CS 3005: Programming in C++

Color Table Class

A color table is an array of colors. It is useful for translating a single number in a range into a color, reliably.

We will use a color table to translate Julia set escape values into colors to create images.

Assignment

Create a class named `Color` and one named `ColorTable`. These classes must have the methods listed below, with the specified behaviors.

Programming Requirements

Your `Color` class must store the following data.

- The integer representation of red, green and blue channels of a color.

Your `Color` class must have the following methods.

Constructors and Getters

- `Color();` Sets all color channels to value 0.
- `Color( const int& red, const int& green, const int& blue );` Sets the color channels to the values provided here. No range checking is applied.
- `int getRed( ) const;` Returns the value of the red channel.
- `int getGreen( ) const;` Returns the value of the green channel.
- `int getBlue( ) const;` Returns the value of the blue channel.
- `int getChannel( const int& channel ) const;` Returns the value of the channel-th channel. 0 == red, 1 == green, 2 == blue. Returns -1 if the channel is out of range.

Setters

- `void setRed( const int& value );` Changes the red channel to value. If value is less than 0, do not make any changes.
- `void setGreen( const int& value );` Changes the green channel to value. If value is less than 0, do not make any changes.
- `void setBlue( const int& value );` Changes the blue channel to value. If value is less than 0, do not make any changes.
- `void setChannel( const int& channel, const int& value );` Changes the channel-th channel to value. If value is less than 0, do not make any changes. 0 == red, 1 == green, 2 == blue. Does not make changes if channel is out of range.

Other Methods

- `void invert( const int& max_color_value );` Inverts the red, green and blue channels, using max_color_value. If max_color_value is less than any of the current color channels (red, green or blue), then make no changes.
- `bool operator==( const Color& rhs ) const;` Returns true if *this and rhs have the same color values. Otherwise, returns false.

Your `ColorTable` class must store the following data.

- A linear collection of Colors.

Your `ColorTable` class must have the following methods.

Constructor and Getters

- `ColorTable( const size_t& num_color );` Sizes the Color collection to num_color items.
- `size_t getNumberOfColors( ) const;` Returns the number of Colors stored.

Setters
void setNumberOfColors( const size_t& num_color ); Resizes the collection to hold num_color items. Previous Color contents may or may not be preserved.

Operators

const Color& operator[]( const int& i ) const; Returns the i-th Color in the collection. If i is out of range, returns a static memory Color object with all three channels set to -1.

Color& operator[]( const int& i ); Returns the i-th Color in the collection. If i is out of range, returns a static memory Color object with all three channels set to -1.

Other Methods

void setRandomColor( const int& max_color_value, const size_t& position ); Assigns the position-th color random values for all three channels. The random values are between 0 and max_color_value, inclusive. If position is out of range, no change is made. If max_color_value is less than 0, no change is made.

void insertGradient( const Color& color1, const Color& color2, const size_t& position1, const size_t& position2 ); Change the colors from position1 to position2, inclusive, to be gradients from color1 to color2. If position1 is not less than position2, no change is made.

Additional Documentation

- Consider using the std::vector class template.

Show Off Your Work

To receive credit for this assignment, you must complete the unit tests available in CodeGrinder.