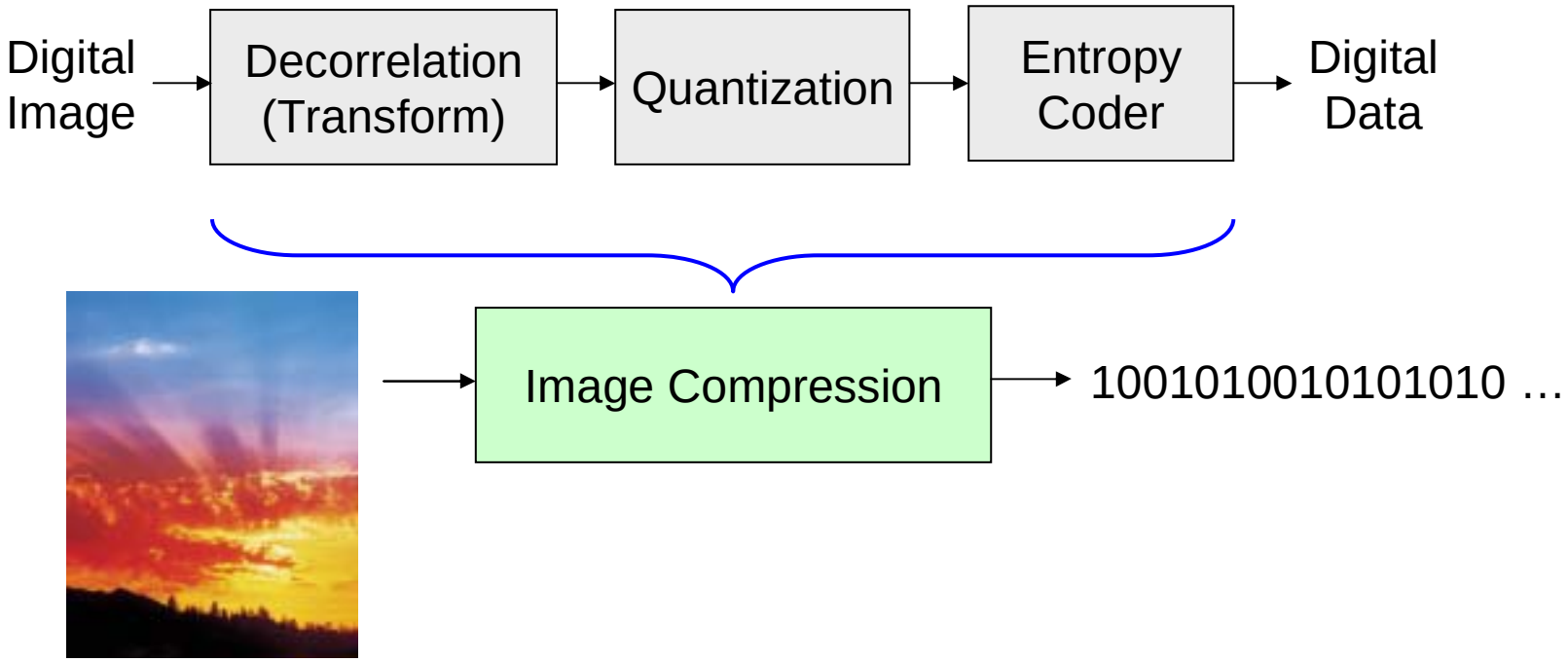
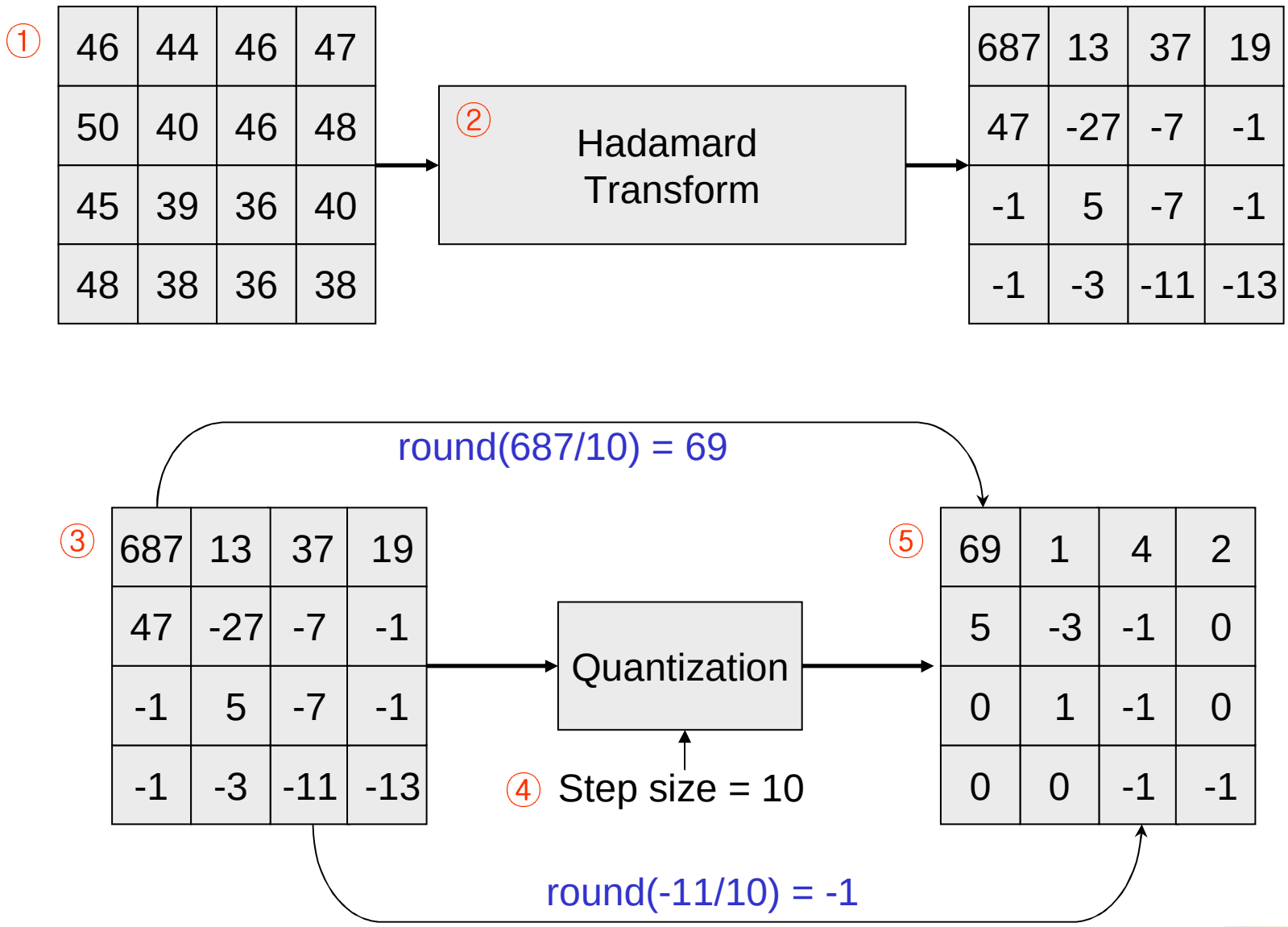
General Diagram of Image Codecs

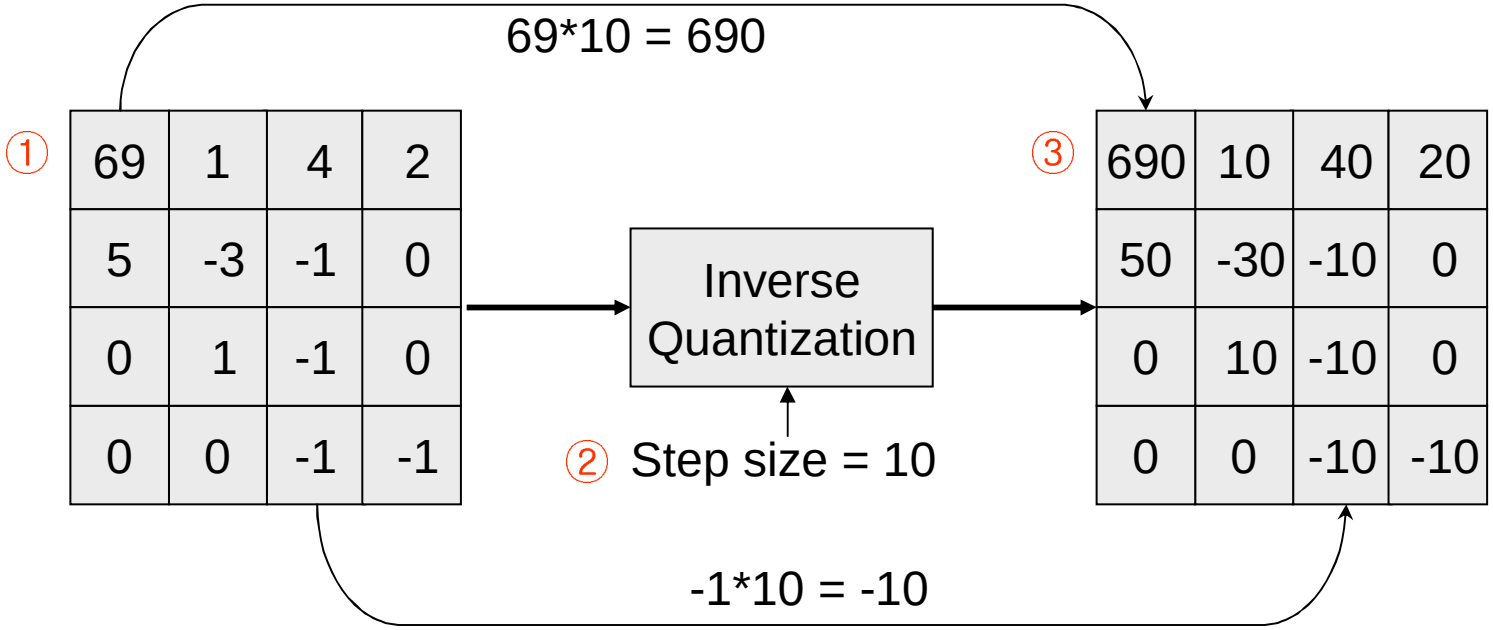
- Decorrelation (Transform, Prediction)
- Quantization
- Entropy Coding



Quantization



Inverse Quantization



④

687	13	37	19
47	-27	-7	-1
-1	5	-7	-1
-1	-3	-11	-13

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⑤

690	10	40	20
50	-30	-10	0
0	10	-10	0
0	0	-10	-10

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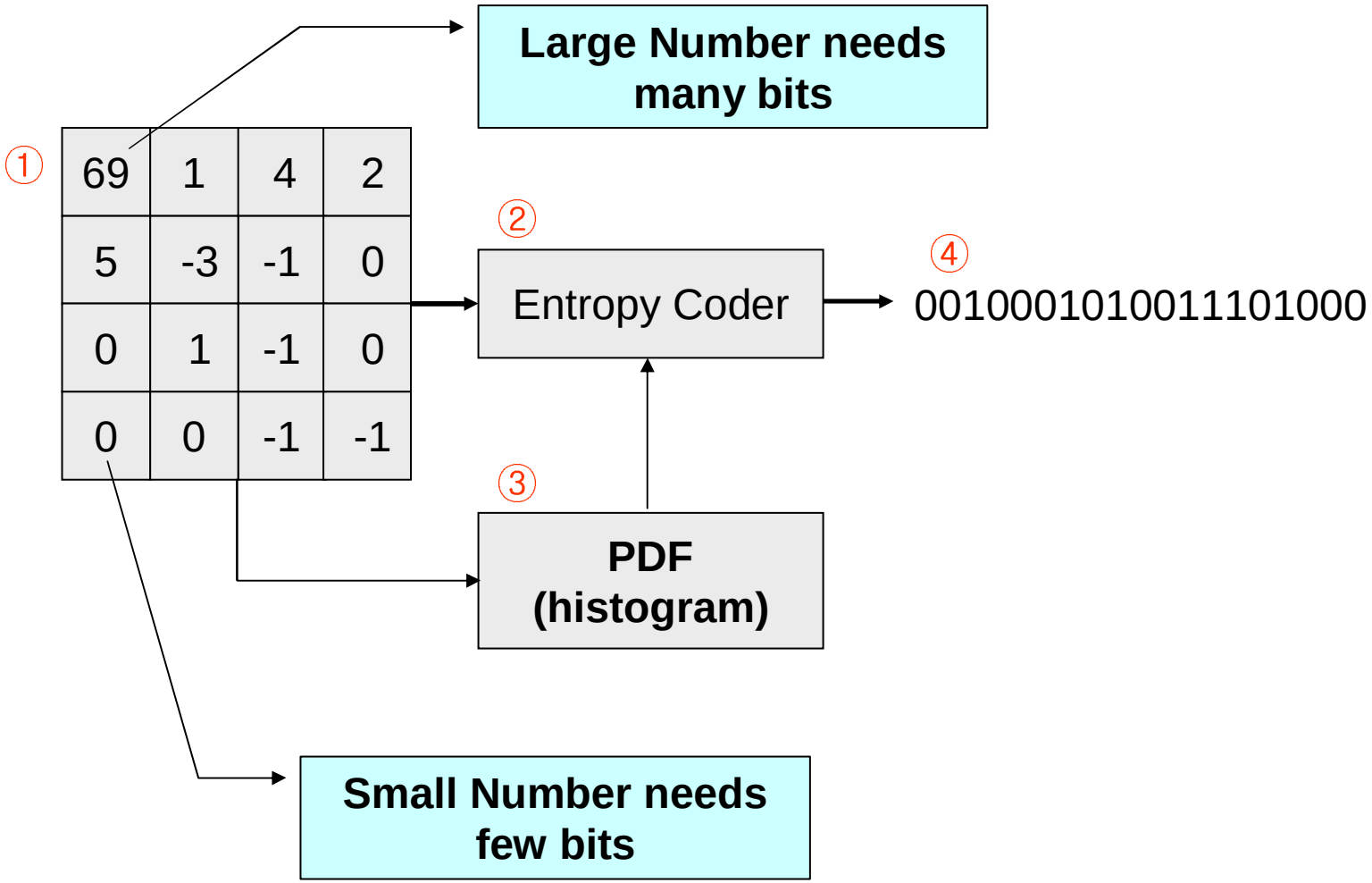
⑥

-3	3	-3	-1
-3	3	3	-1
-1	-5	3	-1
-1	-3	-1	-3

Entropy Coders (Variable Length Codes)



Entropy Coders (Variable Length Codes)

- Run-length coders
  - JPEG, Fax
- Huffman coders
  - JPEG, Fax, MP3
- Arithmetic coders
- Dictionary-based coders
  - .gif, .zip

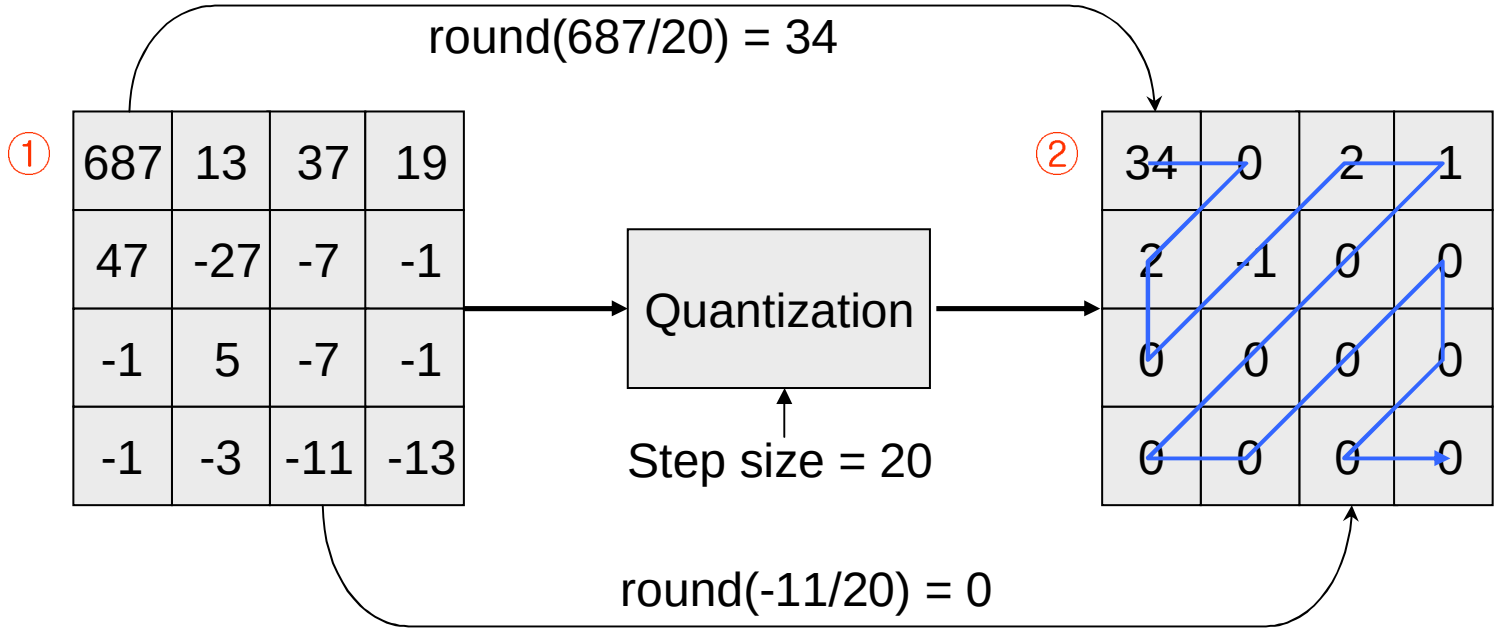
Run Length Coding

- Input data
  {11110000001111000000011110000000}
- Size of counter = 3bits
- Symbols are ‘0’ and ‘1’
- In counter, we have
  (1,4)(0,6)(1,4)(0,7)(1,4)(0,7)
- In fixed length code, we have
  (1,100)(0,110)(1,100)(0,111)(1,100)(0,111)
  →110001101100011111000111

Run Length Decoding

- Input data
  D = {1100011011000111111000111}
- Size of counter = 3bits
- Symbols
  - Two sort of symbols {0,1}
  - The first bit of the stream D is a symbol.
- We have
  (1,100)(0,110)(1,100)(0,111)(1,100)(0,111)
- In counter decoder, we have
  (1,4)(0,6)(1,4)(0,7)(1,4)(0,7)
  → 111100000011111000000011111000000000

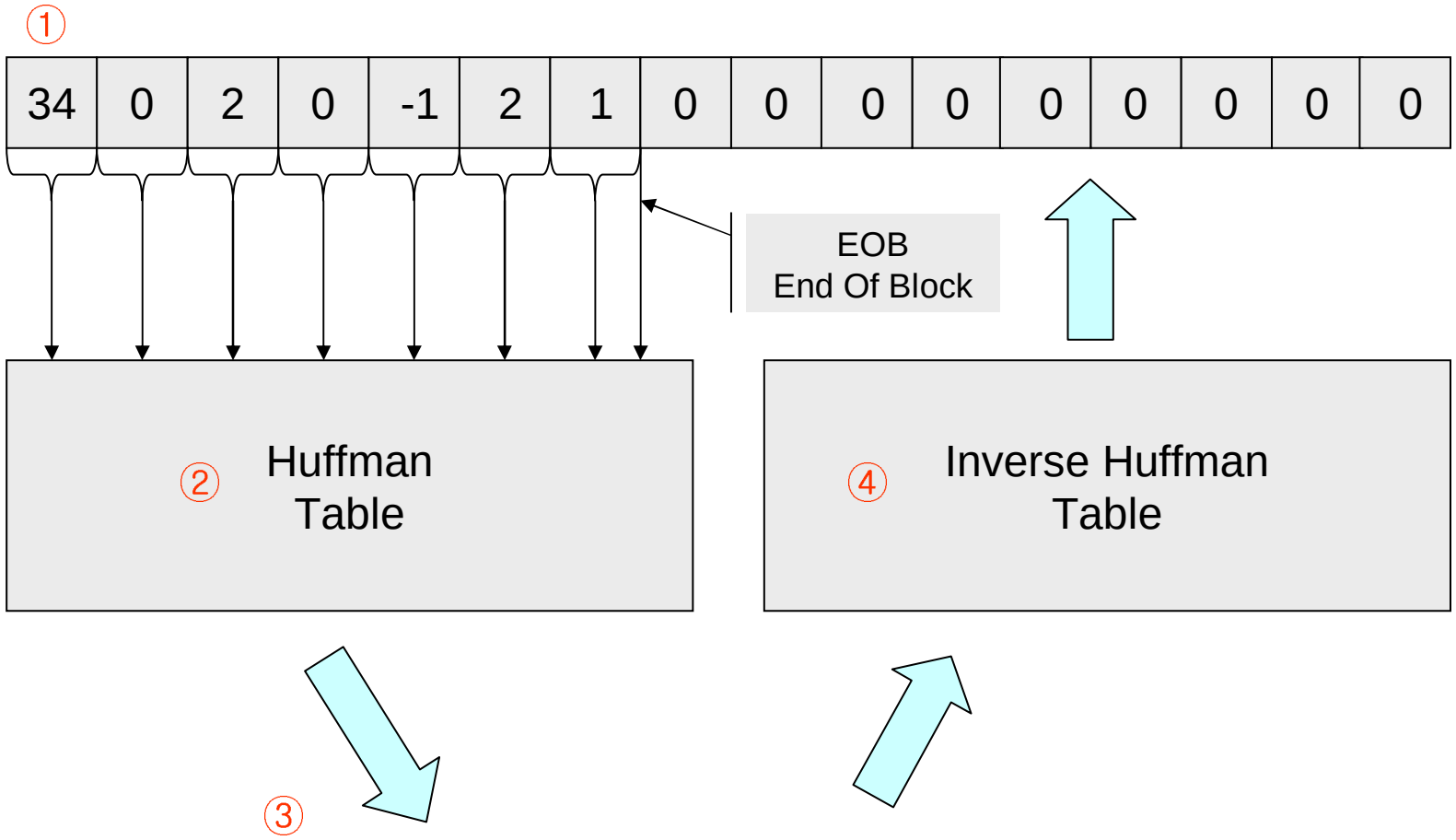
Scanning



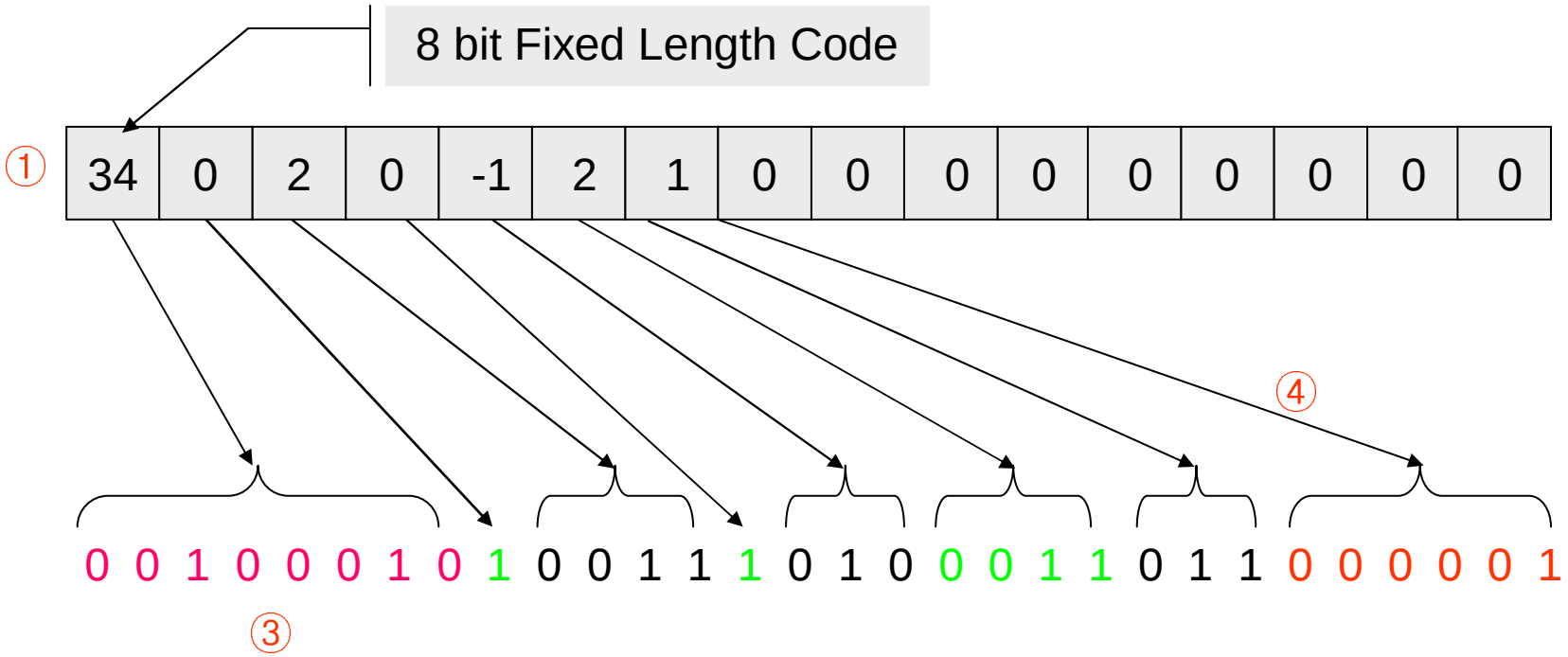
③

34	0	2	0	-1	2	1	0	0	0	0	0	0	0	0	0

Huffman Coding (VLC)



Huffman Coding



②

In	Huffman Code	Sign
0	1	
1	01	1/0
2	001	1/0
3	0001	1/0
…	…	…
EOB	000001	

Summary

- Quantization
- Entropy coders
  - Run-length
  - Huffman