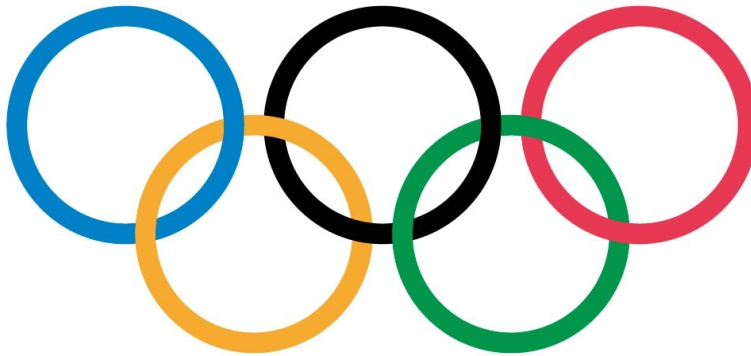


# Designing the Olympic Rings from Scratch

Fletcher Porter

I've been told that the colors of the Olympic Rings logo are meant to represent the colors of all of the flags in the world, but does it really? There are many colors besides blue, yellow, black, green, red, and white that you could potentially see on flags, so is this logo really representative? Let's find out!



Mathematica has data for all the flags in the world (or at least 249 of them) easy to use for my purpose. Here are the first 10 alphabetically. Note that this dataset has some weird features, such as including some territories that are not independent, such as Åland, but not others, like Alabama.

```
In[4]:= (Transpose@ (CountryData["all countries, dependencies, and territories", "COUNTRIES"] /@ { "name", "flag" } )) [[
1 ;; 10]] // TableForm
```

Out[4]/TableForm=

Afghanistan



Åland Islands



Albania



Algeria



American Samoa



Andorra



Angola



Anguilla



Antigua and Barbuda



Argentina



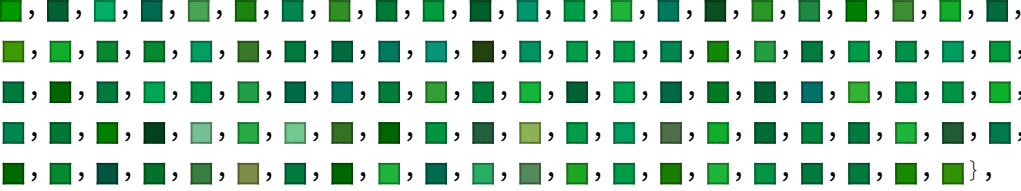
To find what colors the flags are, Mathematica has a method `DominantColors[]` which will find the principal colors in any image. I'll assume here that it'll pull exactly the colors that we want. I'll also won't show the colors that come up in this step since we'll see all the colors in a more interesting way shortly.

```
In[6]:= flagColors =
  Flatten[DominantColors /@  all countries, dependencies, and territories COUNTRIES [  ]];
```

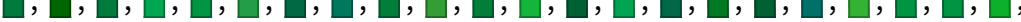
To get the colors for the logo, I'll use `FindClusters[]` to bin all of the colors I have into 6 groups of similar colors. To make the data turn out nicely, I also need to remove the alpha channel from each of these colors, which I'd say is reasonable considering flags ideally aren't transparent.

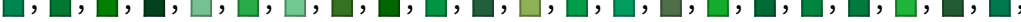
```
In[8]:= colorClusters =
```

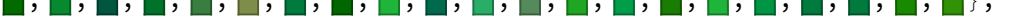
```
FindClusters[flagColors /. RGBColor[r_, g_, b_, _] → RGBColor[r, g, b], 6]
```

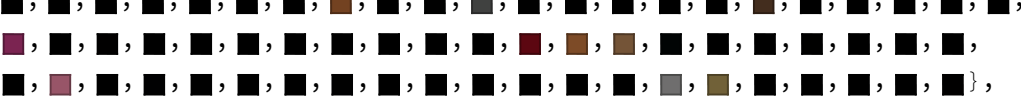
```
Out[8]= { {,  

,  

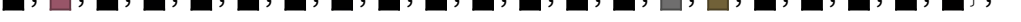
,  

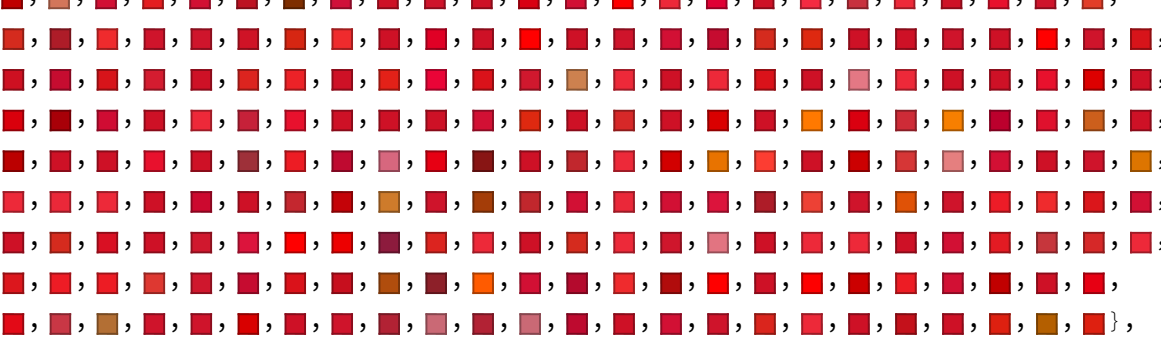
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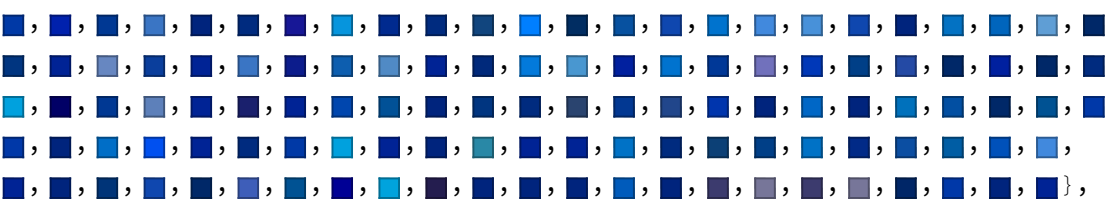
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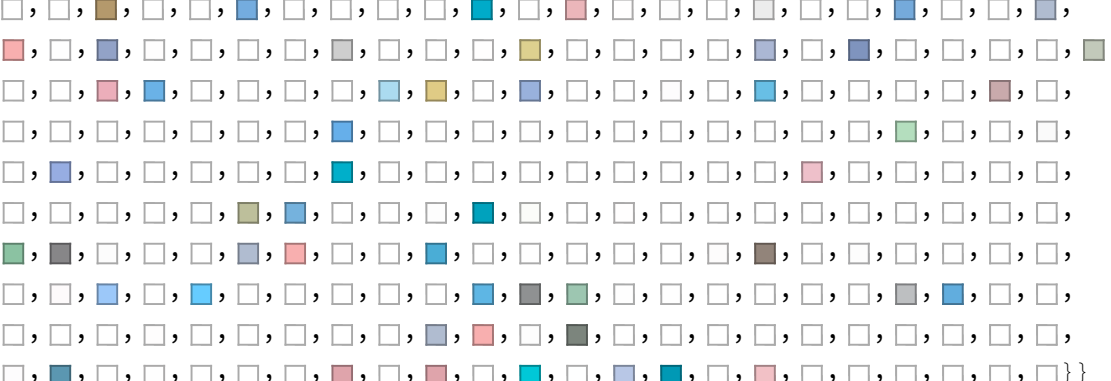
},  

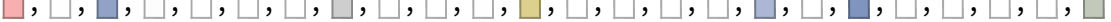
{,  

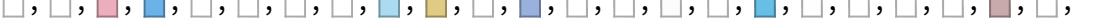
,  

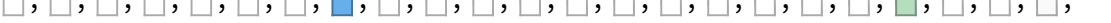
,  

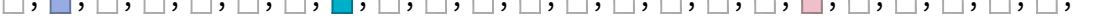
},  

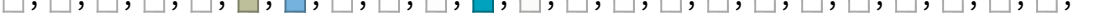
{,  

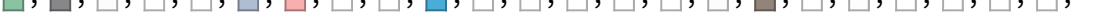
,  

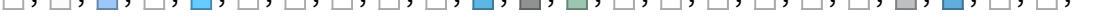
,  

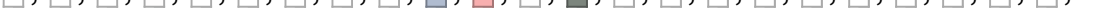
,  

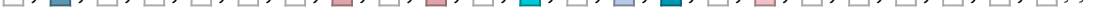
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}
```

Clustering the colors didn't actually yield a list of colors for the rings. To get that, we need to find a color typical of each of the clusters. Because the color distribution within each cluster is likely not

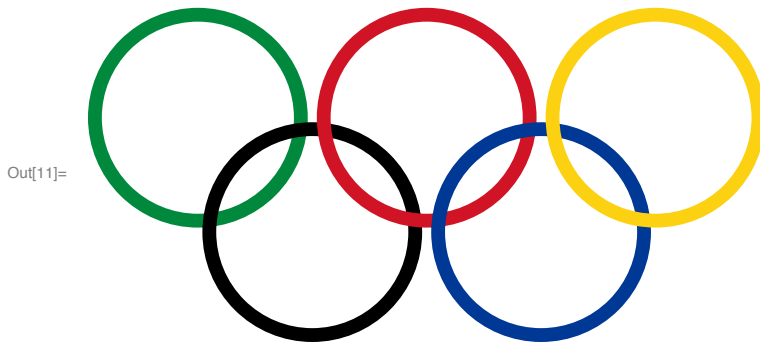
symmetrical (there are probably peaks around popular colors and valleys between), I'll use the median color within the cluster for the logo.

```
In[9]:= logoColors = RGBColor @@ Median[# /. RGBColor -> List] & /@ colorClusters
```

```
Out[9]= { , , , , , }
```

Now to generate the logo. I'll just draw a few circles with thick edges that are colored with the computed colors that are displaced to the proper location.

```
In[11]:= Graphics[Table[{Thickness[.02], logoColors[[i]], Circle[{i, If[EvenQ[i], 0, 1]}, .9]},  
  {i, Length[logoColors] - 1}], Background -> logoColors[[-1]]]
```



Wow! The colors here are roughly the same as in the official Olympic logo. The blue is darker and the yellow is brighter, and the colors are in the wrong order, but the logo is broadly the same. So it seems that the Olympic logo is representative of the worlds flags.