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Huffman Encoding for JPEG

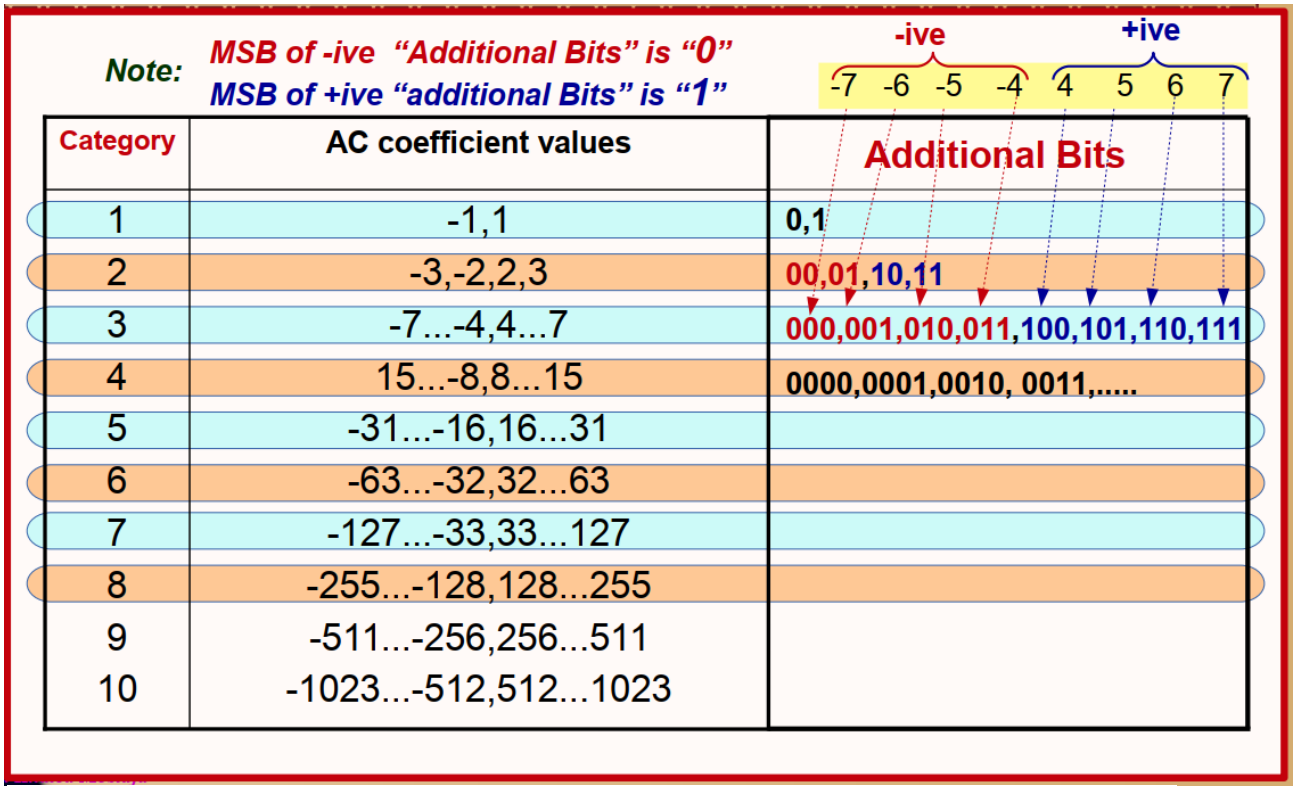
Summary:

Given a picture as a 2-D Matrix consists of many pixels (numbers). Divide it into Blocks each of 8x8 pixels, each of these pixels will be converted to be DCT coefficients using the **Discrete Cosine Transform** as it puts the **most important values** to our eyes in the **upper left corner** of the matrix. Then the matrix will be read in **Zig-Zag order** as the **DC coefficient** and lower-frequency **AC coefficients**, both horizontal and vertical, are scanned first, then a **differential encoding (DPCM)** is **applied on all DC coefficients**.

The **DC coefficients** are coded **separately** from **the AC ones. Run Length Encoding (RLE)** followed by **Entropy Coding** is applied on the **AC coefficients**.

In **RLE**, AC coefficients are divided into pairs; each pair is made up of (skip, value) where skip is the number of zeros in the run and value is the next Non-Zero Value.
{#-zeros-to-skip, next non-zero value}

The project is built using Java, **Intellij**.



Note: ***MSB of -ive "Additional Bits" is "0"***
MSB of +ive "additional Bits" is "1"

-ive: -7 -6 -5 -4 | +ive: 4 5 6 7

Category	AC coefficient values	Additional Bits
1	-1,1	0,1
2	-3,-2,2,3	00,01,10,11
3	-7...-4,4...7	000,001,010,011,100,101,110,111
4	15...-8,8...15	0000,0001,0010, 0011,.....
5	-31...-16,16...31	
6	-63...-32,32...63	
7	-127...-33,33...127	
8	-255...-128,128...255	
9	-511...-256,256...511	
10	-1023...-512,512...1023	

RLE Categories Table

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