in-class_assignment_2_color_RESULTS.R

acate

Sun Nov 6 23:29:24 2016

```
# assignment_color.R
# begun 2016-09-05 (Labor Day) by adc

library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.2.4
```

```
library(colorspace)

allDataManuallyFixed <-
  read.csv(
    "~/Google Drive/teaching/CogPsych_4114_2016/in-class_assignments/assignment_2_color/allDataManuallyF
  )

df <- allDataManuallyFixed

attach(df)

# Make copies of the HSV variables that are normalized to range 0,1
# Some color coordinates require values in that range, or at least as they are
# implemented in R
# Keep the original variables, too.
df$h <- HUE/360;
df$s <- SAT/100;
df$v <- VAL/100;

attach(df)
```

```
## The following objects are masked from df (pos = 3):
##
##     colorName, HUE, id, SAT, VAL
```

```
# CONVERT color coordinates from HSV to L*u*v
```

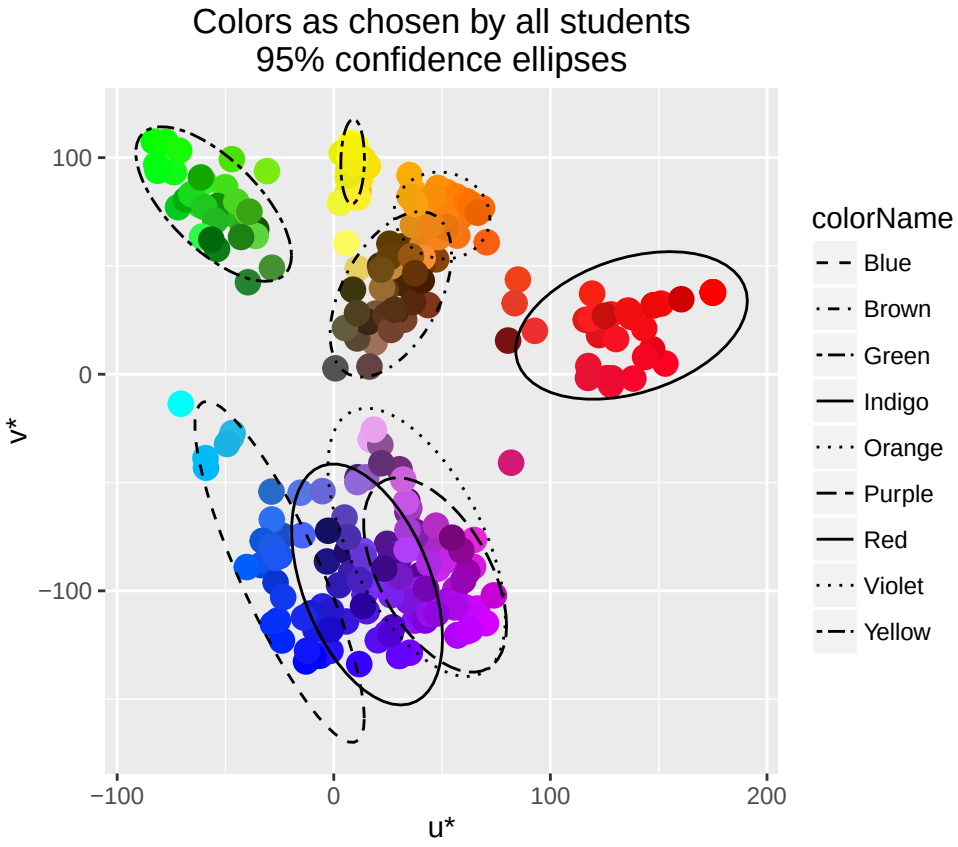
```
# This is worth doing here because we are going to plot the colors on a 2D page.

# - The benefit of the HSV coordinate system is that the terms Hue, Saturation,
# and Value have meanings that make sense (?) in spoken English.

# - The benefit of the L*u*v* coordinate system is that the distances between
# colors in this space coorespond to PERCEPTUAL DISSIMILARITY.  Therefore, this
# is the better coordinate system to use when PLOTTING the colors in a graph.


# Super kludgy code to convert HSV values to L*u*v* coordinates:
```

```
x <- HSV(cbind(HUE,s,v))

# There seems to be a weird problem with the colorspace package's HSV object class
# Other classes from this package (e.g. RGB ) can be converted to the LUV class,
# but not HSV for some reason.
#
# Consider the following error:
# > as(x,"LUV")
# Error in cbind(L, if (missing(U)) NULL else U, if (missing(V)) NULL else V) :
#   Ambiguous conversion
#
# So adc worked around this by converting HSV to RGB (which works) first.

y <- as(as(x,"RGB"),"LUV")

# Another problem: can't directly coerce LUV class to data frame:
# > n <- as.data.frame(y)
# Error in as.data.frame.default(y) :
#   cannot coerce class "structure("LUV", package = "colorspace")" to a data.frame
#
# So, first convert to matrix, then to data frame:

m <- coords(y);
mdf <- as.data.frame(m);

# Calculate means for each category (color name)
meanColors <- rbind(tapply(m[,2],colorName,mean),tapply(m[,3],colorName,mean))
```

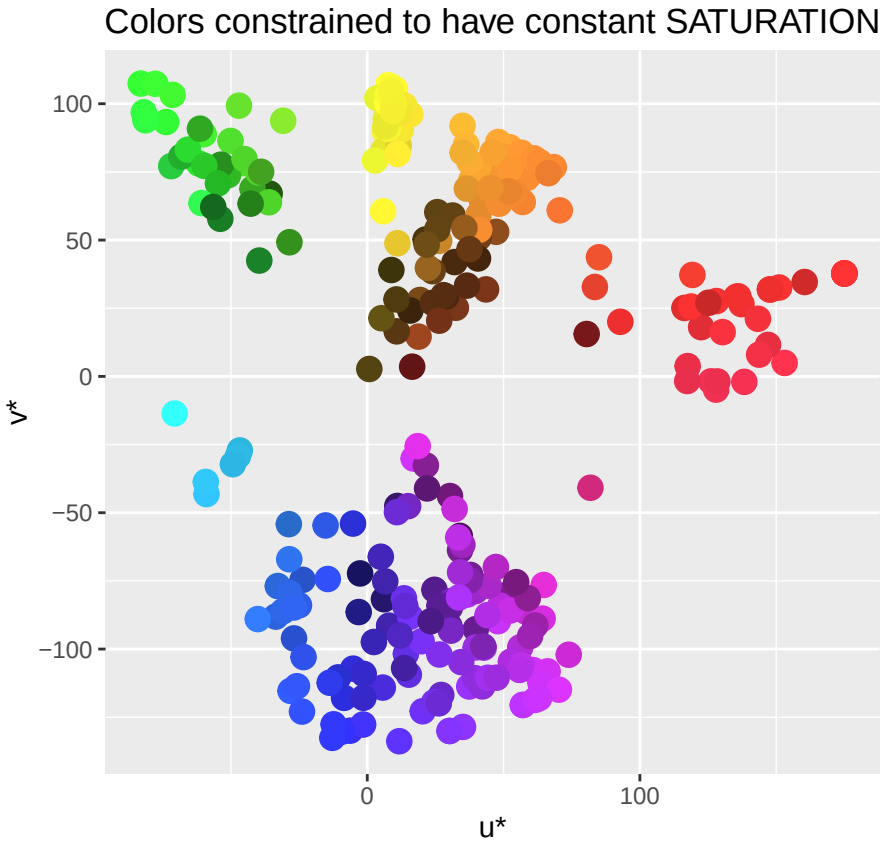
```
# Draw the plots
```

```
# The second and third dimensions of the LUV color space are the ones related to
# hue and saturation.  The first is the lightness dimension, so leave that out
# here
cp <- ggplot(mdf,aes(mdf[,2],mdf[,3],color=hsv(h,s,v),group=colorName,label=colorName))

# For comparison, make plots where the colors are displayed not as the students
# chose them, but with a constant saturation or value level
cpKSat <- ggplot(mdf,aes(mdf[,2],mdf[,3],color=hsv(h,.8,v),group=colorName,label=colorName))
cpKVal <- ggplot(mdf,aes(mdf[,2],mdf[,3],color=hsv(h,s,.8),group=colorName,label=colorName))

# Also make a version where BOTH saturation and value are constant.  This means
# that colors only vary by HUE.
cpKSatVal <- ggplot(mdf,aes(mdf[,2],mdf[,3],color=hsv(h,.8,.8),group=colorName,label=colorName))


# Plot the colors as they appeared when students chose them:
# cp + geom_point(size=8) + scale_color_identity(guide="none") +
#   coord_fixed() + labs(list(title = "Colors as chosen", x = "u*", y = "v*"))

# Version with 95% confidence ellipses
# cp + geom_point(size=8) + scale_color_identity(guide="none") +
#   coord_fixed() + stat_ellipse()
```

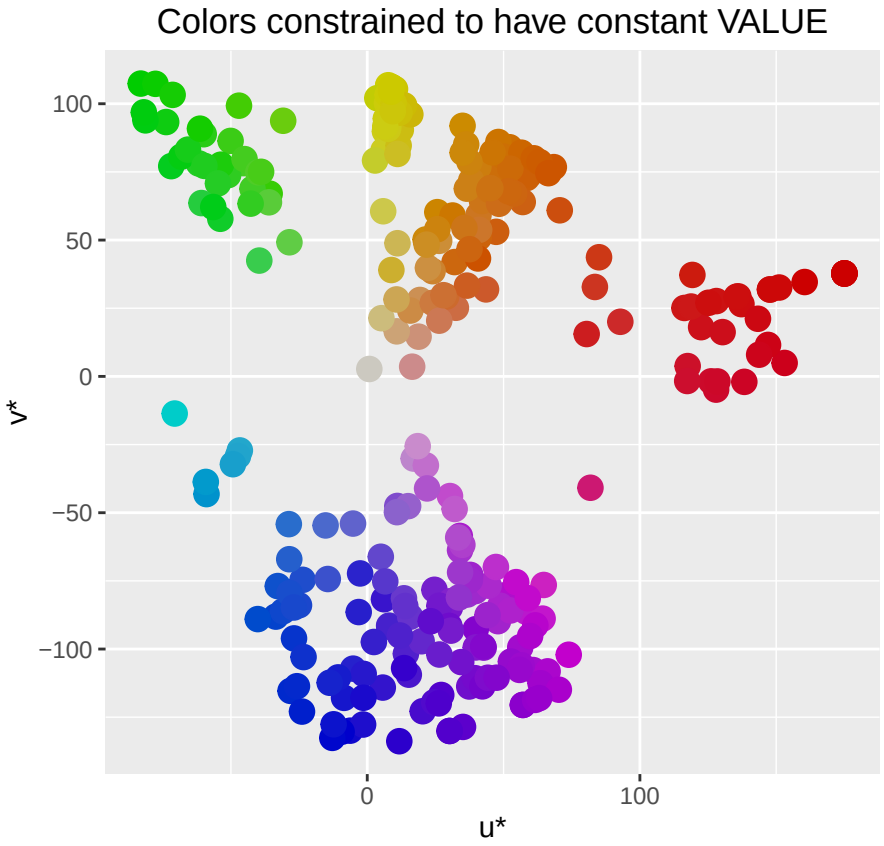
```
# Plot the colors as they appeared when students chose them:
# With linetype to distinguish ellipses, which also makes a legend
# (adc couldn't figure out how to make line colors different easily)
cp + geom_point(size=4) + scale_color_identity() + coord_fixed() +
  stat_ellipse(aes(linetype=colorName)) +
  scale_linetype_manual(values=c(2,4,6,1,3,5,7,3,6)) +
  labs(list(title = "Colors as chosen by all students\n95% confidence ellipses",
            x = "u*", y = "v*"))
```



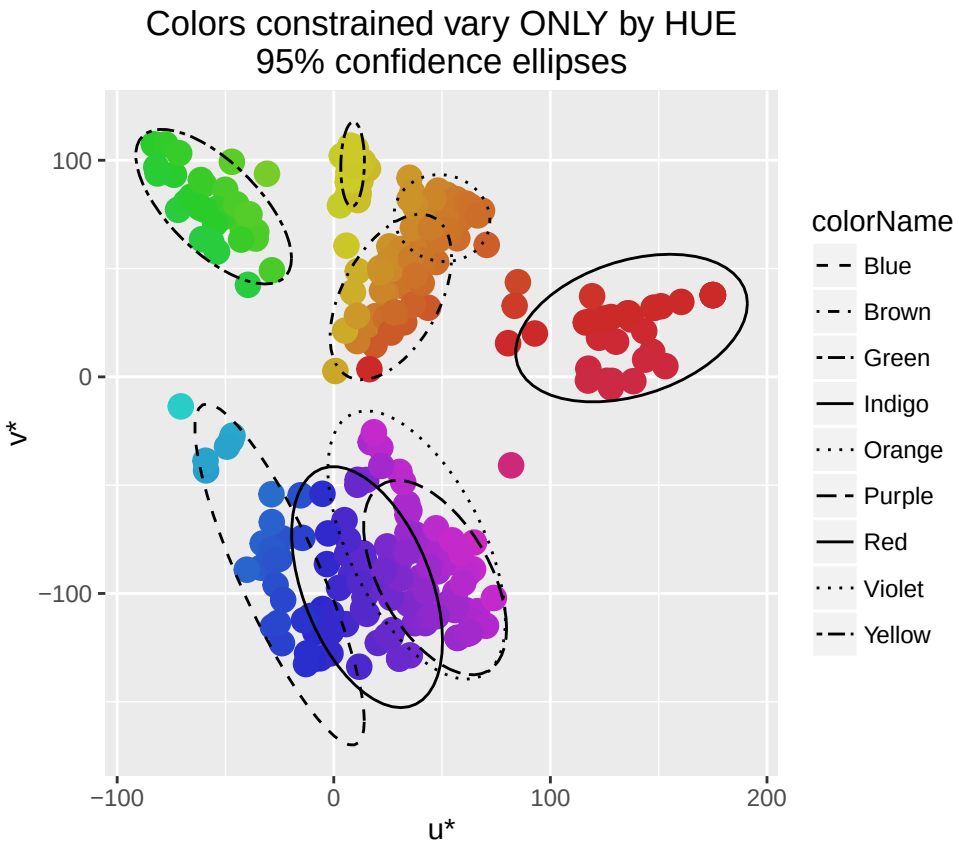

```
# Plot the colors as they would appear if they all had the same SATURATION
cpKSat + geom_point(size=4) + scale_color_identity(guide="none") + coord_fixed() +
  labs(list(title = "Colors constrained to have constant SATURATION", x = "u*", y = "v*"))
```




```
# Plot the colors as they would appear if they all had the same VALUE
cpKVal + geom_point(size=4) + scale_color_identity(guide="none") + coord_fixed() +
  labs(list(title = "Colors constrained to have constant VALUE", x = "u*", y = "v*"))
```




```
# Plot the colors as they would appear if they varied ONLY by HUE
# Put the ellipses on them again, because some color category distinctions will
# no longer be visible!
cpKSatVal + geom_point(size=4) + scale_color_identity(guide="none") + coord_fixed() +
  stat_ellipse(aes(linetype=colorName)) +
  scale_linetype_manual(values=c(2,4,6,1,3,5,7,3,6)) +
  labs(list(title = "Colors constrained vary ONLY by HUE\n95% confidence ellipses",
            x = "u*", y = "v*"))
```




```
# Funny all-text versions:
# (UNCOMMENT these lines to activate the code)
```

```
# cp + scale_color_identity(guide="none") + coord_fixed() + stat_ellipse() +
# geom_text(fontface="bold") cp + scale_color_identity(guide="none") +
# coord_fixed() + stat_ellipse() +
# geom_label(fill=hsv(h,s,v),color="gray",size=3)
```

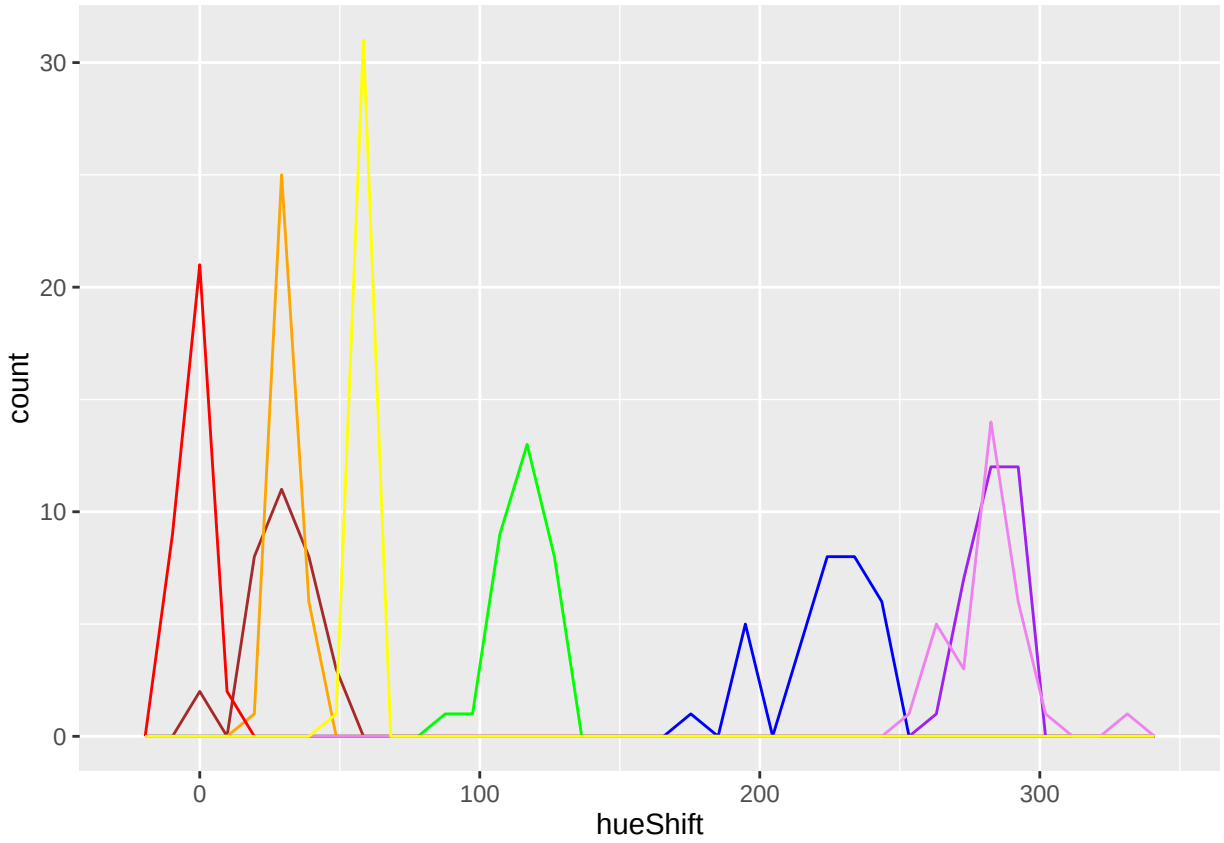
```
# Histograms of HSV variables
```

```
hueShift <- HUE;
hueShift[hueShift > 340] <- hueShift[hueShift > 340] - 360;

df$hueShift <- hueShift;

attach(df)
```

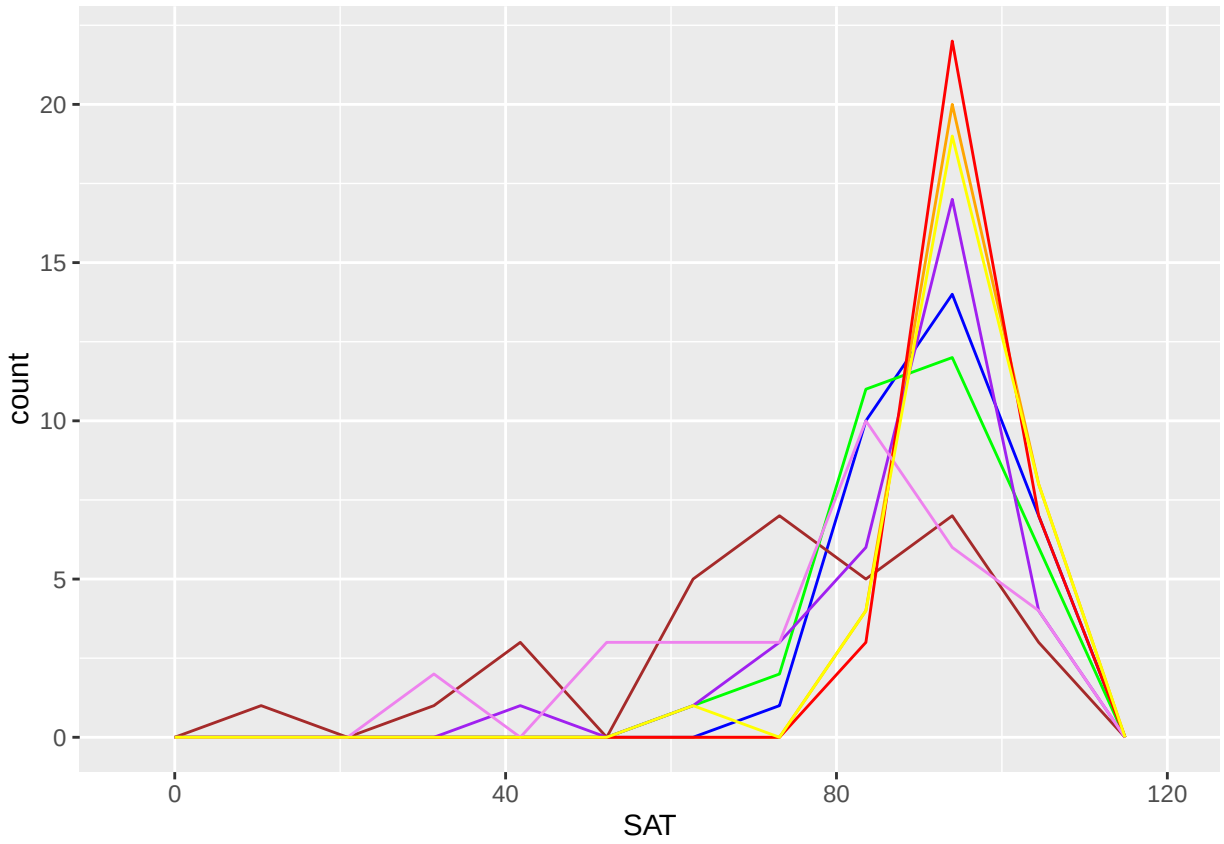
```
## The following object is masked _by_ .GlobalEnv:
##
##     hueShift

## The following objects are masked from df (pos = 3):
##
##     colorName, h, HUE, id, s, SAT, v, VAL
```

```
## The following objects are masked from df (pos = 4):
##
##     colorName, HUE, id, SAT, VAL
```

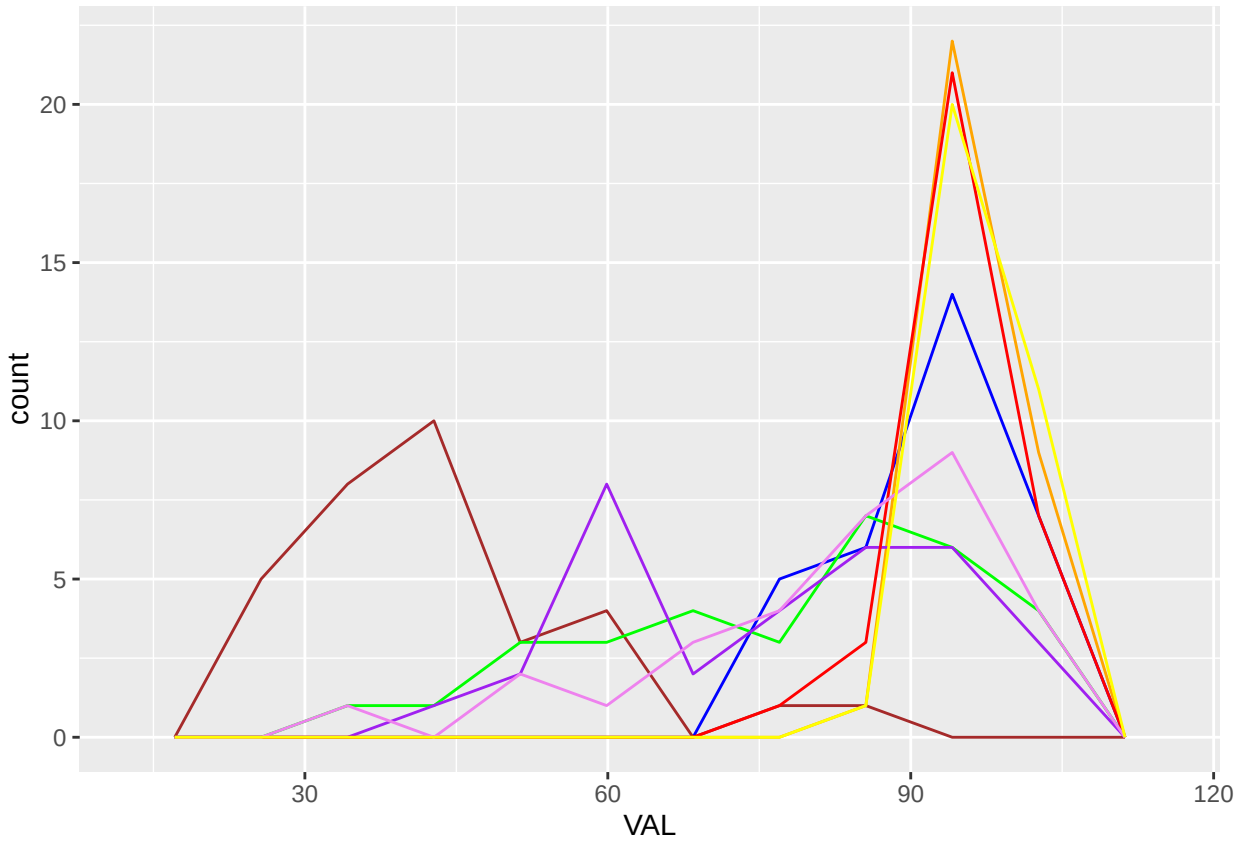
```
# Plot histogram of HUE numbers
ggplot(df[colorName!="Indigo",],aes(hueShift,group=colorName,color=colorName)) +
  geom_freqpoly(bins=36) + scale_color_identity()
```




```
# Plot histogram of SATURATION numbers
ggplot(df[colorName!="Indigo",],aes(SAT,group=colorName,color=colorName)) +
  geom_freqpoly(bins=10) + scale_color_identity()
```




```
# Plot histogram of VALUE numbers
ggplot(df[colorName!="Indigo",],aes(VAL,group=colorName,color=colorName)) +
  geom_freqpoly(bins=10) + scale_color_identity()
```


count
20
15
10
5
0
30
60
90
120
VAL