Calculating Gen2 Height

This sequence picks a single height value per Gen2 subject.

Define the age cutoffs to keep ages within the same Window as Gen1 Heights. Define the height cutoffs to exclude values that are more likely to be entry errors or a developmental disorder, than a true reflection of additive genetics

```
inchesTotalMin <- 56 #4'8"
inchesTotalMax <- 80 #7'0"
feetOnlyMin <- 4
feetOnlyMax <- 8
inchesOnlyMin <- 0
inchesOnlyMax <- 11
ageMin <- 16
ageMax <- 24
zMin <- -3
zMax <- -zMin
```

Load the appropriate information from the SQL Server database

```
#Equivalent ages for 1981 Heights are 16-24 (ignoring two 15-year-old and 1 26-year-old)
# SELECT count([AgeSelfReportYears]), FLOOR([AgeCalculateYears]) AS Age
# FROM [NlsLinks].[Process].[tblSurveyTime]
# WHERE SurveyYear=1981
# GROUP BY floor([AgeCalculateYears]) ORDER BY Age

channel <- odbcConnect("BeeNlsLinks")
dsHeightLong <- sqlQuery(channel,
  "SELECT SubjectTag, SurveyYear, Item, Value
    FROM NlsLinks.Process.tblResponse
    WHERE Generation=2 AND Item in (501, 502)
    ORDER BY SubjectTag, SurveyYear"
)#Items 501 & 502 are HeightInFeetOnly and HeightInInchesOnly
dsSubjectYear <- sqlQuery(channel,
  "SELECT tblSurveyTime.SubjectTag, tblSurveyTime.SurveyYear,
  Floor(tblSurveyTime.AgeCalculateYears) AS Age, tblSubject.Generation, tblSubject.Gender
  FROM NlsLinks.Process.tblSurveyTime
    INNER JOIN NlsLinks.Process.tblSubject ON tblSurveyTime.SubjectTag = tblSubject.SubjectTag
  WHERE Generation=2 AND  (AgeCalculateYears IS NOT NULL)
  ORDER BY SubjectTag, SurveyYear"
)
odbcClose(channel)
summary(dsHeightLong)
```

```
   SubjectTag        SurveyYear         Item          Value
 Min.   :    301   Min.   :1994   Min.   :501   Min.   :-2.00
 1st Qu.: 267702   1st Qu.:2002   1st Qu.:501   1st Qu.: 5.00
 Median : 546901   Median :2006   Median :502   Median : 5.00
 Mean   : 550041   Mean   :2004   Mean   :502   Mean   : 5.23
 3rd Qu.: 805901   3rd Qu.:2008   3rd Qu.:502   3rd Qu.: 6.00
 Max.   :1266703   Max.   :2010   Max.   :502   Max.   :11.00
```

```
summary(dsSubjectYear)
```

```
   SubjectTag        SurveyYear         Age          Generation     Gender
 Min.   :    201   Min.   :1986   Min.   : 0.0   Min.   :2    Min.   :1.0
 1st Qu.: 266304   1st Qu.:1992   1st Qu.: 6.0   1st Qu.:2    1st Qu.:1.0
 Median : 533301   Median :1998   Median :12.0   Median :2    Median :1.0
 Mean   : 546354   Mean   :1999   Mean   :12.6   Mean   :2    Mean   :1.5
 3rd Qu.: 805101   3rd Qu.:2004   3rd Qu.:18.0   3rd Qu.:2    3rd Qu.:2.0
 Max.   :1266703   Max.   :2010   Max.   :38.0   Max.   :2    Max.   :2.0
```

```
comma(c(nrow(dsHeightLong), nrow(dsSubjectYear)))
```

```
[1] "70,614" "86,579"
```

Combine the feet and inches to get total inches. Filter out records with height values that are outside the desired range

```
CombineHeightUnits <- function( df ) {
  feet <- df[df$Item==501, 'Value']
  feet <- ifelse(feetOnlyMin <= feet & feet <= feetOnlyMax, feet, NA)
  inches <- df[df$Item==502, 'Value']
  inches <- ifelse(inchesOnlyMin <= inches & inches <= inchesOnlyMax, inches, NA)
  return( data.frame(InchesTotal=feet*12 + inches) )
} # system.time( )#23.94 sec
#Combine to one row per SubjectYear combination
dsHeightYear <- ddply(dsHeightLong, c("SubjectTag", "SurveyYear"), CombineHeightUnits)
nrow(dsHeightYear)
```

```
[1] 35307
```

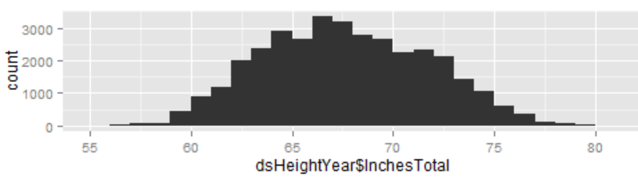
```

#Filter out records with undesired height values
dsHeightYear <- dsHeightYear[inchesTotalMin <= dsHeightYear$InchesTotal & dsHeightYear$InchesTotal <= in
dsHeightYear <- dsHeightYear[!is.na(dsHeightYear$InchesTotal), ]
nrow(dsHeightYear)
```

```
[1] 35067
```

```
summary(dsHeightYear)
```

```
   SubjectTag        SurveyYear    InchesTotal
 Min.   :    301   Min.   :1994   Min.   :56.0
 1st Qu.: 267502   1st Qu.:2002   1st Qu.:64.0
 Median : 546701   Median :2006   Median :67.0
 Mean   : 549932   Mean   :2004   Mean   :67.2
 3rd Qu.: 805901   3rd Qu.:2008   3rd Qu.:70.0
 Max.   :1266703   Max.   :2010   Max.   :80.0
```

```
qplot(dsHeightYear$InchesTotal, binwidth=1) #Make sure ages are normalish with no extreme values.
```



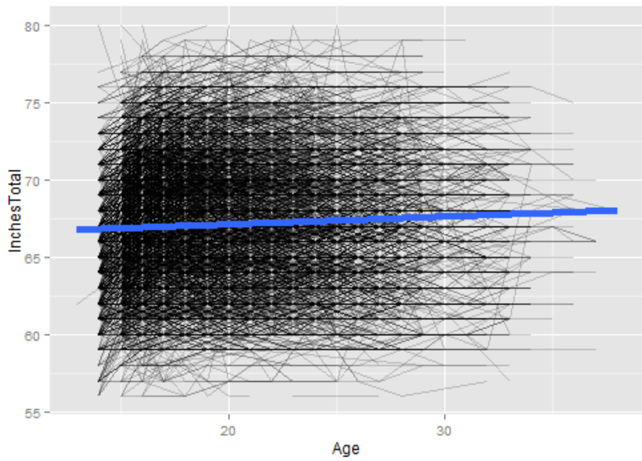

```
rm(dsHeightLong)
```

Join the height data with age of the subject when the height was taken. Filter out records where the age is outside of the desired window.

```
dsLong <- join(x=dsSubjectYear, y=dsHeightYear, type="inner", by=c("SubjectTag", "SurveyYear"))
nrow(dsLong)
```

```
[1] 35067
```

```
ggplot(dsLong, aes(x=Age, y=InchesTotal, group=SubjectTag)) + geom_line(alpha=.2) + geom_smooth(method="
```




```
rm(dsSubjectYear, dsHeightYear)
```

Standardize by Gender & Age. Calculated Age (using SurveyDate and MOB) has been truncated to integers.

```
dsLong <- dsLong[ageMin <= dsLong$Age & dsLong$Age <= ageMax, ]
nrow(dsLong)
```

```
[1] 22795
```

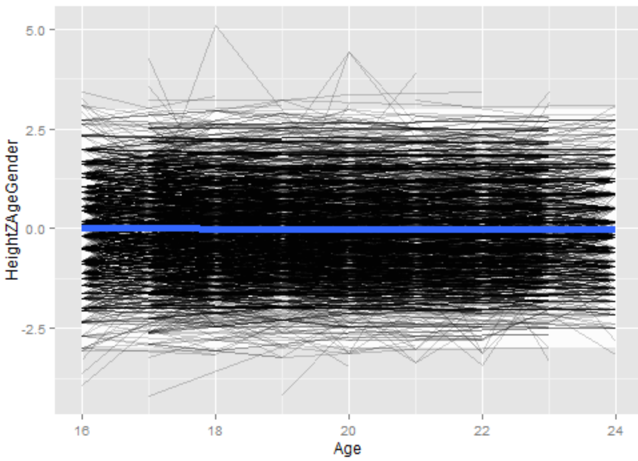
```
dsLong <- ddply(dsLong, c("Age", "Gender"), transform, HeightZAgeGender=scale(InchesTotal))
nrow(dsLong)
```

```
[1] 22795
```

```
qplot(dsLong$HeightZAgeGender, binwidth=.25) #Make sure ages are normalish with no extreme values.
```

Determine Z-score to clip at. Adjust as necessary (zMin & zMax were defined at the top of the page). The white box extends between zMin and zMax.

```
ggplot(dsLong, aes(x=Age, y=HeightZAgeGender, group=SubjectTag)) +
  annotate("rect", xmin=min(dsLong$Age), xmax=max(dsLong$Age), ymin=zMin, ymax= zMax, fill="gray99") +
  geom_line(alpha=.2) + geom_smooth(method="rlm", aes(group=NA), size=2)
```




```
dsLong <- dsLong[zMin <= dsLong$HeightZAgeGender & dsLong$HeightZAgeGender <= zMax, ]
nrow(dsLong)
```

```
[1] 22733
```

Pick the subject's oldest record (within that age window). Then examine the age & Z values

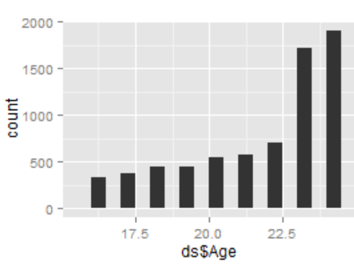
```
ds <- ddply(dsLong, "SubjectTag", subset, rank(-Age)==1)
summary(ds)
```

```
   SubjectTag        SurveyYear       Age          Generation      Gender
 Min.   :    301   Min.   :1994   Min.   :16.0   Min.   :2    Min.   :1.00
 1st Qu.: 266202   1st Qu.:2004   1st Qu.:20.0   1st Qu.:2    1st Qu.:1.00
 Median : 537401   Median :2008   Median :23.0   Median :2    Median :1.00
 Mean   : 545706   Mean   :2007   Mean   :21.5   Mean   :2    Mean   :1.49
 3rd Qu.: 804403   3rd Qu.:2010   3rd Qu.:24.0   3rd Qu.:2    3rd Qu.:2.00
 Max.   :1266703   Max.   :2010   Max.   :24.0   Max.   :2    Max.   :2.00
  InchesTotal   HeightZAgeGender
 Min.   :56.0   Min.   :-2.9855
 1st Qu.:64.0   1st Qu.:-0.7195
 Median :67.0   Median :-0.0730
 Mean   :67.5   Mean   :-0.0016
 3rd Qu.:71.0   3rd Qu.: 0.5766
 Max.   :79.0   Max.   : 2.9905
```

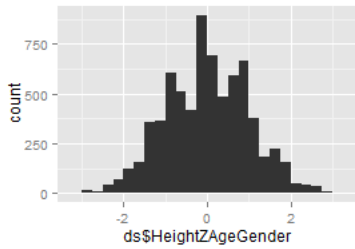
```
# SELECT [Mob], [LastSurveyYearCompleted], [AgeAtLastSurvey]
#   FROM [NlsLinks].[dbo].[vewSubjectDetails79]
#   WHERE Generation=2 and AgeAtLastSurvey >=16
#After the 2010 survey, there were 7,201 subjects who were at least 16 at the last survey.
nrow(ds)
```

```
[1] 7069
```

```
qplot(ds$Age, binwidth=.5) #Make sure ages are within window, and favoring older values
```




```
qplot(ds$HeightZAgeGender, binwidth=.25) #Make sure ages are normalish with no extreme values.
```



Compare with Kelly's height values. Make sure they roughly agree. There are a few differences, including (1) the age range is a little shifted, (2) the 2010 survey wasn't available, (3) the cutoff scores were more generous, and (4) the order of standardization & clipping *might* have been different.

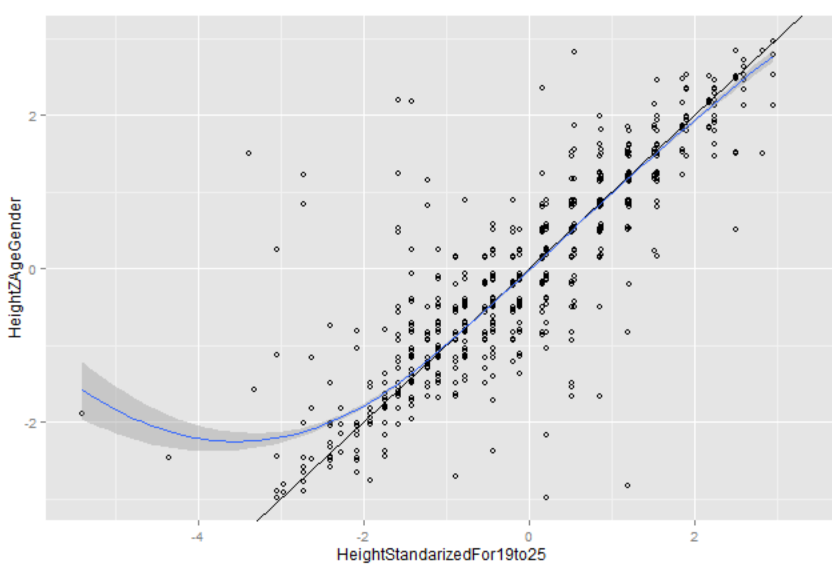
```
#   Compare against Kelly's previous versions of Gen2 Height
# pathInputKellyOutcomes <- "F:/Projects/Nls/Links2011/CodingUtilities/Gen2Height/ExtraOutcomes79FromKel
dsKelly <- read.csv(pathInputKellyOutcomes, stringsAsFactors=FALSE)
dsKelly <- dsKelly[, c("SubjectTag", "HeightStandarizedFor19to25")]
dsOldVsNew <- join(x=ds, y=dsKelly, by="SubjectTag", type="full")

#See if the new version is missing a lot of values that the old version caught.
#   The denominator isn't exactly right, because it doesn't account for the 2010 values missing in the n
table(is.na(dsOldVsNew$HeightZAgeGender), is.na(dsOldVsNew$HeightStandarizedFor19to25), dnn=c("NewIsMiss
```

```
            OldIsMissing
NewIsMissing FALSE TRUE
       FALSE  5089 1980
       TRUE     34 4392
```

```
#View the correlation
cor(dsOldVsNew$HeightZAgeGender,dsOldVsNew$HeightStandarizedFor19to25, use="complete.obs")
```

```
[1] 0.9553
```

```
#Compare against an x=y identity line.
ggplot(dsOldVsNew, aes(x=HeightStandarizedFor19to25, y=HeightZAgeGender)) + geom_point(shape=1) + geom_a
```




```
# @knitr WriteToCsv
write.csv(ds, pathOutputSubjectHeight, row.names=FALSE)
```