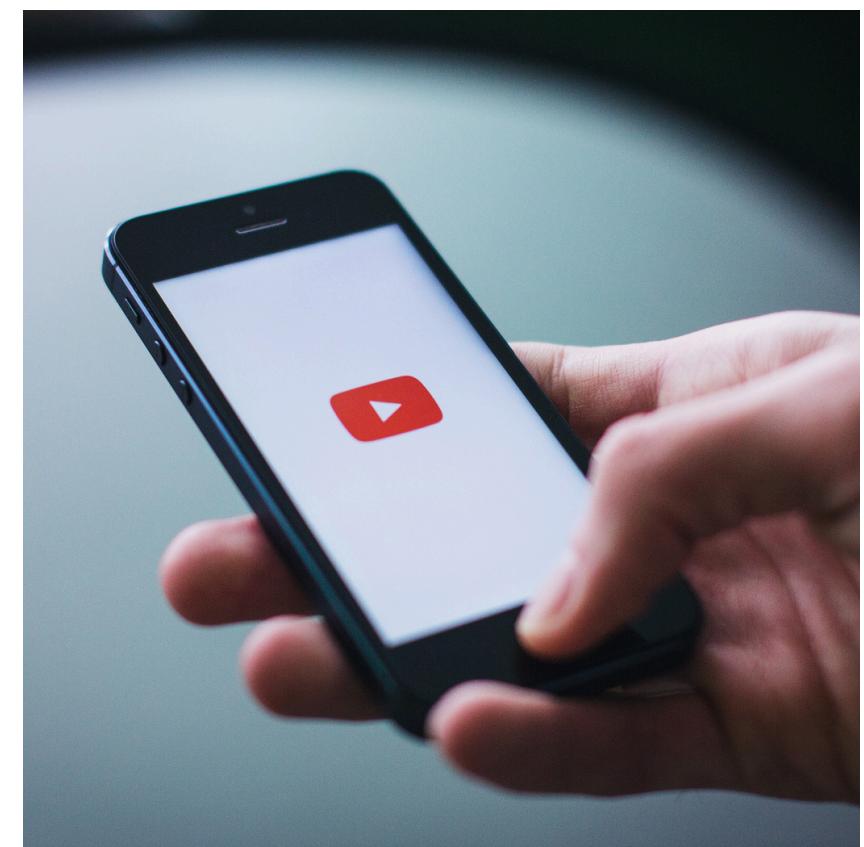
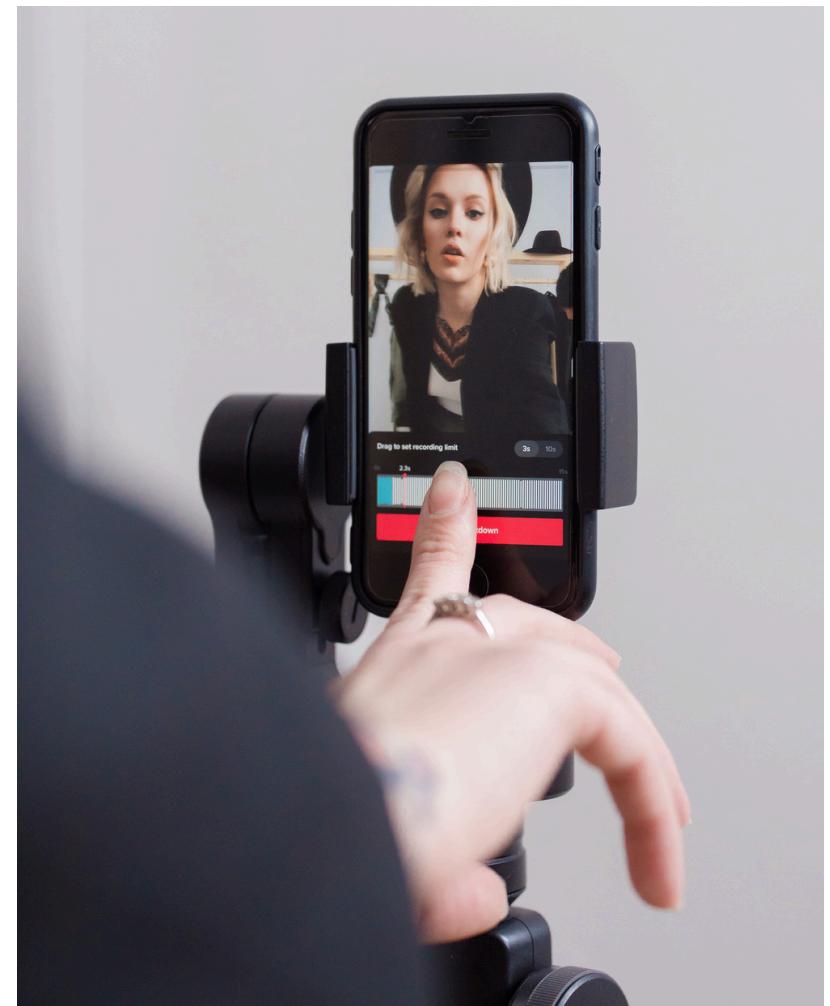


# **Codificação de Vídeo: Uma abordagem prática utilizando a linguagem C**

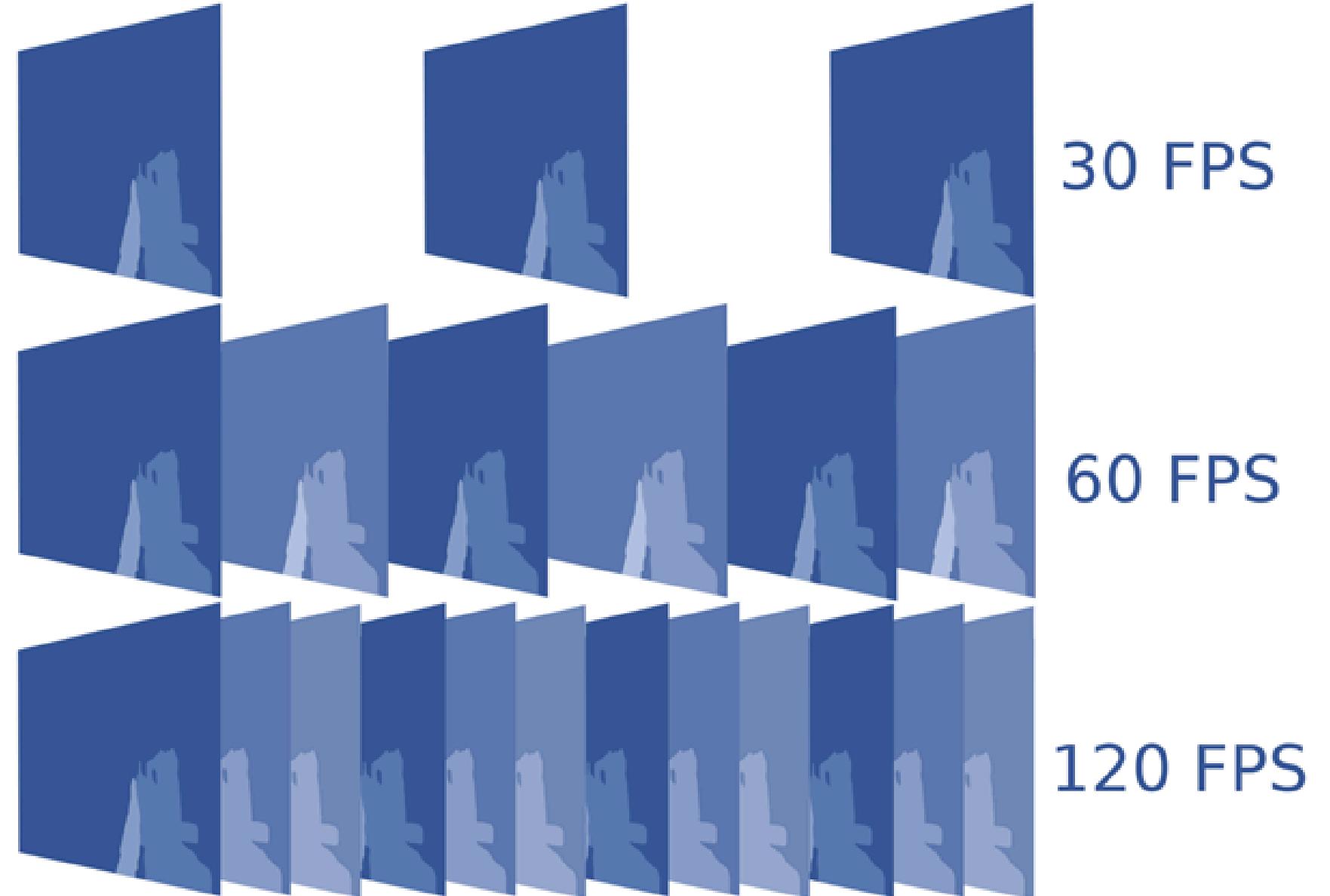
IFTech 2025

**Rafael Cavalcante Chaves  
Lucas Mendes de Souza**

# Contextualização

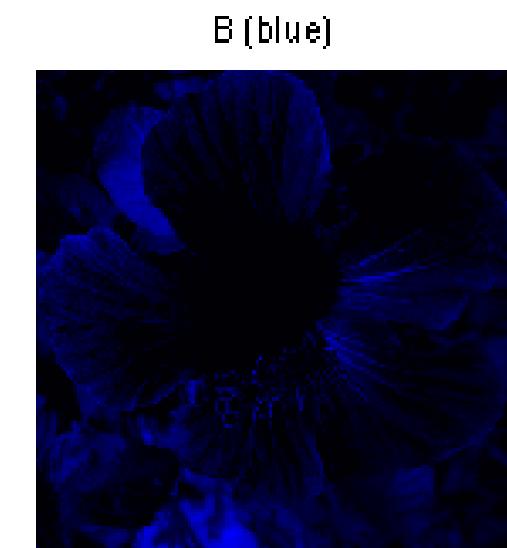
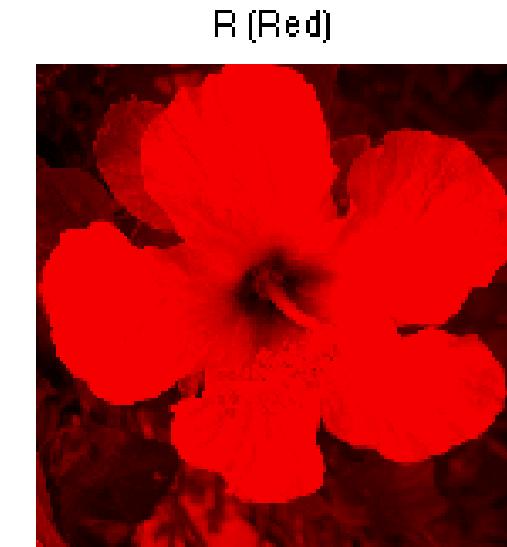
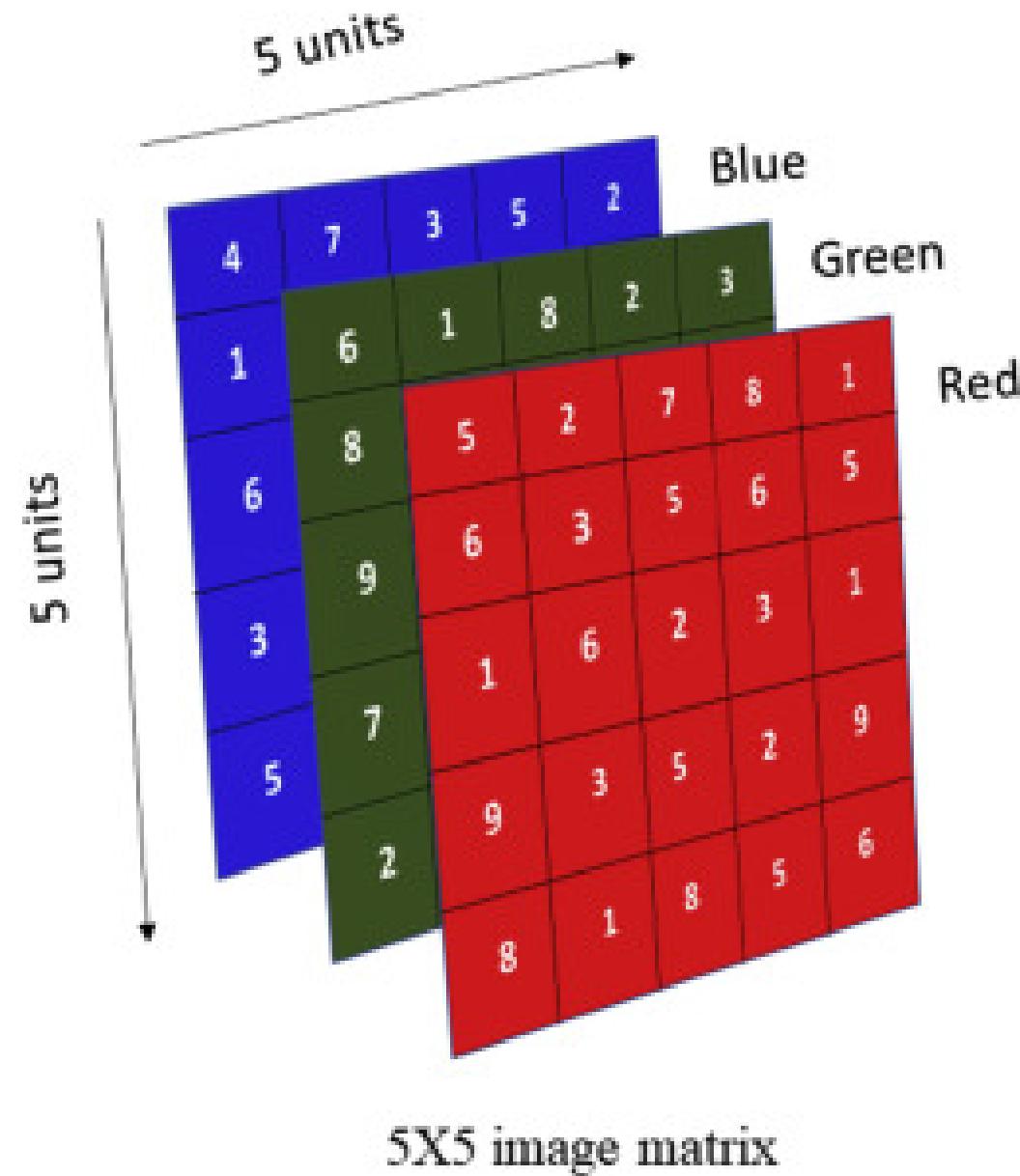


# Como representar vídeos?

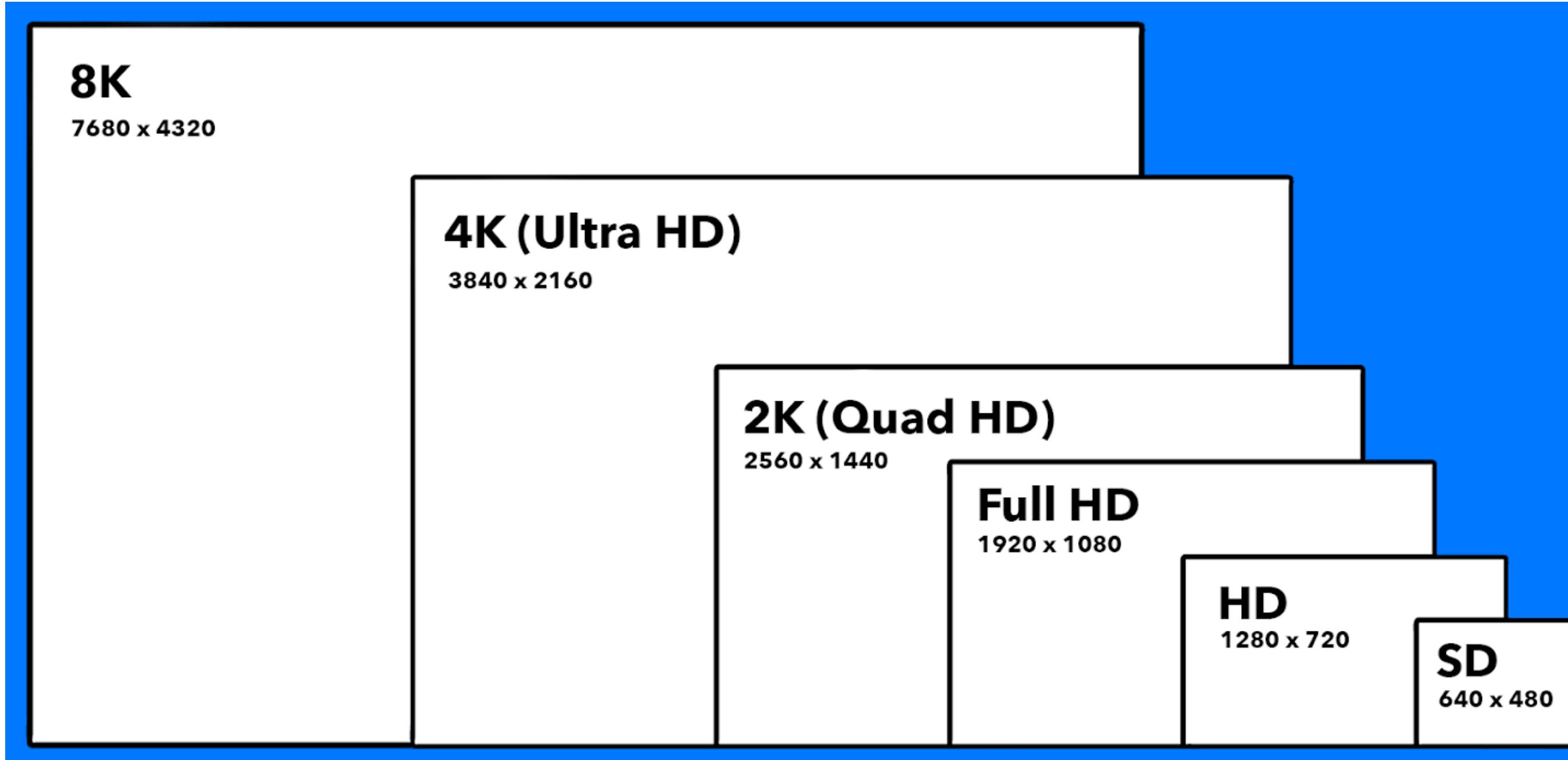


<https://www.youtube.com/watch?v=LEnudlc6ruE>

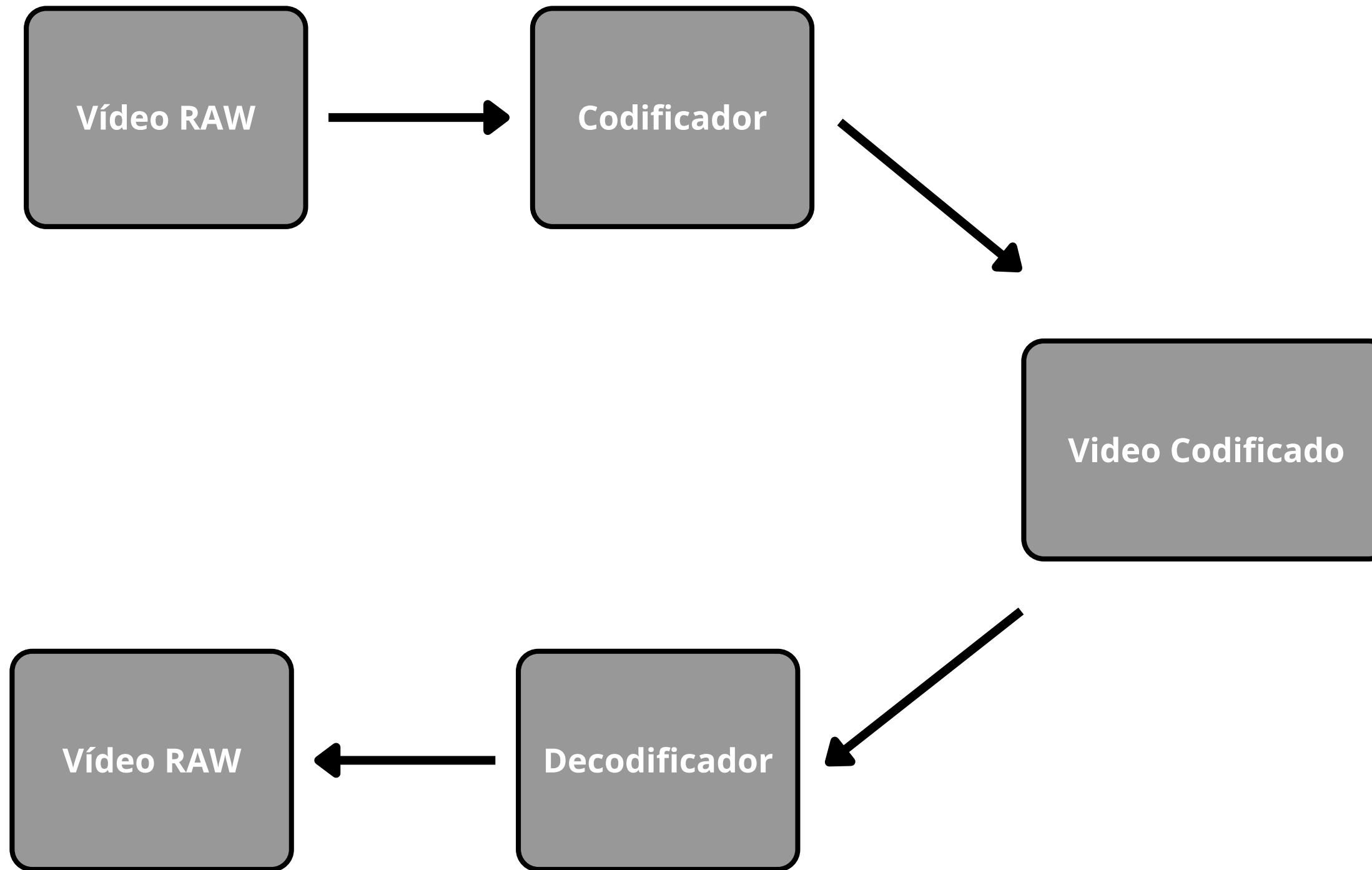
# Como representar vídeos?



# Como representar vídeos?



# Codificação



- **Lossless x Losy**
- **Intraframe x Interframe**
- **Hardware x Software**

# Codificação

Codec	Full Name	Year	Key Features	Common Uses
MJPEG	Motion JPEG	1992	Series of JPEG images, intra-frame coding	Webcams, video editing
MPEG-2	Moving Picture Experts Group 2	1995	Early digital video standard	DVDs, digital TV
H.264	Advanced Video Coding (AVC)	2003	High compression, widely supported	Streaming, Blu-ray
VP9	Video Processor 9	2013	Open-source, good compression	YouTube, WebRTC
H.265	High Efficiency Video Coding (HEVC)	2013	50% better compression than H.264	4K/8K streaming, UHD Blu-ray
AV1	AOMedia Video 1	2018	Royalty-free, high efficiency	Streaming (YouTube, Netflix)
H.266	Versatile Video Coding (VVC)	2020	50% better compression than H.265	Future 8K, VR/AR

O olho humano é mais sensível a variações de **luz** do que de **cores**.

Logo, é possível utilizar **menos bits** para representar as cores sem que haja **perda de qualidade**.



**Original**



**Y - Intensidade  
da luz**



**Cb - Cromitancia  
Azul**



**Cr - Cromitancia  
Vermelha**

## YCbCr 4:2:2

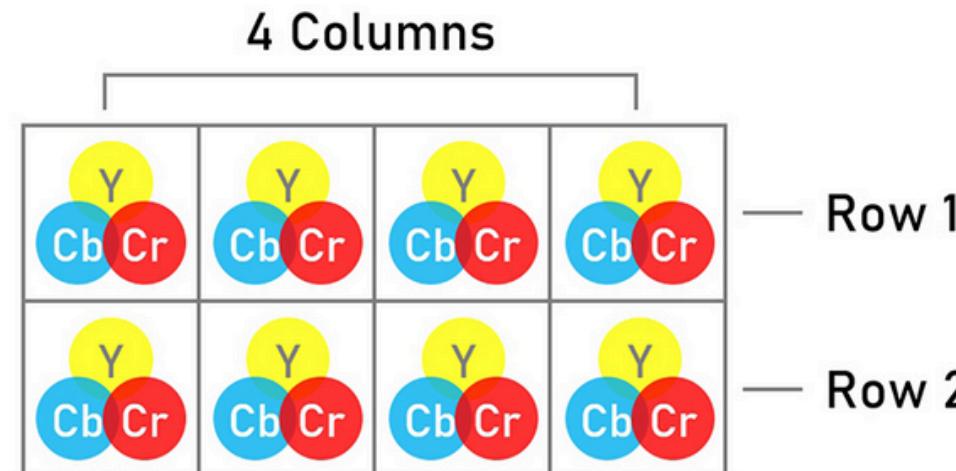
Y	Y	Y	Y
Y	Y	Y	Y

Cb Cr		Cb Cr	
Cb Cr		Cb Cr	

8 Pixels x 1 Byte + 4 Pixels x 2 Bytes = 16 Bytes

Compressão de 33%

## YCbCr 4:4:4



8 Pixels x 3 Bytes = 24 Bytes

## YCbCr 4:2:0

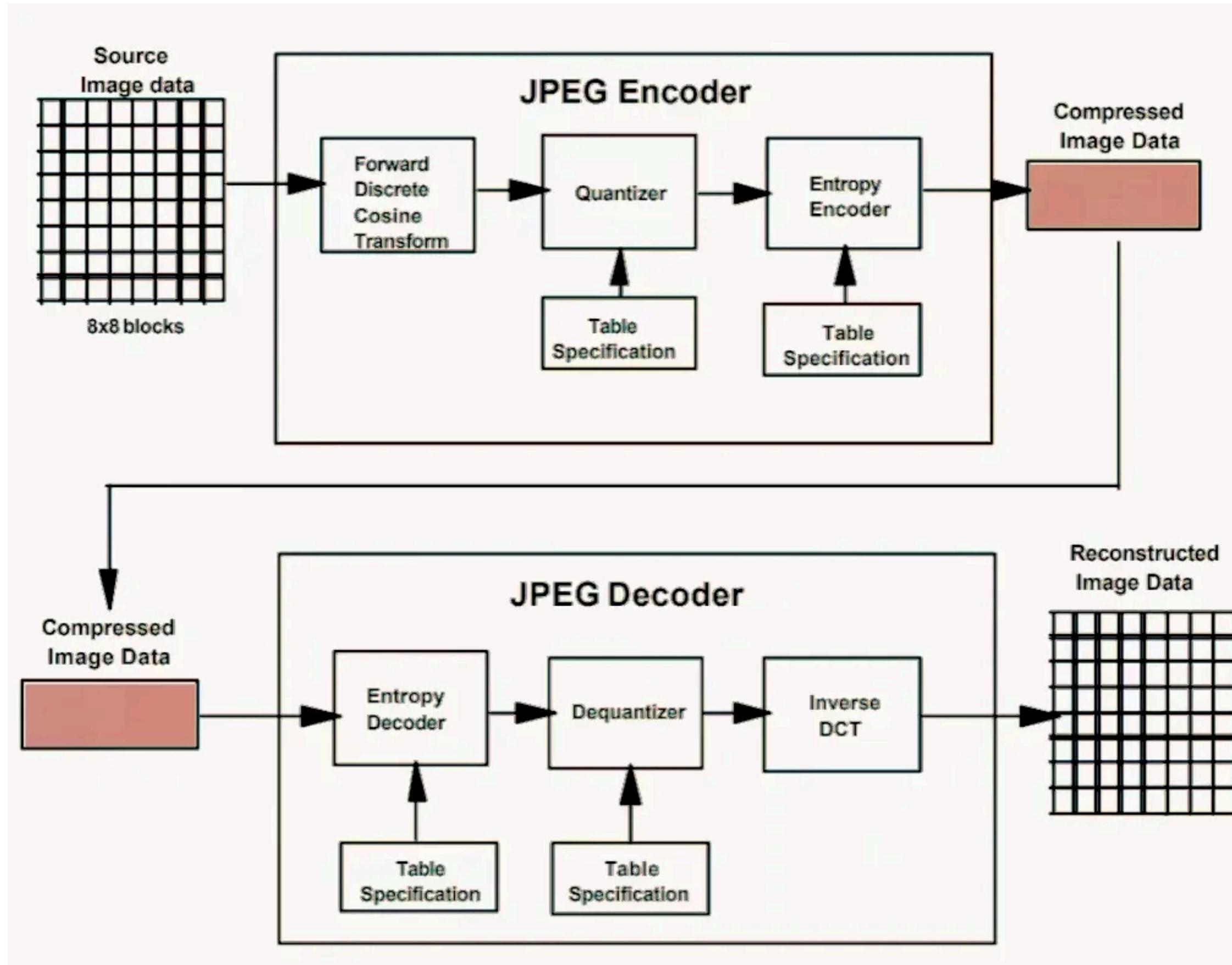
Y	Y	Y	Y
Y	Y	Y	Y

Cb Cr		Cb Cr	

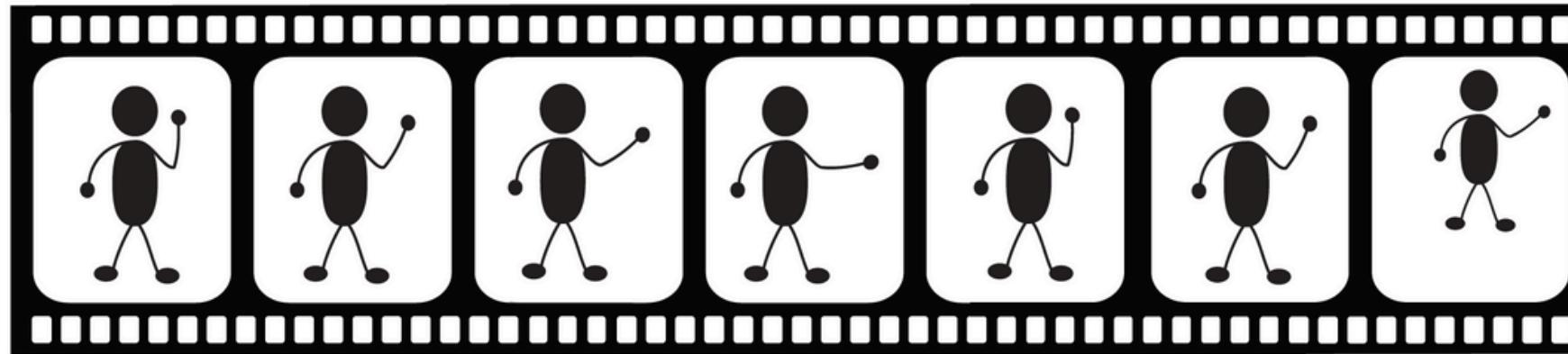
8 Pixels x 1 Byte + 2 Pixels x 2 Bytes = 12 Bytes

Compressão de 50%

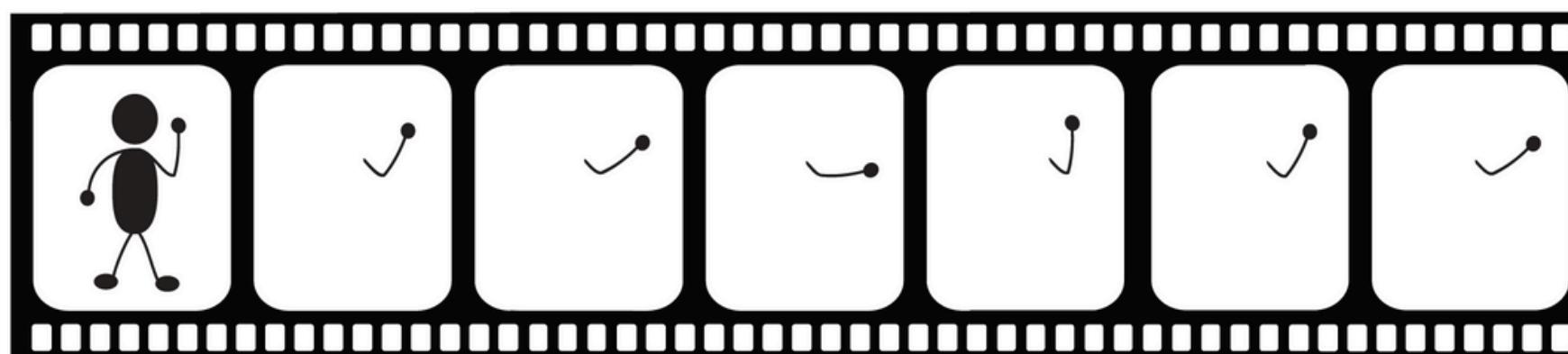
# MJPEG



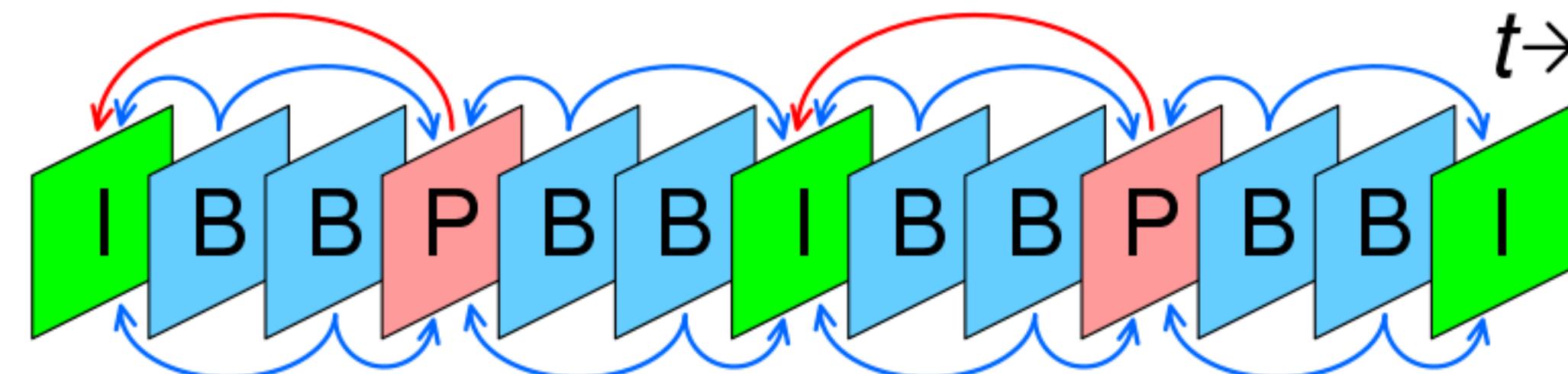
# H264



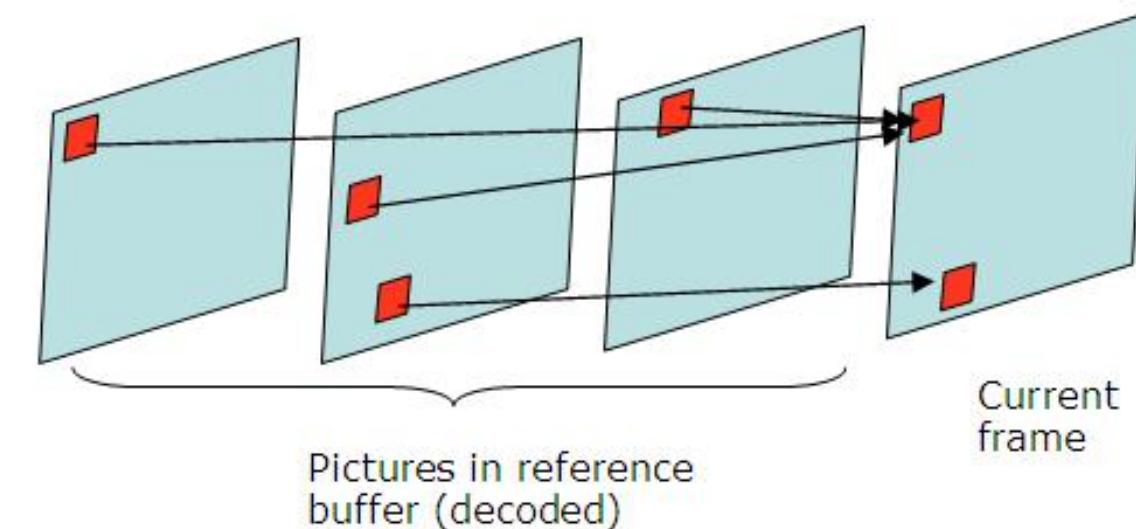
Intraframe Compression  
Every frame is encoded individually



Interframe Compression  
Only the differences between frames are encoded for each group of frames

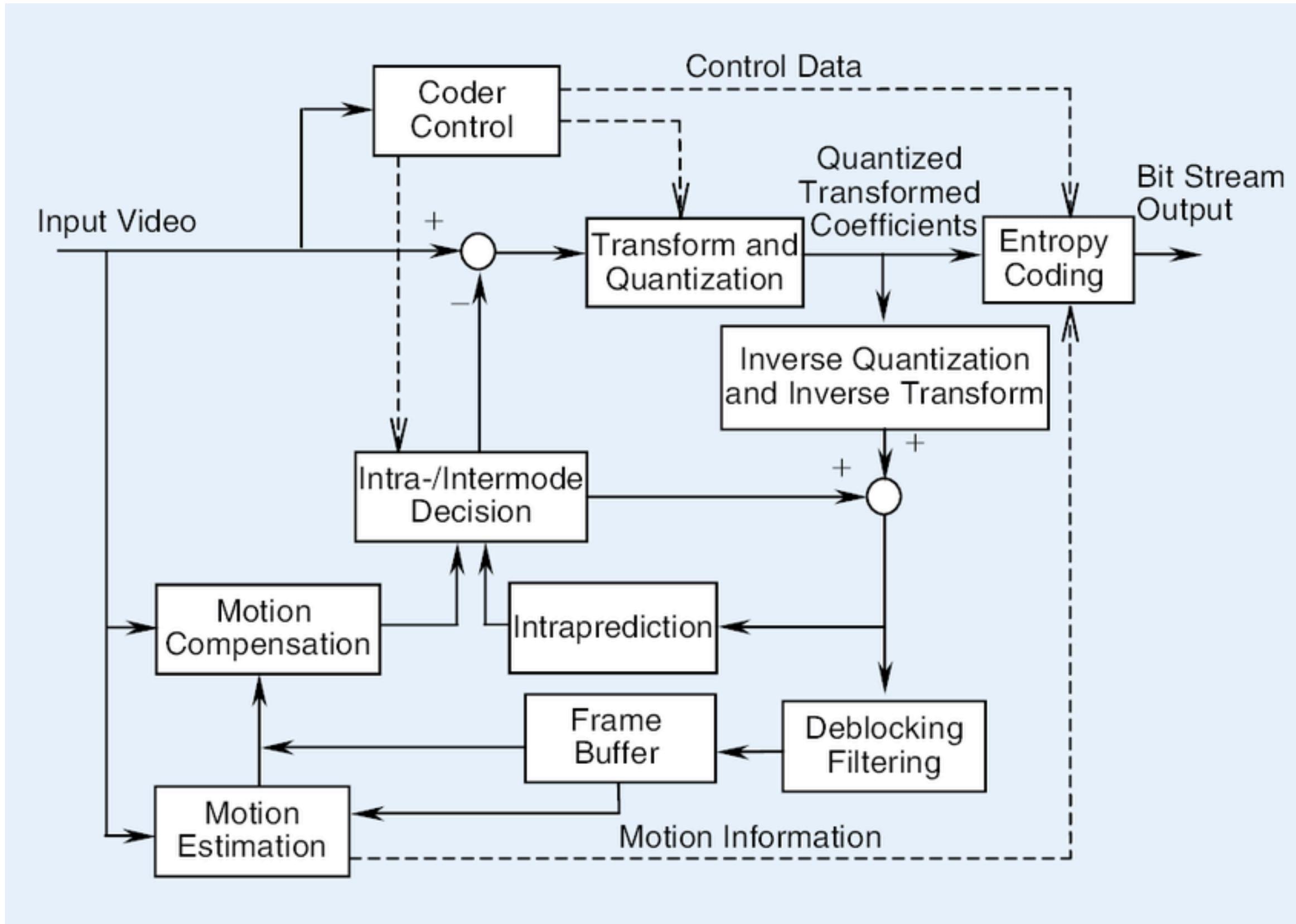


- I-Frames
- P-Frames
- B-Frames



Current frame

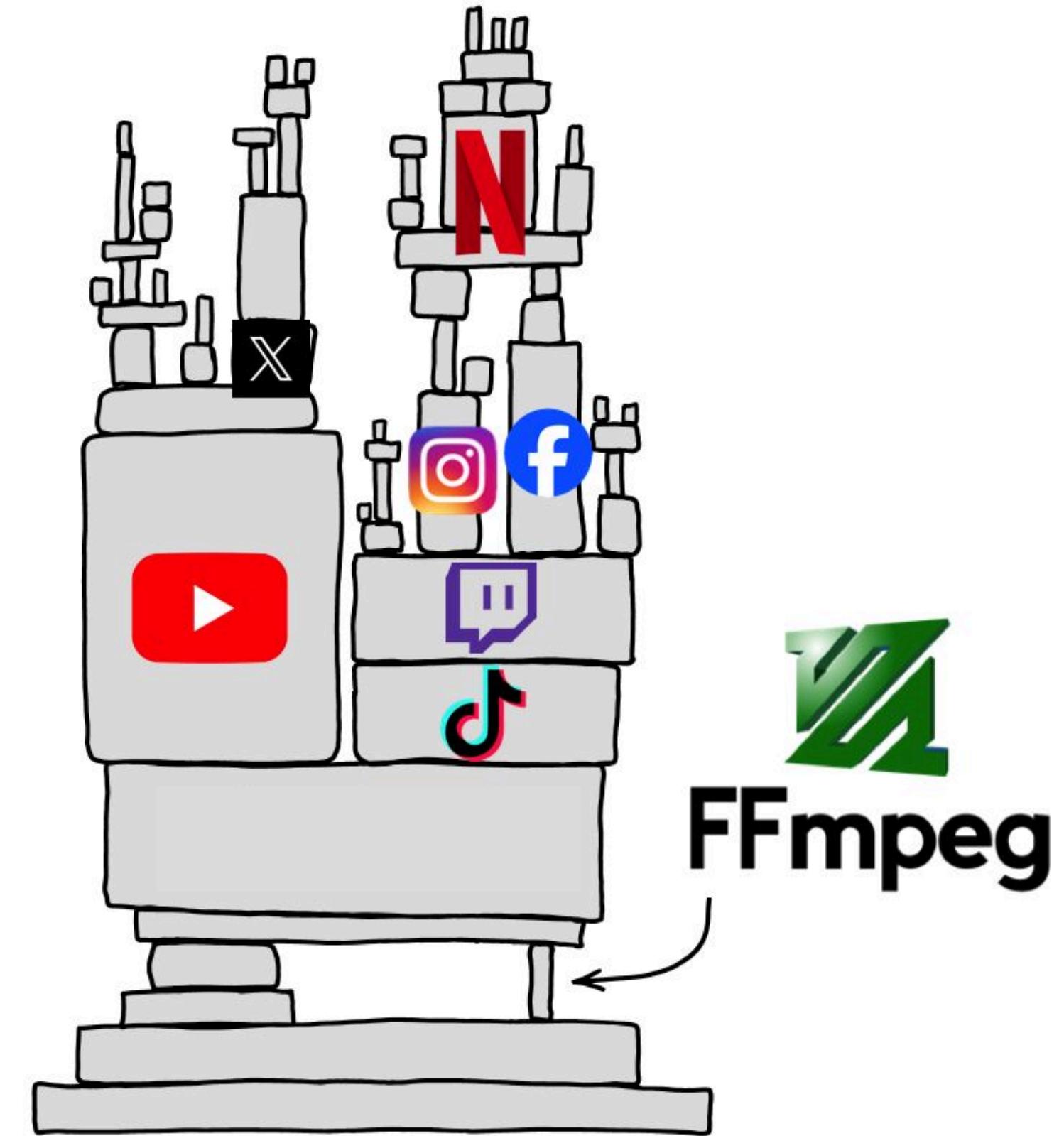
# H264



# FFMPEG

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**Obrigado pela Atenção!**

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