```c
enum { CHEIO, PARCIAL };

struct Quad {
    unsigned int id;
    float x, y;              // canto superior esquerdo da região
    float width, height;     // largura e altura da região
    int status;              // CHEIO ou PARCIAL
    unsigned char color[3];  // cor média da região
    struct Quad *NW;         // ponteiros para os filhos, se houver
    struct Quad *NE;
    struct Quad *SW;
    struct Quad *SE;
};

typedef struct Quad QuadNode;
```

QUADTREE

Algorithm steps

For each region / quad node

Implement in constructor?

Allocate memory for grayscale image

Pixel (I_{ij})->char (1byte)

Convert image to grayscale

Iij = 0.3 Rij + 0.59 Gij + 0.11Bij

Calculate average color (Quadnode->color) R + B + G / 3

Calculate histogram

Calculates quantity of pixels in the region (quad node?)

Essentially an array where each index is the pixel value and the integer is the occurrence

Get average (histogram array sum / histogram array size)

Divide by total pixels in quad node

=

$\bar{I}$

Calculate error level

$$E=\sqrt{1 frac \frac{1}{wh}\sum_{i=0}^{w-1}\sum_{j=0}^{h-1}(I_{ij}-\bar{I})^2}$$

W = width
H = height