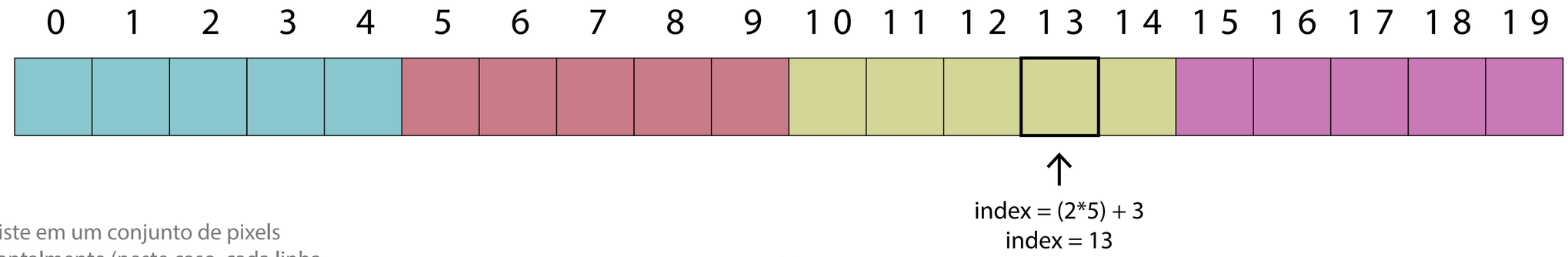


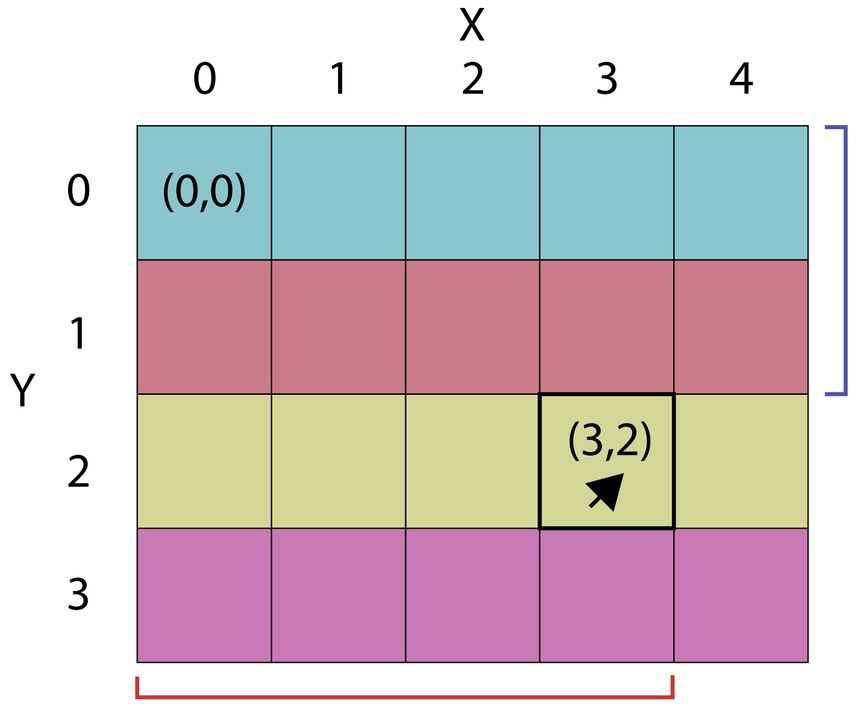

Uma linha consiste em um conjunto de pixels dispostos horizontalmente (neste caso, cada linha possui 5 pixels). Cada linha, portanto, avança 5 indexes em um array de pixels.

Estar na 3ª linha (y=2, a partir da origem 0) significa já ter passado por todos os pixels da 1ª e da 2ª linhas (linhas y=0 e y=1).

Sendo assim, sabemos que já passamos de um total de **2** [linhas] * **5** [pixels em cada linha] casas no array (indexes **0** a **9**).

O valor de x nos dá o deslocamento horizontal na linha em que estamos. Se x for igual a 0 estaremos na primeira casa, à esquerda, da linha. Se x for igual à largura da imagem -1 (lembrando que, se a largura da composição for 5, as coordenadas x vão de 0 a 4, portanto de **0** a **largura-1**), estaremos na última casa dessa linha.

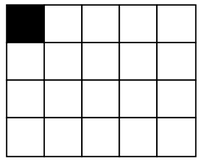
Ao somarmos a coordenada x (**3**) ao cálculo que fizemos anteriormente (**10**), obtemos, como resultado, a coordenada (x,y) traduzida como um index de um array linear; neste caso, **13**.




```
size(5,4);
```

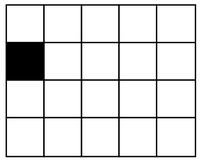
```
int index = (y*width) + x;
```

Cálculo do index em uma matriz linear a partir de uma coordenada (x,y)



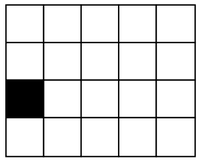
(0,0)

(0*5) + 0 = 0



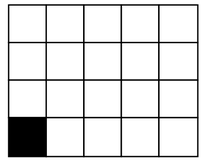
(0,1)

(1*5) + 0 = 5



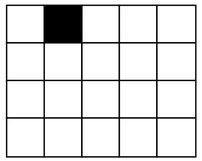
(0,2)

(2*5) + 0 = 10



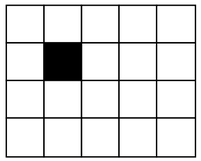
(0,3)

(3*5) + 0 = 15



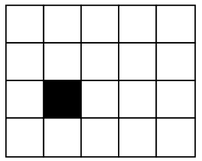
(1,0)

(0*5) + 1 = 1



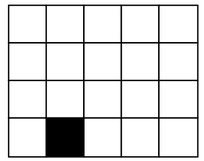
(1,1)

(1*5) + 1 = 6



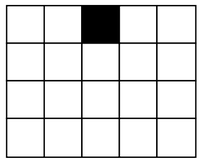
(1,2)

(2*5) + 1 = 11



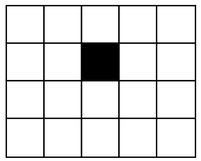
(1,3)

(3*5) + 1 = 16



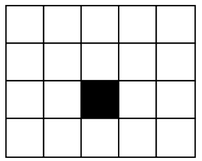
(2,0)

(0*5) + 2 = 2



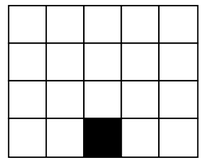
(2,1)

(1*5) + 2 = 7



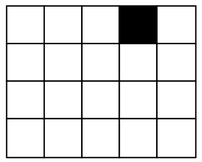
(2,2)

(2*5) + 2 = 12



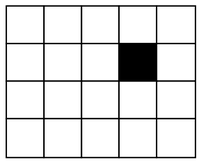
(2,3)

(3*5) + 2 = 17



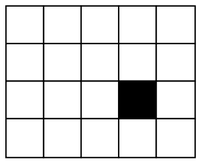
(3,0)

(0*5) + 3 = 3



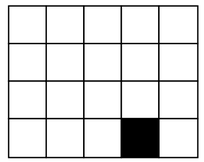
(3,1)

(1*5) + 3 = 8



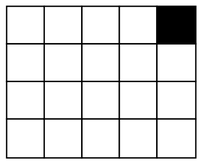
(3,2)

(2*5) + 3 = 13



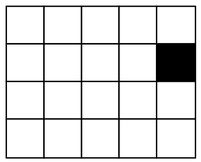
(3,3)

(3*5) + 3 = 18



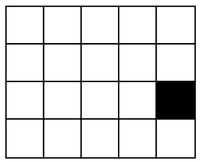
(4,0)

(0*5) + 4 = 4



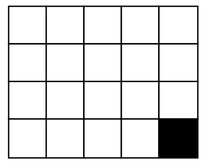
(4,1)

(1*5) + 4 = 9



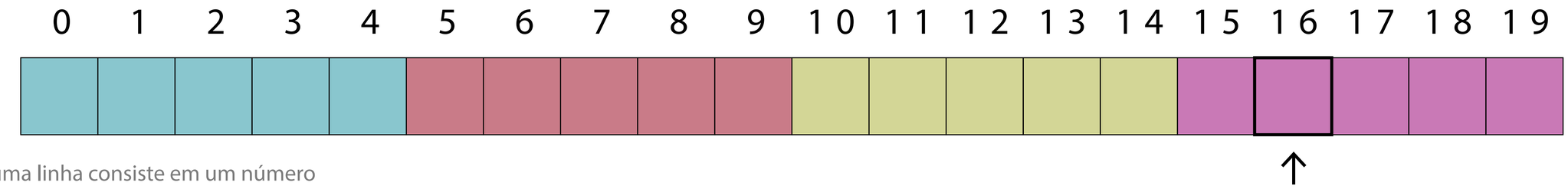
(4,2)

(2*5) + 4 = 14



(4,3)

(3*5) + 4 = 19

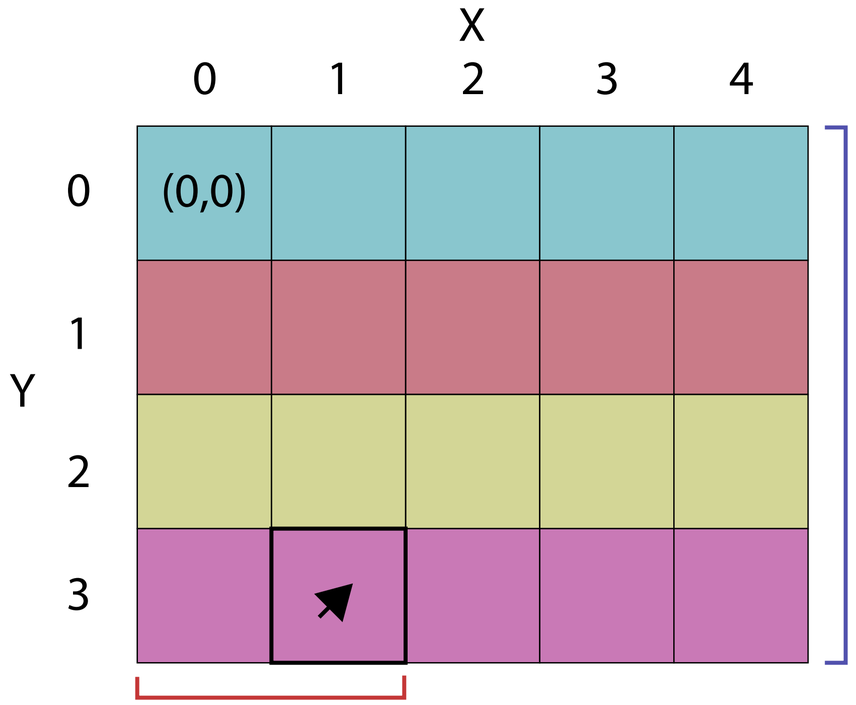



Sabendo que uma linha consiste em um número determinado de pixels dispostos horizontalmente, para descobrirmos a coordenada y de um determinado index de um array, precisamos calcular por quantas linhas já passamos até chegarmos nesse index.

Se dividirmos o index pelo número total de pixels em uma linha [largura da imagem], descobriremos o número de vezes que uma linha completa foi desenhada no array até o index onde estamos. Esse valor deve ser sempre arredondado para baixo. No caso da imagem ao lado, o index **16** dividido pela largura **5** nos dá o resultado **3.2**; ao arredondarmos para baixo, descobrimos a coordenada **y = 3**.

Para descobrirmos o valor de x, precisamos calcular a linha incompleta. No nosso caso, o resto **0.2** da divisão que fizemos consiste no número de pixels que ainda não foram computados como coordenadas.

Utilizamos a função matemática % (módulo) para descobrirmos o resto de uma divisão. No nosso caso, a divisão de 16 [index] por 5 [largura] nos dá o resultado 3, com a sobra de 1. 1 é, portanto, o resultado do cálculo do resto da divisão de 16/5, ou seja, 16%5 = 1. Descobrimos, portanto, que **x=1** neste caso.

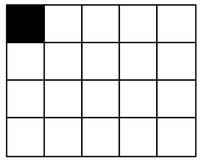



size(5,4);

int x = index%width; int x = 16%5; int x = 1;

int y = floor(index/width); int y = floor(16/5); int y = 3;

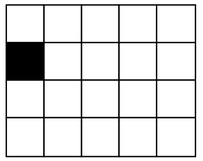
Cálculo de uma coordenada (x,y) a partir do index em uma matriz linear



[0]

x = 0%5
x = 0

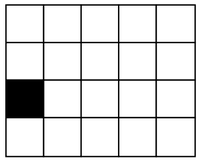
y = 0/5
y = 0



[5]

x = 5%5
x = 0

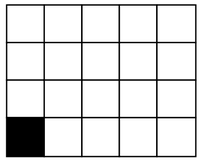
y = 5/5
y = 1



[10]

x = 10%5
x = 0

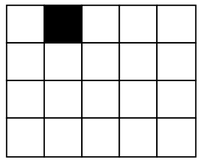
y = 10/5
y = 2



[15]

x = 15%5
x = 0

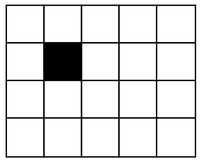
y = 15/5
y = 3



[1]

x = 1%5
x = 1

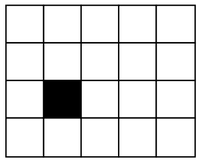
y = 1/5
y = 0



[6]

x = 6%5
x = 1

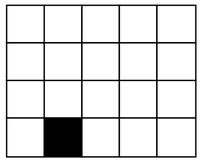
y = 6/5
y = 1



[11]

x = 11%5
x = 1

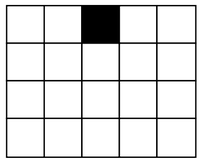
y = 11/5
y = 2



[16]

x = 16%5
x = 1

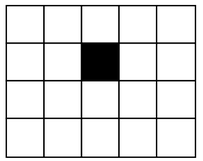
y = 16/5
y = 3



[2]

x = 2%5
x = 2

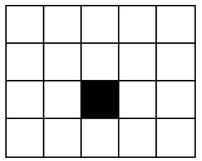
y = 2/5
y = 0



[7]

x = 7%5
x = 2

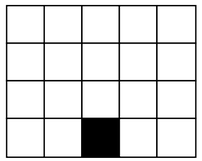
y = 7/5
y = 1



[12]

x = 12%5
x = 2

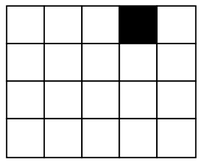
y = 12/5
y = 2



[17]

x = 17%5
x = 2

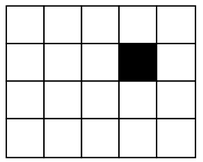
y = 17/5
y = 3



[3]

x = 3%5
x = 3

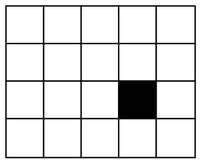
y = 3/5
y = 0



[8]

x = 8%5
x = 3

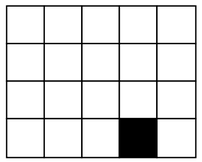
y = 8/5
y = 1



[13]

x = 13%5
x = 3

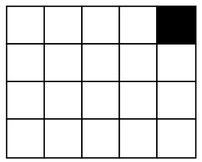
y = 13/5
y = 2



[18]

x = 18%5
x = 3

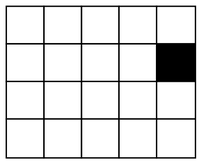
y = 18/5
y = 3



[4]

x = 4%5
x = 4

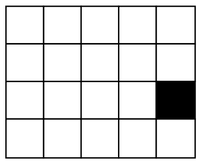
y = 4/5
y = 0



[9]

x = 9%5
x = 4

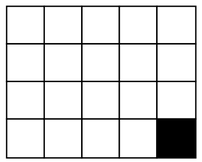
y = 9/5
y = 1



[14]

x = 14%5
x = 4

y = 14/5
y = 2



[19]

x = 19%5
x = 4

y = 19/5
y = 3