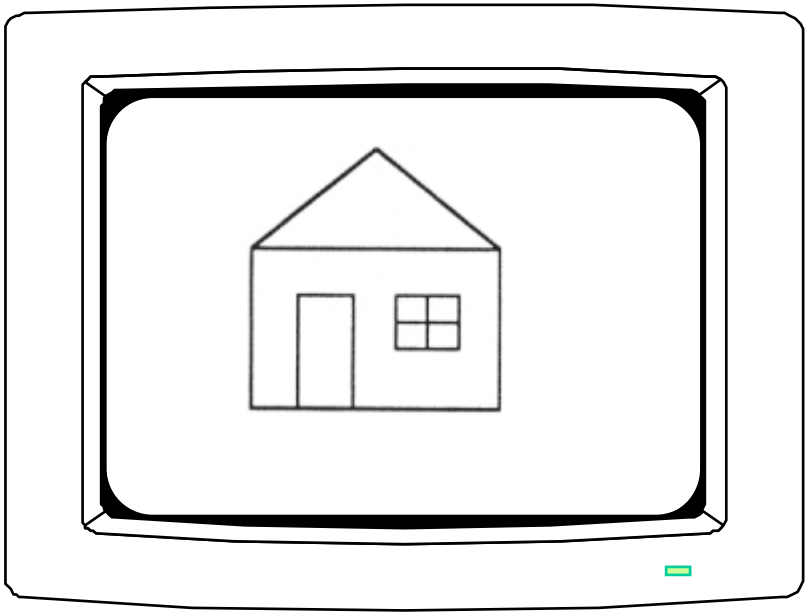
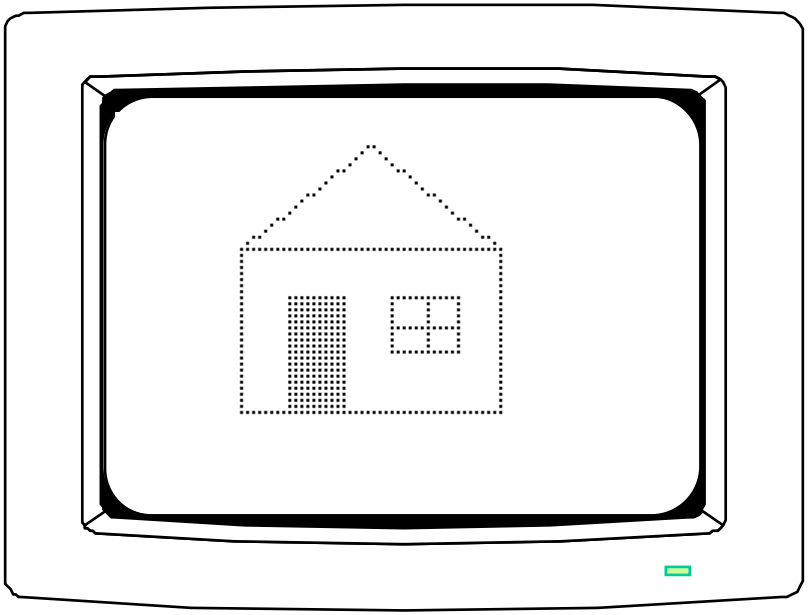
Vector Display



Raster Display



Pen plotter (*traçador*)

DVST

Laser printer

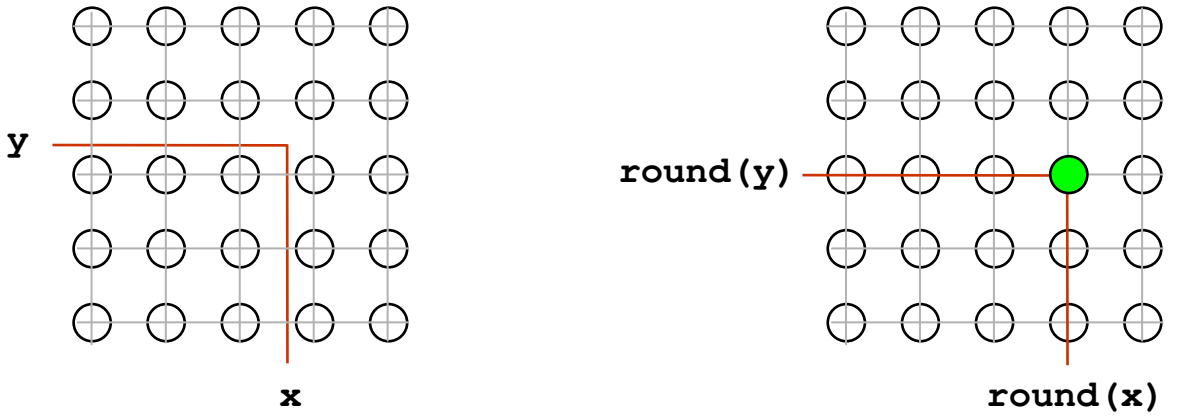
Inkjet printer

Scan Conversion problems

The most obvious attempt to overcome almost all the following side-effects is to deal with a higher resolution.

Aliasing

Plotting a point in a location other than its true location.

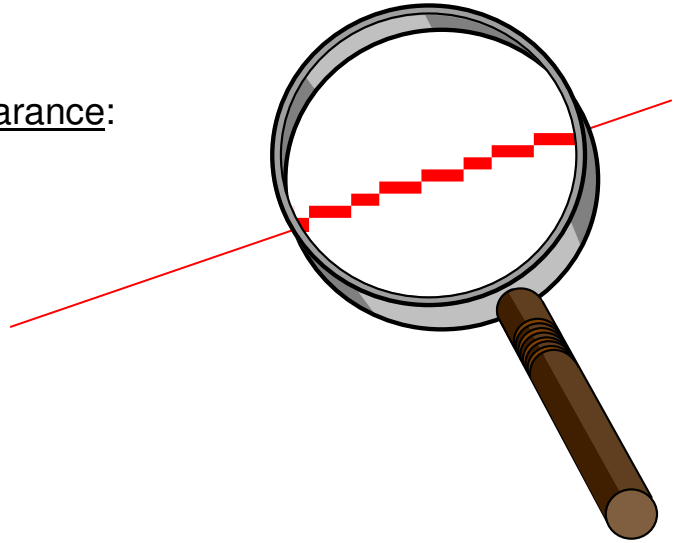


True location

Alias location

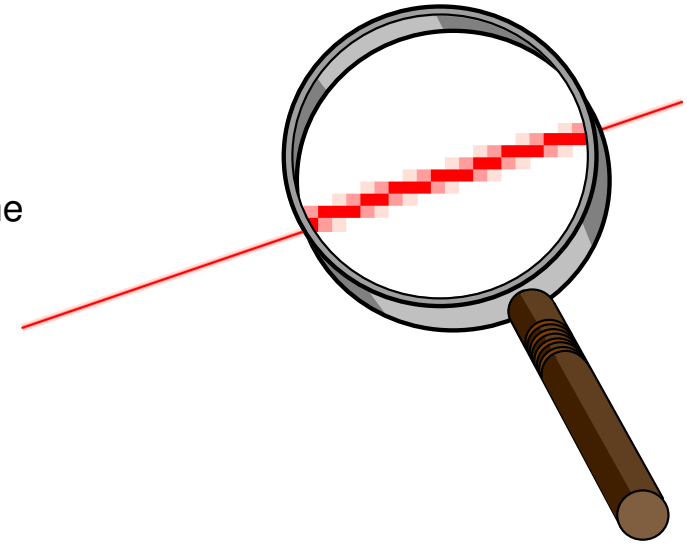
For this reason, lines may have a stair-step appearance:

Efeito de Escada



Antialiasing technique:

Turning on more than one pixel in a column (see Bresenham or Midpoint Line algorithms) by using several intensity levels.
The proper value to be used will be choosen according to a function of the distance between the pixel location and the true location.



Application to TEXT CHARACTERS:

Normal sample in Times New Roman

Zoom in

... and with Antialias

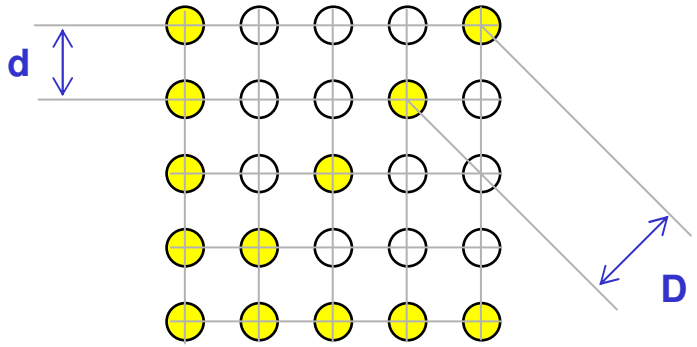
Zoom in

Unequal Intensity

Diagonal lines of pixels appear dimmer than vertical or horizontal lines.

Why?

For the same intensity of light sources, our perception of light also depends on their density.



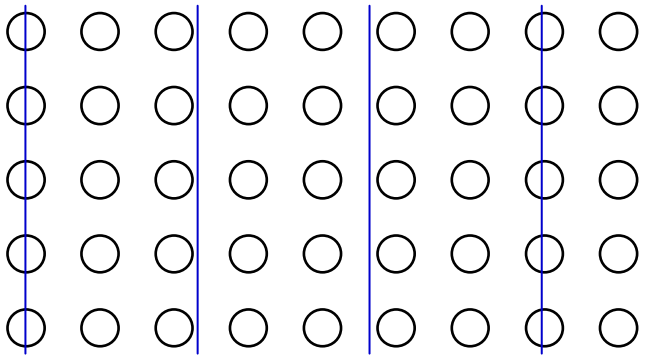
$$D = d\sqrt{2}$$

Picket Fence

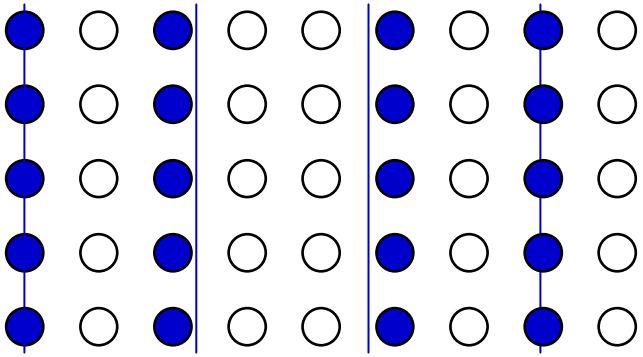
A decision problem about dimensions will occur if an object does not fit exactly into the raster.

Given a picket fence as the original object:

Vedação com estacas (paliçada)
Exemplo em desenho técnico: tracejado

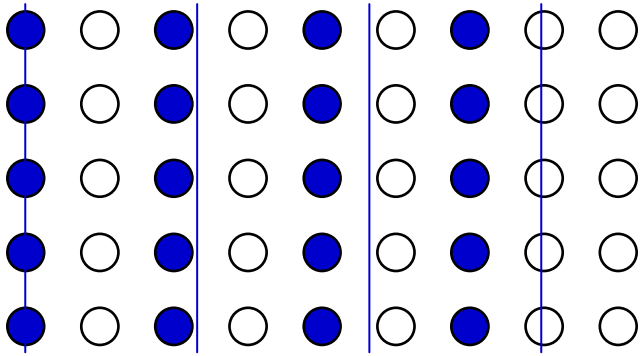


1st solution: **Local Aliasing**



Equal overall length
but different distances between pickets.

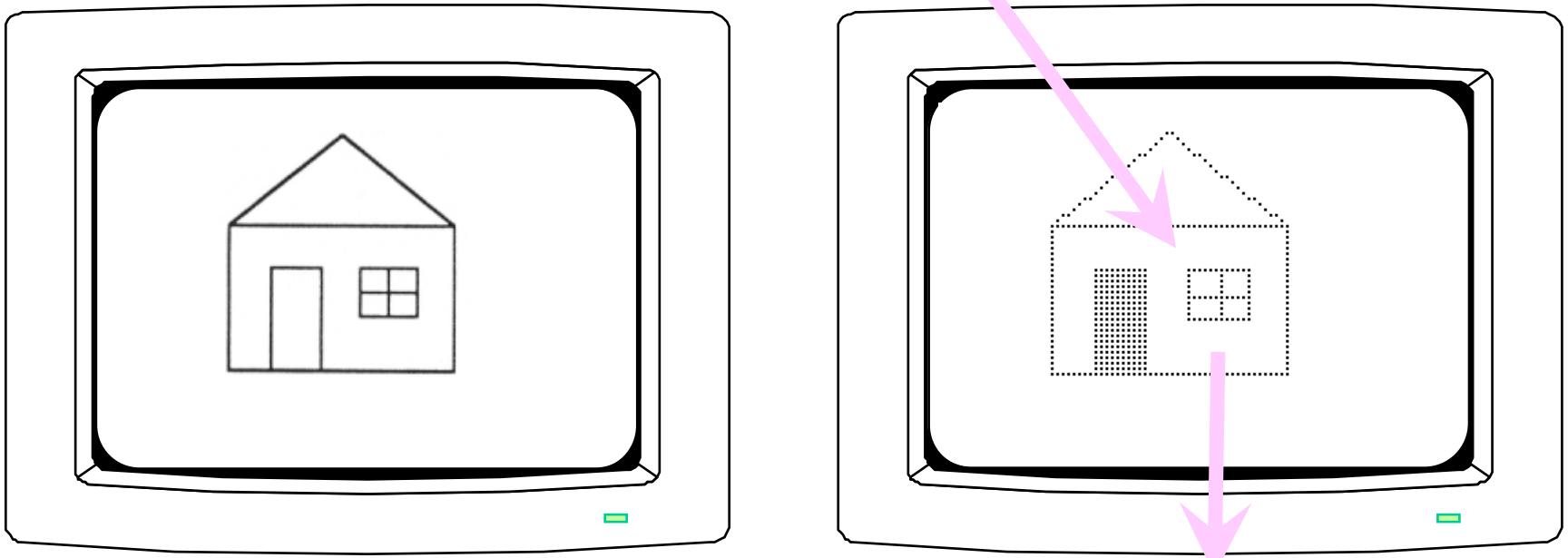
2nd solution: **Global Aliasing**

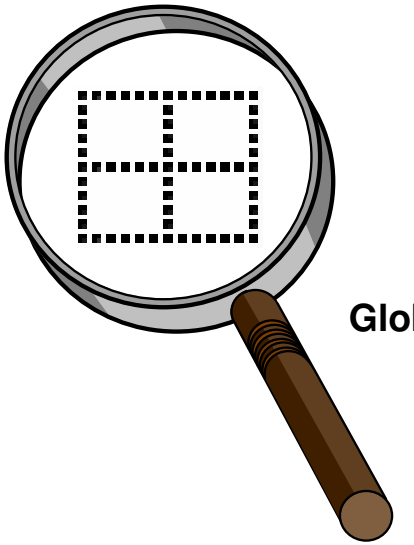


Equal distances between pickets
but different overall length.

M.Próspero

Example

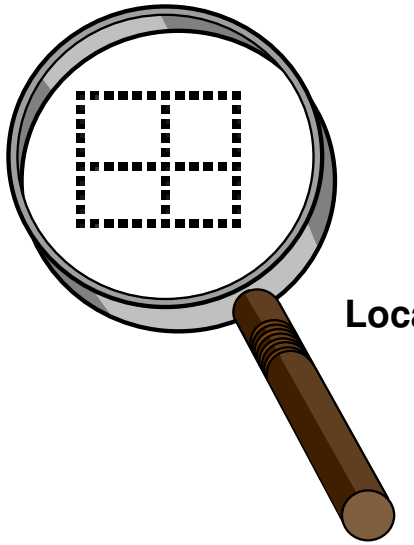




Global Aliasing

Which one

do you prefer?



Local Aliasing

M.Próspero

ANTIALIASING pelo Método da Filtragem

Aplica-se (por pós-processamento) a uma imagem já existente.
Método: o valor de cada pixel contribui, por soma ponderada, para os valores dos pixels vizinhos e na relação inversa da distância.
Este cálculo não é cumulativo, dando resultados bastante aceitáveis tanto para linhas como para polígonos.

Como a menor das vizinhanças é a de pixels adjacentes, o menor dos filtros possíveis é 3x3.

Por exemplo:

	1/36	1/9	1/36
y	1/9	4/9	1/9
	1/36	1/9	1/36

x

Os valores numéricos indicam as ponderações de intensidade de todos os nove pixels para o cálculo da intensidade no pixel ***(x,y)***.

Exemplo de aplicação concreta do filtro 3x3 :

Imagem original:

(com o cálculo de três dos pixels a tratar)

Black=0
White=1

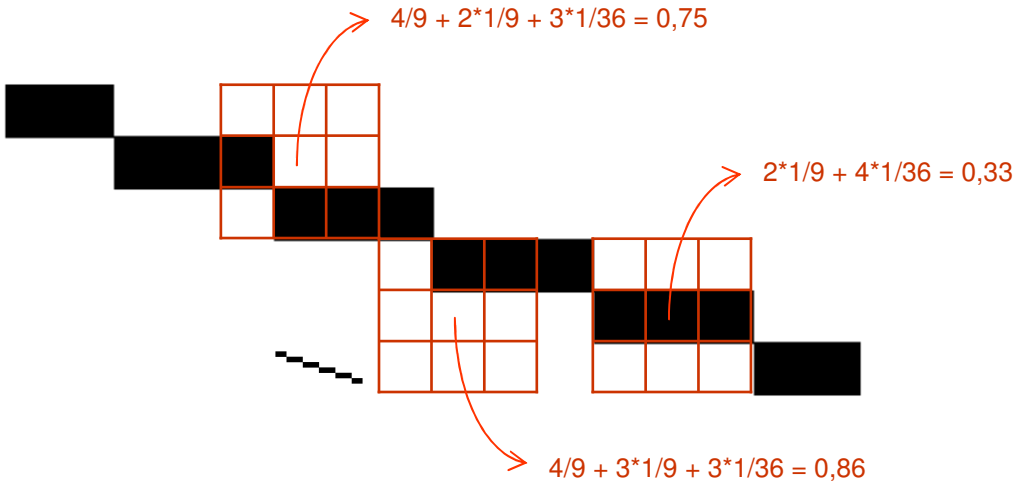


Imagem tratada:

(inconveniente: as linhas finas ficarão mais ténues)