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Program to Change RGB color model to HSV color model

Difficulty Level : Easy   •   Last Updated : 01 Aug, 2022

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Given RGB color range, our task is to convert RGB color to HSV color.
RGB Color Model :
The RGB color model is an additive color model in which red, green and blue light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green, and blue.

HSV Color Model :
HSV – (hue, saturation, value), also known as HSB (hue, saturation, brightness), is often used by artists because it is often more natural to think about a color in terms of hue and saturation than in terms of additive or subtractive color components. HSV is a transformation of an RGB colorspace, and its components and colorimetry are relative to the RGB colorspace from which it was derived.

Examples :

```
Input : r, g, b = 45, 215, 0
Output :
h, s, v = 107.44186046511628, 100.0, 84.31372549019608
```

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```
h, s, v = 114.78260869565217, 44.230769230769226, 20.392156862745097
```

Approach :

1. *Divide r, g, b by 255*
2. *Compute cmax, cmin, difference*
3. *Hue calculation :*
   - *if cmax and cmin equal 0, then h = 0*
   - *if cmax equal r then compute h = (60 * ((g − b) / diff) + 360) % 360*
   - *if cmax equal g then compute h = (60 * ((b − r) / diff) + 120) % 360*
   - *if cmax equal b then compute h = (60 * ((r − g) / diff) + 240) % 360*
4. *Saturation computation :*
   - *if cmax = 0, then s = 0*
   - *if cmax does not equal 0 then compute s = (diff/cmax)*100*
5. *Value computation :*
   - *v = cmax*100*

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Recommended: Please try your approach on *{IDE}* first, before moving on to the solution.

C++

```cpp
// C++ program change RGB Color
// Model to HSV Color Model
#include <bits/stdc++.h>
using namespace std;

void rgb_to_hsv(double r, double g, double b)
{

    // R, G, B values are divided by 255
    // to change the range from 0..255 to 0..1
    r = r / 255.0;
    g = g / 255.0;
    b = b / 255.0;

    // h, s, v = hue, saturation, value
    double cmax = max(r, max(g, b)); // maximum of r, g, b
    double cmin = min(r, min(g, b)); // minimum of r, g, b
    double diff = cmax - cmin; // diff of cmax and cmin.
    double h = -1, s = -1;

    // if cmax and cmax are equal then h = 0
    if (cmax == cmin)
        h = 0;

    // if cmax equal r then compute h
    else if (cmax == r)
        h = fmod(60 * ((g - b) / diff) + 360, 360);

    // if cmax equal g then compute h
    else if (cmax == g)
        h = fmod(60 * ((b - r) / diff) + 120, 360);

    // if cmax equal b then compute h
```

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```cpp
        // if cmax equal zero
        if (cmax == 0)
            s = 0;
        else
            s = (diff / cmax) * 100;

        // compute v
        double v = cmax * 100;
        cout << "(" << h << ", " << s << ", " << v << ")"
            << endl;
}

// Driver Code
int main()
{
    // rgb_to_hsv(45, 215, 0);
    // rgb_to_hsv(31, 52, 29);
    rgb_to_hsv(129, 88, 47);
}

// This code is contributed by phasing17
```

Java ▼

```java
// Java program change RGB Color
// Model to HSV Color Model
class GFG
{

    static void rgb_to_hsv(double r, double g, double b)
    {

        // R, G, B values are divided by 255
        // to change the range from 0..255 to 0..1
        r = r / 255.0;
        g = g / 255.0;
        b = b / 255.0;

        // h, s, v = hue, saturation, value
        double cmax = Math.max(r, Math.max(g, b)); // maximum of r, g, b
        double cmin = Math.min(r, Math.min(g, b)); // minimum of r, g, b
        double diff = cmax - cmin; // diff of cmax and cmin.
        double h = -1, s = -1;

        // if cmax and cmax are equal then h = 0
```

```java
            // if cmax equal r then compute h
            else if (cmax == r)
                h = (60 * ((g - b) / diff) + 360) % 360;

            // if cmax equal g then compute h
            else if (cmax == g)
                h = (60 * ((b - r) / diff) + 120) % 360;

            // if cmax equal b then compute h
            else if (cmax == b)
                h = (60 * ((r - g) / diff) + 240) % 360;

            // if cmax equal zero
            if (cmax == 0)
                s = 0;
            else
                s = (diff / cmax) * 100;

            // compute v
            double v = cmax * 100;
            System.out.println("(" + h + " " + s + " " + v + ")");

    }

    // Driver Code
    public static void main(String[] args)
    {
        // rgb_to_hsv(45, 215, 0);
        // rgb_to_hsv(31, 52, 29);
        rgb_to_hsv(129, 88, 47);

    }
}

// This code is contributed by PrinciRaj1992
```

Python3

```python
# Python3 program change RGB Color
# Model to HSV Color Model

def rgb_to_hsv(r, g, b):

    # R, G, B values are divided by 255
    # to change the range from 0..255 to 0..1:
```

```python
    cmax = max(r, g, b)      # maximum of r, g, b
    cmin = min(r, g, b)      # minimum of r, g, b
    diff = cmax-cmin         # diff of cmax and cmin.

    # if cmax and cmax are equal then h = 0
    if cmax == cmin:
        h = 0

    # if cmax equal r then compute h
    elif cmax == r:
        h = (60 * ((g - b) / diff) + 360) % 360

    # if cmax equal g then compute h
    elif cmax == g:
        h = (60 * ((b - r) / diff) + 120) % 360

    # if cmax equal b then compute h
    elif cmax == b:
        h = (60 * ((r - g) / diff) + 240) % 360

    # if cmax equal zero
    if cmax == 0:
        s = 0
    else:
        s = (diff / cmax) * 100

    # compute v
    v = cmax * 100
    return h, s, v


''' Driver Code '''
# print(rgb_to_hsv(45, 215, 0))
# print(rgb_to_hsv(31, 52, 29))

print(rgb_to_hsv(129, 88, 47))
```

C#

```csharp
// C# program change RGB Color
// Model to HSV Color Model
using System;

class GFG
```

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```csharp
        // R, G, B values are divided by 255
        // to change the range from 0..255 to 0..1
        r = r / 255.0;
        g = g / 255.0;
        b = b / 255.0;

        // h, s, v = hue, saturation, value
        double cmax = Math.Max(r, Math.Max(g, b)); // maximum of r, g, b
        double cmin = Math.Min(r, Math.Min(g, b)); // minimum of r, g, b
        double diff = cmax - cmin; // diff of cmax and cmin.
        double h = -1, s = -1;

        // if cmax and cmax are equal then h = 0
        if (cmax == cmin)
            h = 0;

        // if cmax equal r then compute h
        else if (cmax == r)
            h = (60 * ((g - b) / diff) + 360) % 360;

        // if cmax equal g then compute h
        else if (cmax == g)
            h = (60 * ((b - r) / diff) + 120) % 360;

        // if cmax equal b then compute h
        else if (cmax == b)
            h = (60 * ((r - g) / diff) + 240) % 360;

        // if cmax equal zero
        if (cmax == 0)
            s = 0;
        else
            s = (diff / cmax) * 100;

        // compute v
        double v = cmax * 100;
        Console.WriteLine("(" + h + " " + s + " " + v + ")");

    }

    // Driver Code
    public static void Main(String[] args)
    {
        // rgb_to_hsv(45, 215, 0);
        // rgb_to_hsv(31, 52, 29);
        rgb_to_hsv(129, 88, 47);
```

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```javascript
// This code is contributed by Rajput-Ji
```

Javascript ▼

```javascript
<script>
// javascript program change RGB Color
// Model to HSV Color Model
function rgb_to_hsv(r , g , b) {

        // R, G, B values are divided by 255
        // to change the range from 0..255 to 0..1
        r = r / 255.0;
        g = g / 255.0;
        b = b / 255.0;

        // h, s, v = hue, saturation, value
        var cmax = Math.max(r, Math.max(g, b)); // maximum of r, g, b
        var cmin = Math.min(r, Math.min(g, b)); // minimum of r, g, b
        var diff = cmax - cmin; // diff of cmax and cmin.
        var h = -1, s = -1;

        // if cmax and cmax are equal then h = 0
        if (cmax == cmin)
            h = 0;

        // if cmax equal r then compute h
        else if (cmax == r)
            h = (60 * ((g - b) / diff) + 360) % 360;

        // if cmax equal g then compute h
        else if (cmax == g)
            h = (60 * ((b - r) / diff) + 120) % 360;

        // if cmax equal b then compute h
        else if (cmax == b)
            h = (60 * ((r - g) / diff) + 240) % 360;

        // if cmax equal zero
        if (cmax == 0)
            s = 0;
        else
            s = (diff / cmax) * 100;

        // compute v
```

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```
    }

    // Driver Code

        // rgb_to_hsv(45, 215, 0);
        // rgb_to_hsv(31, 52, 29);
        rgb_to_hsv(129, 88, 47);


// This code is contributed by todaysgaurav
</script>
```

Output :

```
(30.0, 63.56589147286821, 50.588235294117645)
```

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