DIGITAL SIGNAL PROCESSING

Processamento Digital de Sinais

Prof. Bruno Zatt
Ruhan Conceição

DIGITAL SIGNAL PROCESSING

Aula 7 - Projeto Dirigido Part. 1

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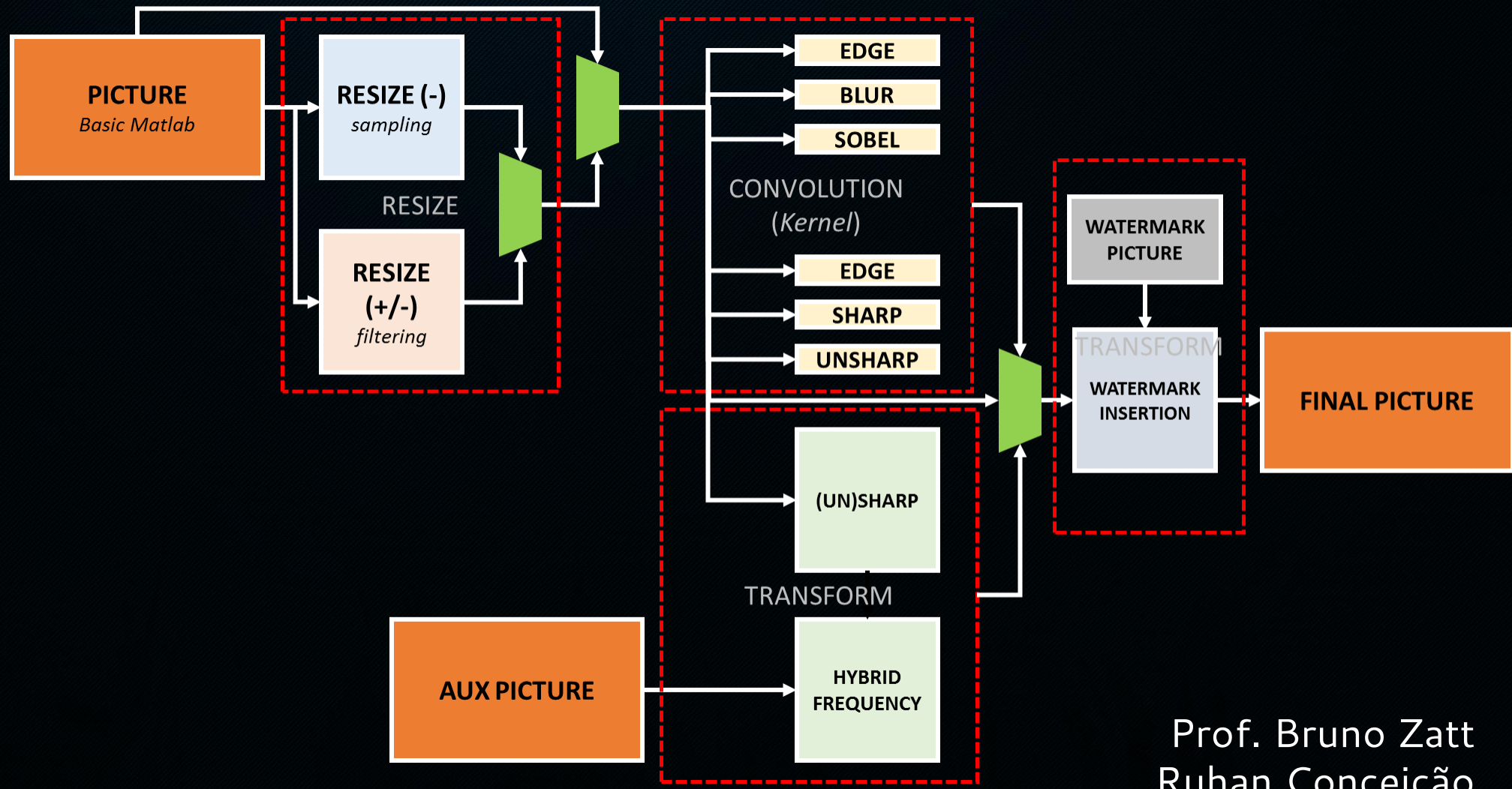
PROJETO A SER DESENVOLVIDO EM AULA



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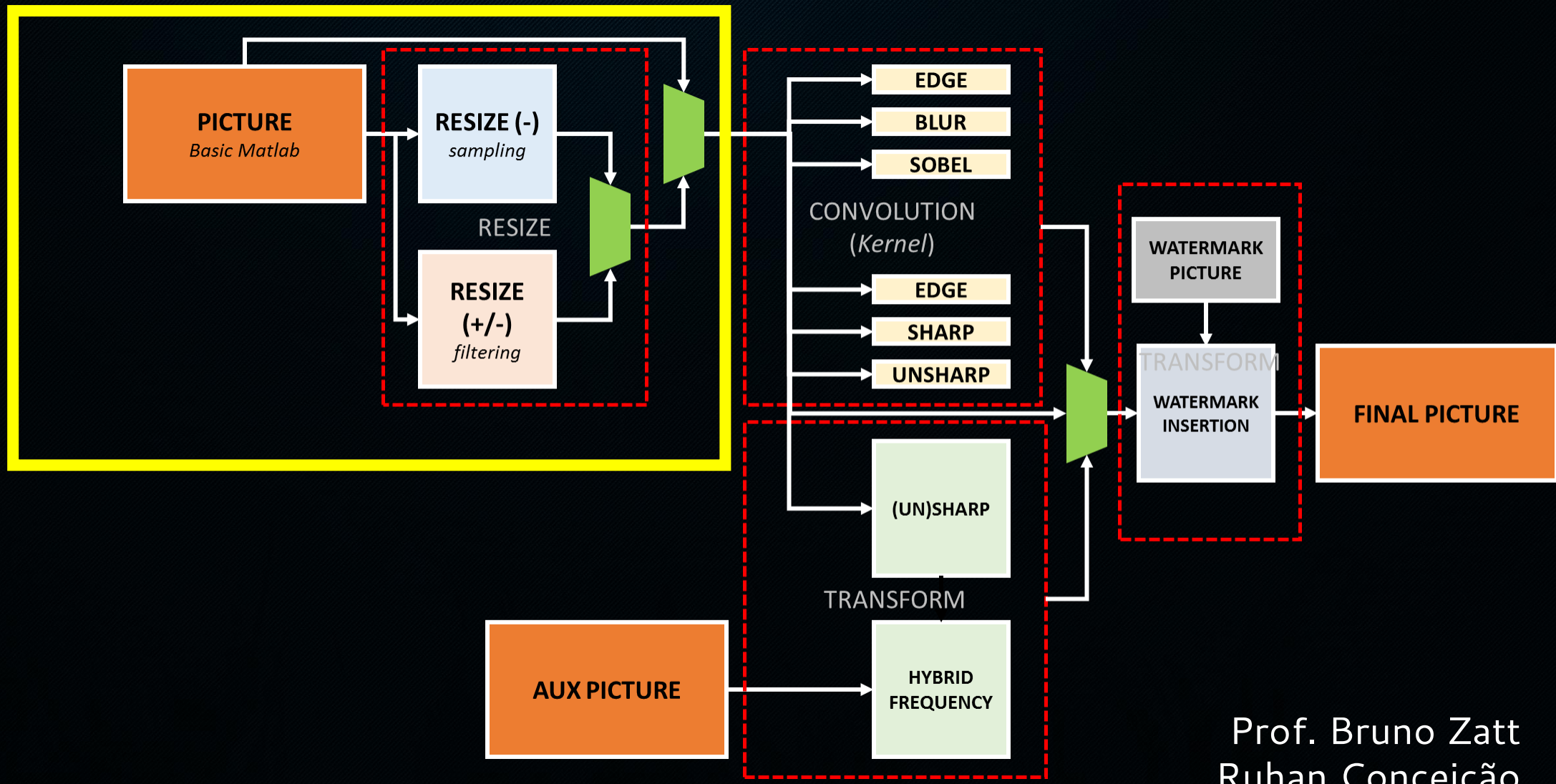
PROJETO A SER DESENVOLVIDO EM AULA



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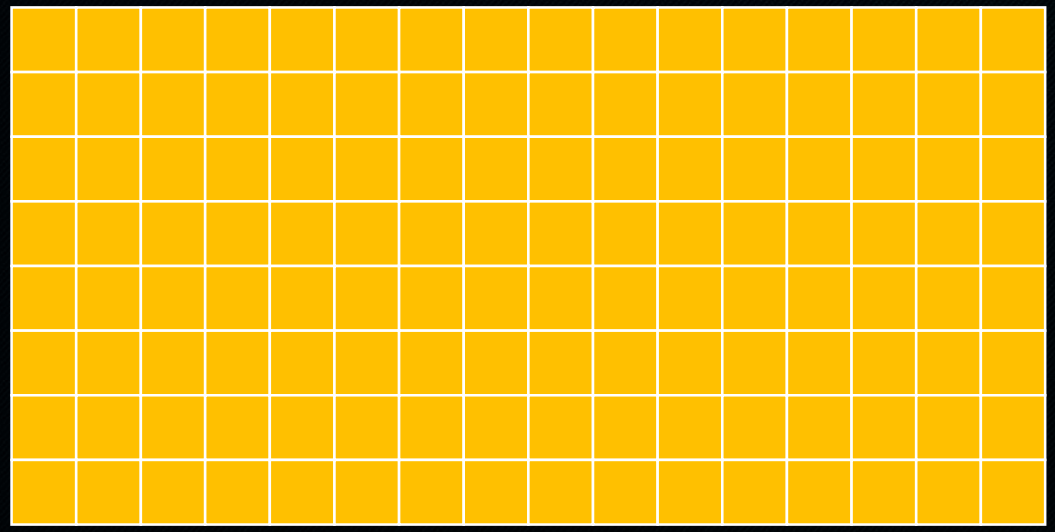
FILTRO DOWNSAMPLING

FILTRO DOWNSAMPLING

Reduz pela metade a resolução da imagem



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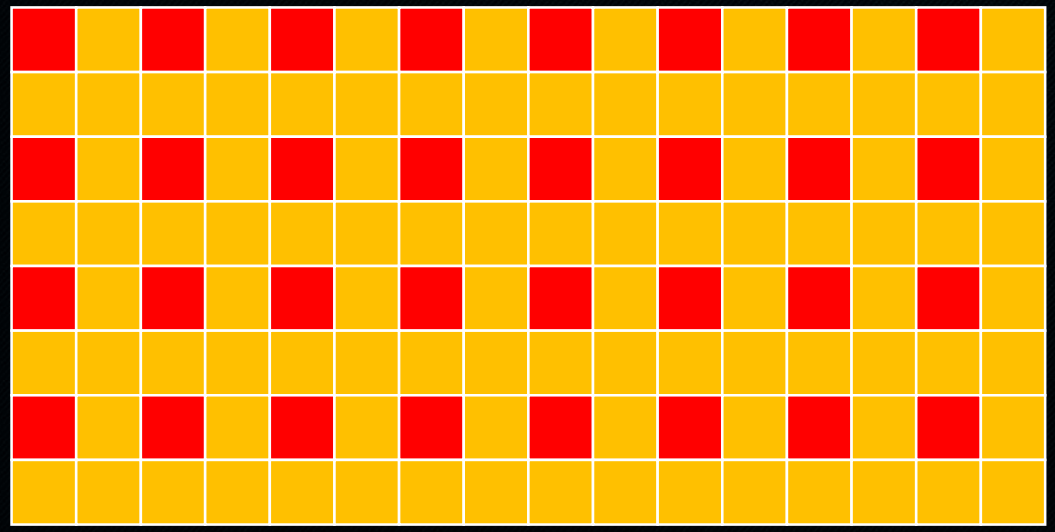
Reduz pela metade a resolução da imagem



FILTRO DOWNSAMPLING

Reduz pela metade a resolução da imagem

FILTRO DOWNSAMPLING

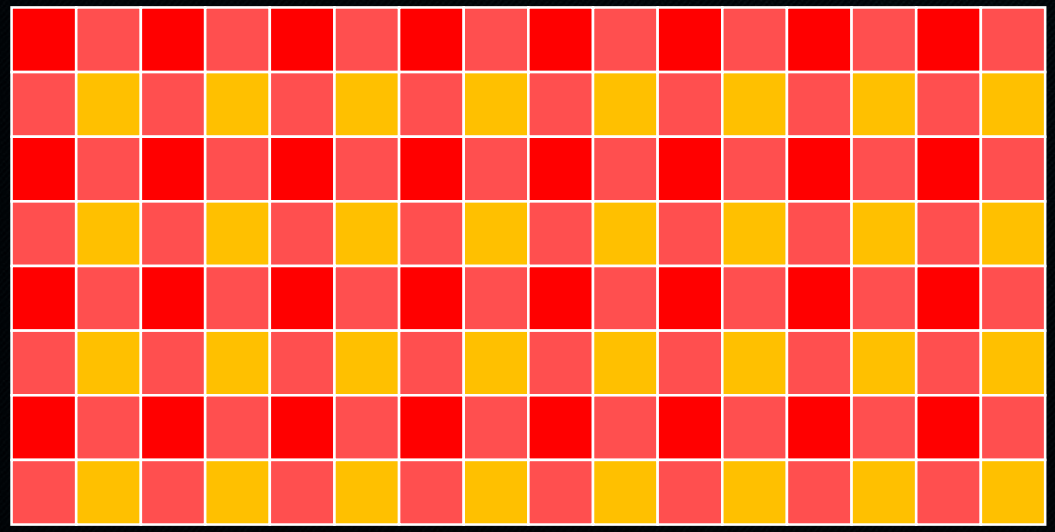
Reduz pela metade a resolução da imagem

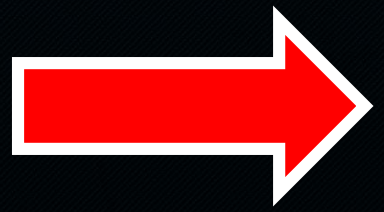
$$y[n] = x[2n]$$

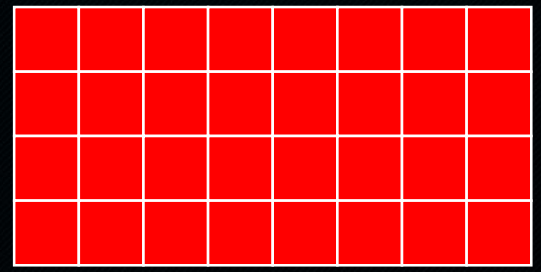
FILTRO DOWNSAMPLING

Reduz pela metade a resolução da imagem

$$y[n] = \frac{1}{2}(x[2n] + x[2n+1])$$



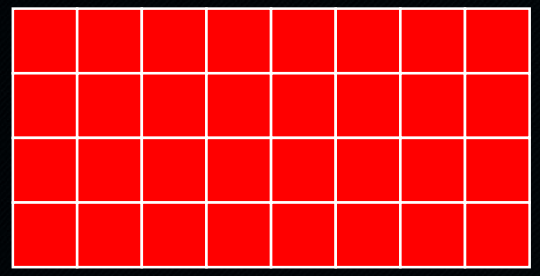




FILTRO UPSAMPLING

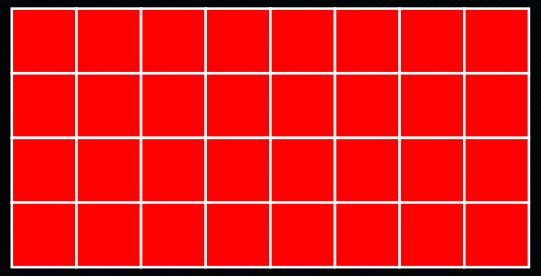
FILTRO DOWNSAMPLING

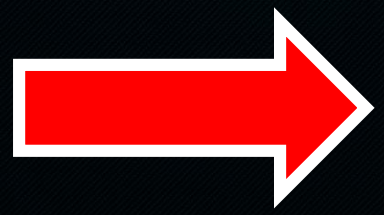
Dobra a resolução da imagem

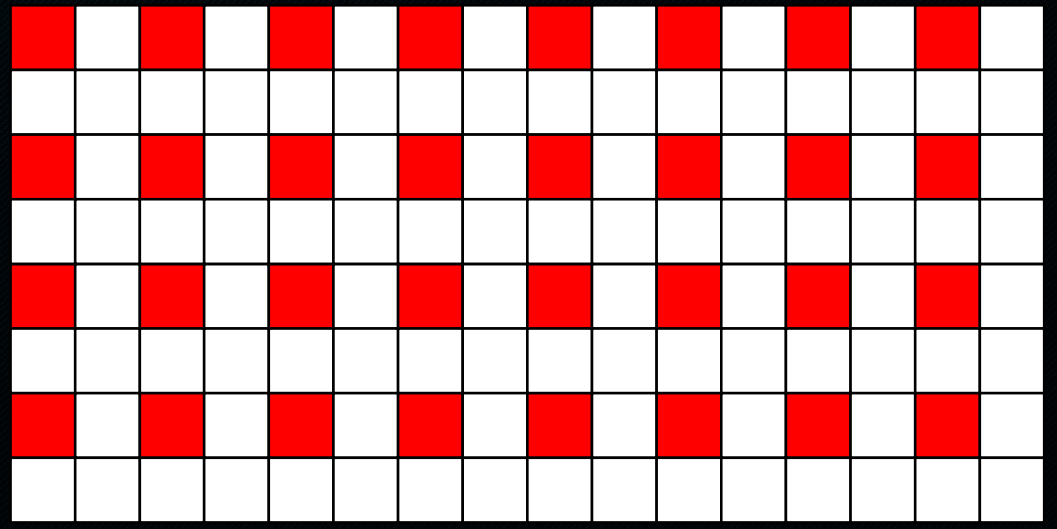


FILTRO DOWNSAMPLING

Dobra a resolução da imagem







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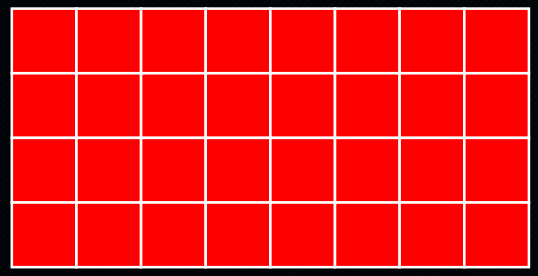
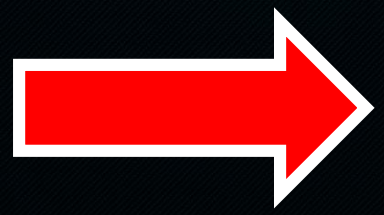
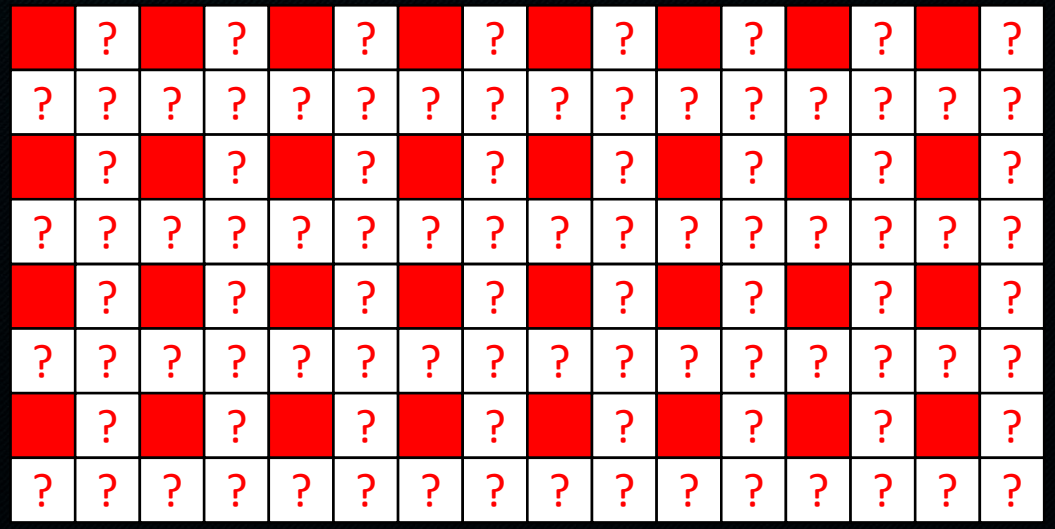






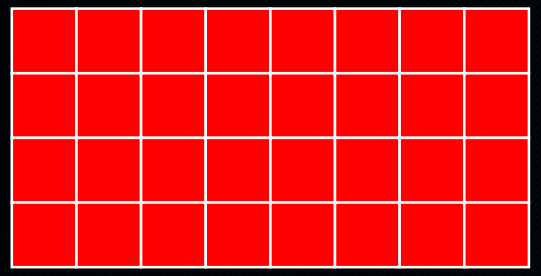
FILTRO UPSAMPLING

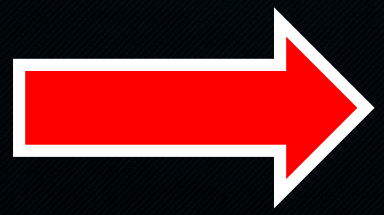
Retentor de Ordem Zero

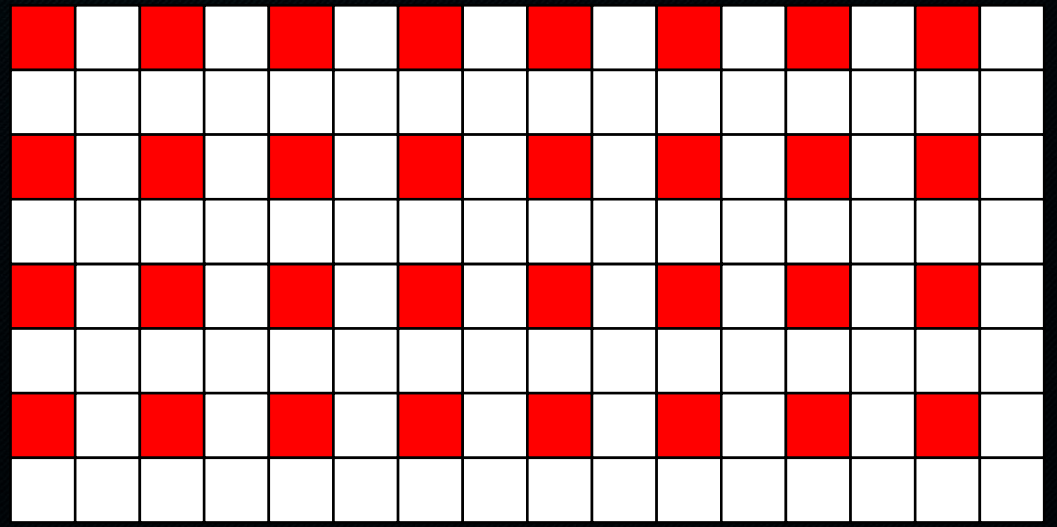
$$y[n] = \begin{cases} x[0.5n], se\ n\ par \\ x[0.5(n-1)], caso\ contrário \end{cases}$$

FILTRO UPSAMPLING

Dobra a resolução da imagem



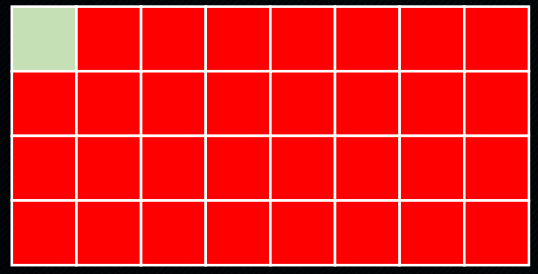


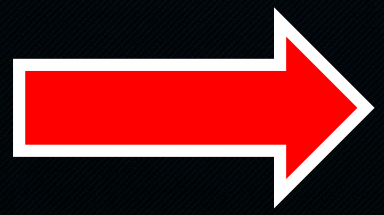


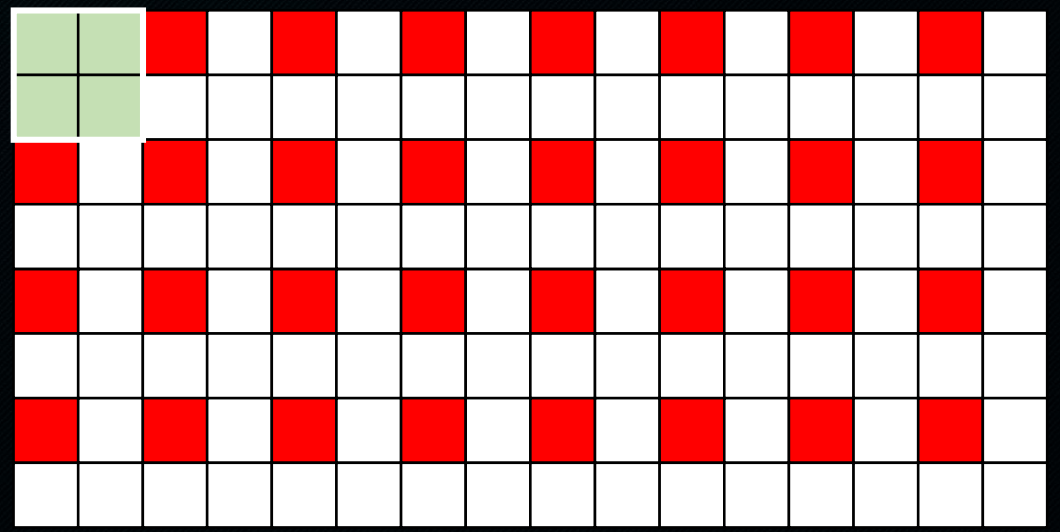
$$y[n] = \begin{cases} x[0.5n], se\ n\ par \\ x[0.5(n-1)], caso\ contrário \end{cases}$$

FILTRO UPSAMPLING

Dobra a resolução da imagem







$$y[n] = \begin{cases} x[0.5n], se\ n\ par \\ x[0.5(n-1)], caso\ contrário \end{cases}$$

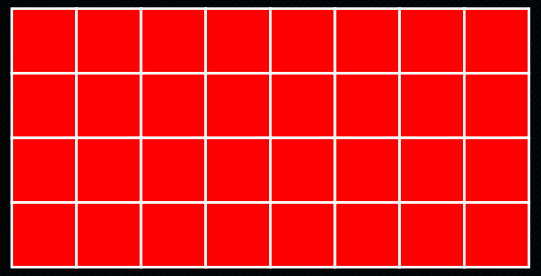
FILTRO UPSAMPLING

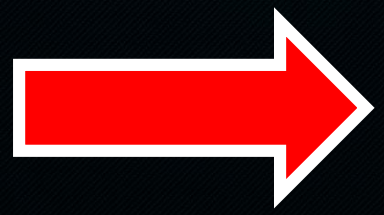
Filtro Interpolador do H.264/AVC

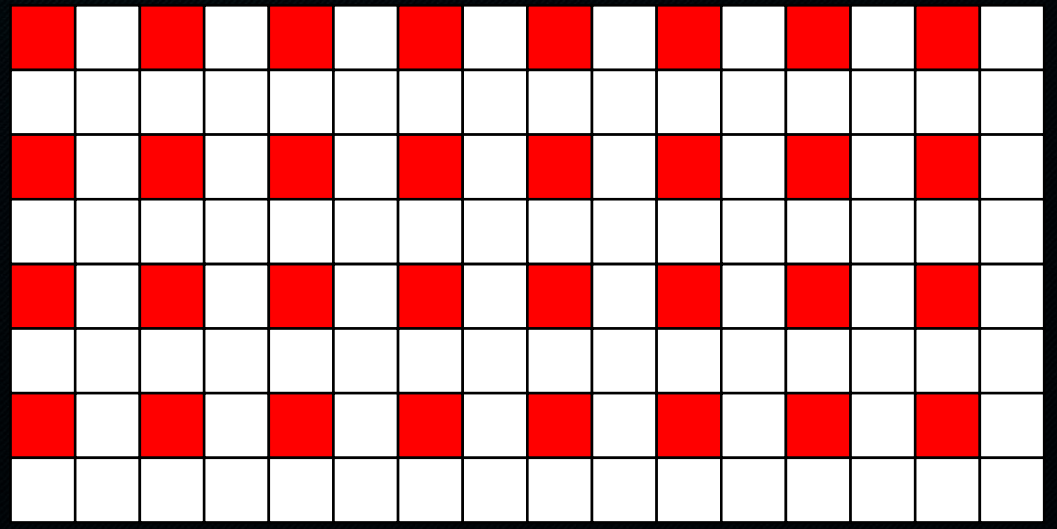
$$y[n] = \begin{cases} x[0.5n], & se\ n\ par \\ \dfrac{x[0.5(n-5)] - 5x[0.5(n-3)] + 20x[0.5(n-1)] + 20x[0.5(n+1)] - 5x[0.5(n+3)] + x[0.5(n+5)]}{32}, & caso\ contrario \end{cases}$$

FILTRO UPSAMPLING

Filtro Interpolador do H.264/AVC

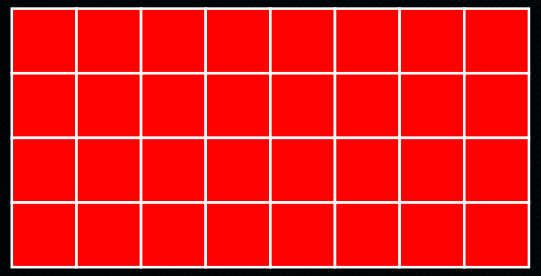


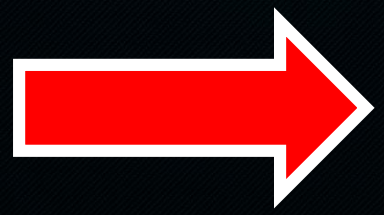


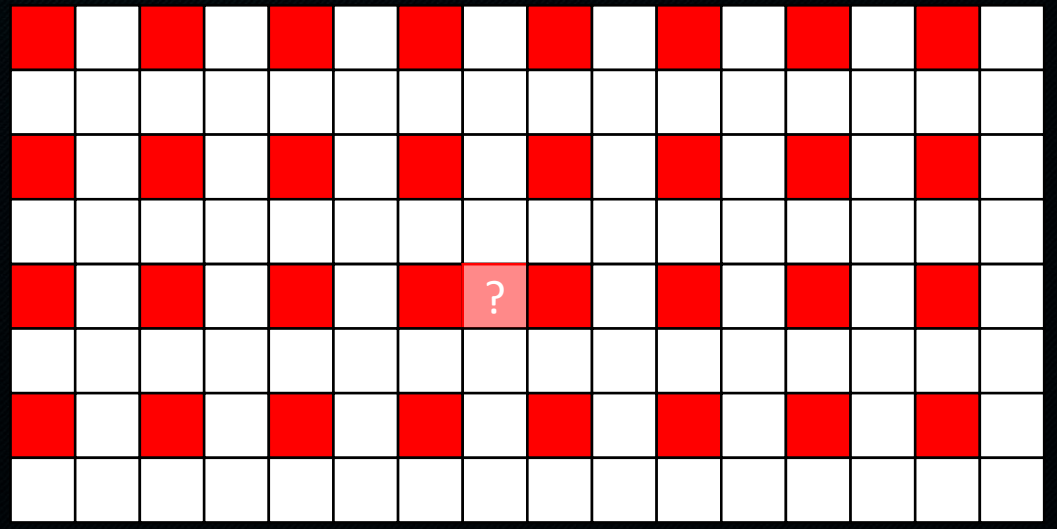


FILTRO UPSAMPLING

Filtro Interpolador do H.264/AVC

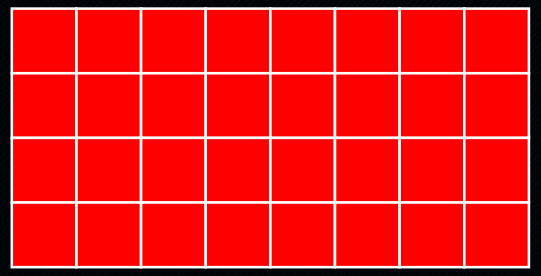


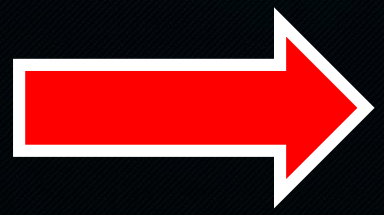


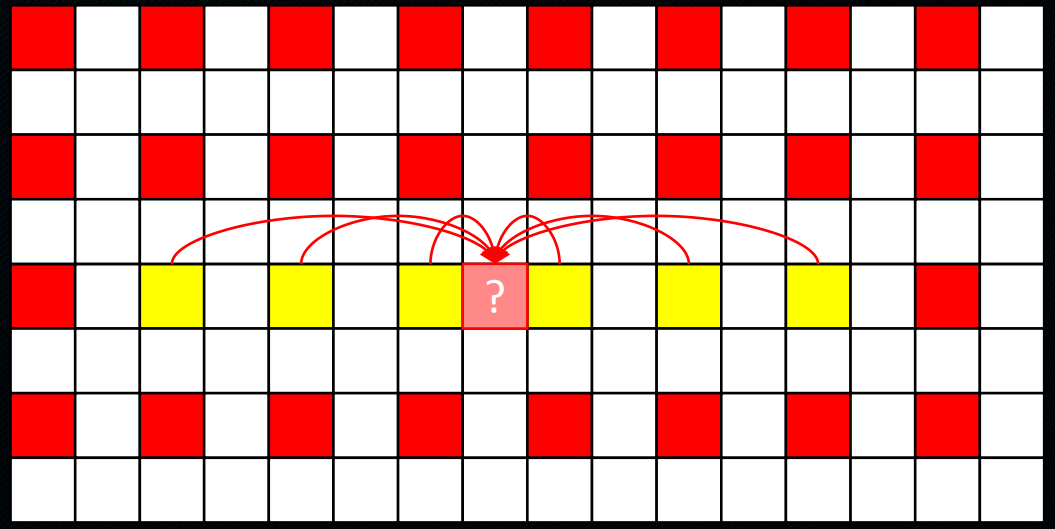


FILTRO UPSAMPLING

Filtro Interpolador do H.264/AVC

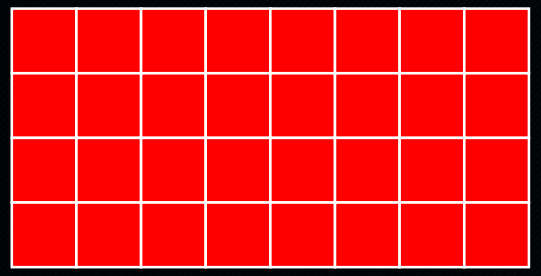


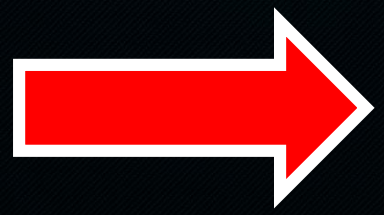


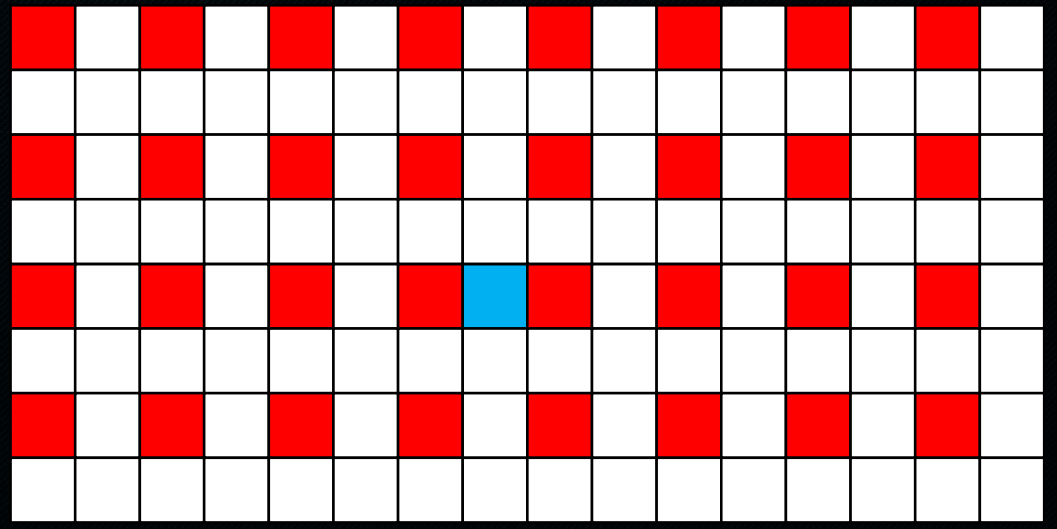


FILTRO UPSAMPLING

Filtro Interpolador do H.264/AVC

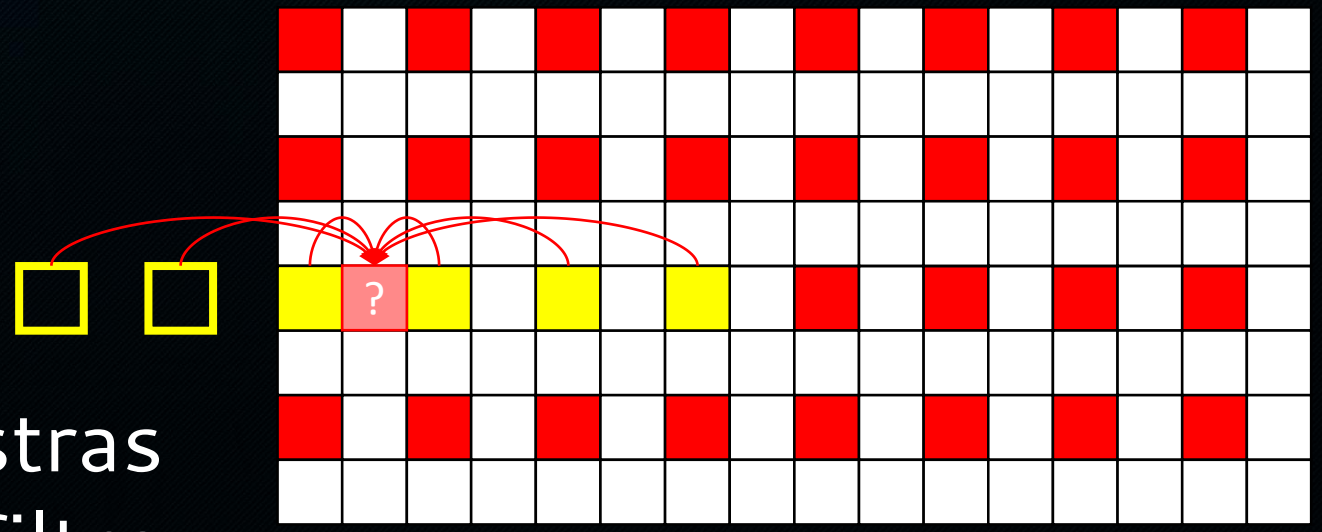






FILTRO UPSAMPLING

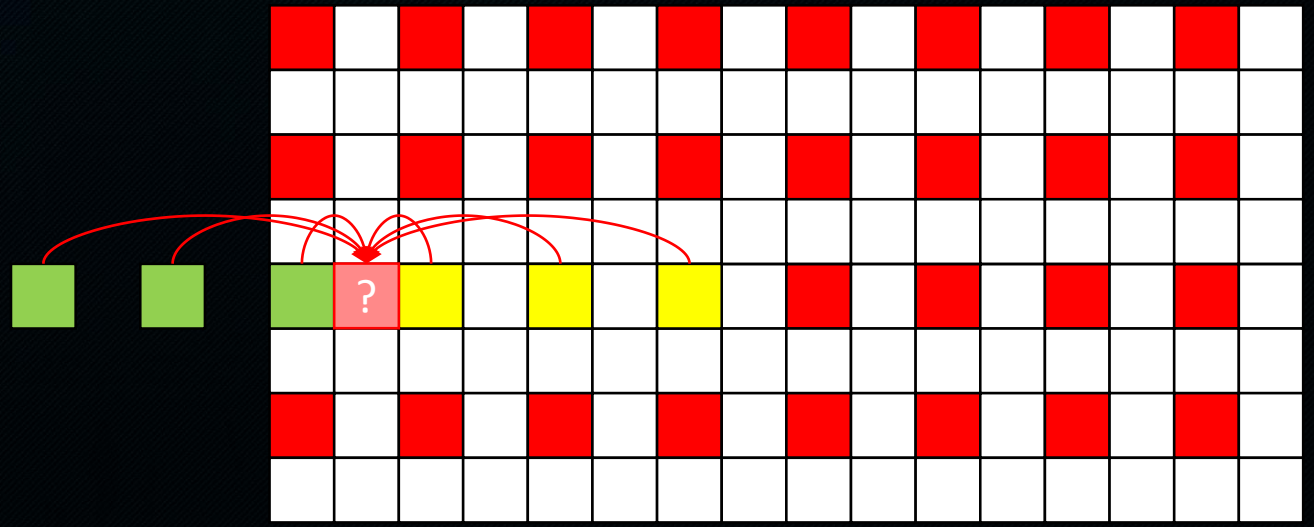
Problema:



Não há amostras
para aplicar o filtro...

FILTRO UPSAMPLING

Solução: extrapolação de borda



NOTA

Embora as equações do sistema sejam dadas em termos de uma variável independente, destaca-se que o processo é aplicado em duas dimensões. Assim, adaptações deverão ser realizadas, tais como aplicar o filtro horizontalmente e verticalmente.

TRABALHO

Matlab

- *Crie quatro funções em Matlab que modifiquem a resolução de uma imagem*
  - *Downsampling com descarte de amostra*
  - *Downsampling aplicando média*
  - *Upsampling com retenção de ordem zero*
  - *Upsampling com filtro de interpolação*

- *Entregar os códigos fonte e um relatório comparando as soluções de downsampling a upsampling*
  - *Prazo de entrega 05/09/2016*

DICAS

Salvar imagem no arquivo

```
>> I = imread(‘lena.png');
>> I2 = rgb2ycbcr(I);
>> I2 = I2(:,:,1);
>> imshow(I)
>> imshow(I2)
>> imwrite(I2,‘lena_gray.png');
```


"That's all Folks!"