Questions about Minesweeper Game

Script Input.hs

I found that Graphics.UI.GLUT.Callbacks.Window has the following types and functions:

```
type KeyboardMouseCallback = Key -> KeyState -> Modifiers -> Position -> IO ()    # Source
```
A keyboard/mouse callback

```
keyboardMouseCallback :: SettableStateVar (Maybe KeyboardMouseCallback)    # Source
```
Controls the keyboard/mouse callback for the *current window.* The keyboard/mouse callback for a window is called when the state of a key or mouse button changes. The callback parameters indicate the new state of the key/button, the state of the keyboard modifiers, and the mouse location in window relative coordinates.

Note that this is a convenience function that should not ordinarily be used in conjunction with keyboardCallback, keyboardUpCallback, specialCallback, specialUpCallback, or mouseCallback.

```
type MotionCallback = Position -> IO ()    # Source
```
A motion callback

```
motionCallback :: SettableStateVar (Maybe MotionCallback)    # Source
```
Controls the motion callback for the *current window.* The motion callback for a window is called when the mouse moves within the window while one or more mouse buttons are pressed. The callback parameter indicates the mouse location in window relative coordinates.

- Does your functions "mouseKeyboardCallback" and "mouseMovementCallback" of Input.hs have a relation with this types and function that I found?

Script Game.hs

- How works "fromintegral"? Line 120 - 121.
- Why in the function "placeMines" for "maxMineCount" we have to multiply by 0.75? Line 77.
- I don't know how works the function "placeMines". What is the variable "randGen", "minesX", minesY"?. Line 79.
- Why I have to put "-> game" at the end when I use "case"?. Line 55-69.
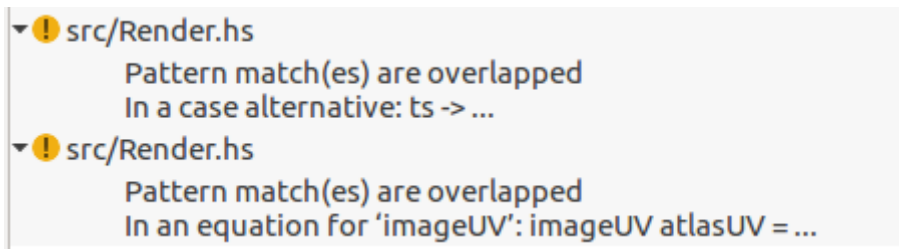
OpenGLUtils.hs

- Did you implemented the function "loadGLTextureFromFile" ? Cause I found on Internet some pages that implemented in the same way. I don't know if its already implemented on another library or you implemented it.

- What does IO TextureObject do in LoadGLTextureFromFile?

- Could you explain the function LoadGLTexture?

- Could you detailed explain this lines from the function "drawTexture"

?

```
renderPrimitive Quads $ do
    tex (u)      (v - vh) >> ver (x)     (y - h) -- Top left coor: (-1, 1)
    tex (u + uw) (v - vh) >> ver (x + w) (y - h)
    tex (u + uw) (v)      >> ver (x + w) (y)....
    tex (u)      (v)      >> ver (x)     (y)....
    where ver x y = vertex (Vertex2 x y :: Vertex2 GLfloat)
          tex u v = texCoord (TexCoord2 u v :: TexCoord2 GLfloat)
```

Script Render.hs

- How works the "display function"?. What are the data types IORef and DisplayCallback for? . Line 13-20 of the script Render.
- Why I need to clear the "ColorBuffer" and "DepthBuffer"? What means these variables? Line 17.
- Why you use "mapM_" and not "mapM"? Line 18.
- What are "color" and "flush" for? Line 19-20.
- In the drawTile function you have done some math operations that I don't undertand. Why the numbers 2, 0.5 and 1/4?. Line 25-29.
- In the function "imageUv" I don't understand how works the dimensions of the images. I mean, the values (1/4, 2/4, 3/4, 0/4). Line 45-49.
- For the state "DigitUV n" I don't understand how it take the respective digit of the image to show. Line 50-52.
- I have two warnings: first in the line 30 to 42, second in the line 45 to 53. The image below shows the warnings.

```
▼❗ src/Render.hs
        Pattern match(es) are overlapped
        In a case alternative: ts -> ...
▼❗ src/Render.hs
        Pattern match(es) are overlapped
        In an equation for 'imageUV': imageUV atlasUV = ...
```

Script Main.hs

- What is the difference of → and ← ?

- Could you explain this part of the code?

```
-- OpenGL configuration
depthFunc $= Just Lequal
blend $= Enabled
blendFunc $= (SrcAlpha, OneMinusSrcAlpha)
normalize $= Enabled
shadeModel $= Smooth
texture Texture2D $= Enabled

-- Callbacks
idleCallback $= Just (do
                        updateGameIO inputState gameIORef
                        postRedisplay Nothing
                        threadDelay 5000)
keyboardMouseCallback $= Just (\k kState kModif mPos -> do
                                            mouseKeyboardCallback inputState k kState kModif mPos
                                            updateGameIO inputState gameIORef
                                            postRedisplay Nothing)
displayCallback $= display gameIORef
motionCallback $= Just (\newMousePos -> do
                                    mouseMovementCallback inputState newMousePos
                                    updateGameIO inputState gameIORef....
                                    postRedisplay Nothing)........................
reshapeCallback $= Just (\(Size x' y') -> do
                                    Graphics.UI.GLUT.windowSize $= Size x' y'
                                    viewport $= ((Position 0 0), (Size x' y'))
                                    modifyIORef' gameIORef (\g -> g {viewportRes = (x', y')}))
passiveMotionCallback $= Just (\newMousePos -> do
                                        mouseMovementCallback inputState newMousePos
                                        updateGameIO inputState gameIORef..
                                        postRedisplay Nothing)

-- First display & Main loop
postRedisplay Nothing
..
mainLoop
```

- I have this error (image below), but the minesweeper runs without problems. I don't know why this message appears. I am using leksah to run the minesweeper.