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This is an R HTML document. When you click the **Knit HTML** button a web page will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
who <- read.csv("C:/Users/prera/Downloads/Life_Expectancy_Data.csv")
head(who)
```

```
##      Country Year      Status Life.expectancy Adult.Mortality infant.deaths
## 1 Afghanistan 2015 Developing          65.0           263           62
## 2 Afghanistan 2014 Developing          59.9           271           64
## 3 Afghanistan 2013 Developing          59.9           268           66
## 4 Afghanistan 2012 Developing          59.5           272           69
## 5 Afghanistan 2011 Developing          59.2           275           71
## 6 Afghanistan 2010 Developing          58.8           279           74
##      Alcohol percentage.expenditure Hepatitis.B Measles BMI under.five.deaths
## 1      0.01      71.279624          65      1154 19.1           83
## 2      0.01      73.523582          62      492 18.6           86
## 3      0.01      73.219243          64      430 18.1           89
## 4      0.01      78.184215          67      2787 17.6           93
## 5      0.01      7.097109          68      3013 17.2           97
## 6      0.01      79.679367          66      1989 16.7          102
##      Polio Total.expenditure Diphtheria HIV.AIDS GDP Population
## 1      6      8.16          65      0.1 584.25921 33736494
## 2      58      8.18          62      0.1 612.69651 327582
## 3      62      8.13          64      0.1 631.74498 31731688
## 4      67      8.52          67      0.1 669.95900 3696958
## 5      68      7.87          68      0.1 63.53723 2978599
## 6      66      9.20          66      0.1 553.32894 2883167
##      thinness..1.19.years thinness.5.9.years Income.composition.of.resources
## 1      17.2           17.3           0.479
## 2      17.5           17.5           0.476
## 3      17.7           17.7           0.470
## 4      17.9           18.0           0.463
## 5      18.2           18.2           0.454
## 6      18.4           18.4           0.448
##      Schooling
## 1      10.1
## 2      10.0
## 3      9.9
## 4      9.8
## 5      9.5
## 6      9.2
```

```
#####Dimesion of the dataset#####
```

```
dim(who)
```

```
## [1] 2938 22
```

```
##### TOP 10 DEVELOPED & DEVELOPING Countires #####
```

```
status.of.countries <- who[(who$Status %in% c("Developing") & who$Life.expectancy<55) | (who$Status %in% c("Developed") & who$Life.expectancy>85) ,]
dim(status.of.countries)
```

```
## [1] 347 22
```

```
#View(status.of.countries)
```

```
class(status.of.countries)
```

```
## [1] "data.frame"
```

```
head(status.of.countries)
```

```
##      Country Year      Status Life.expectancy Adult.Mortality infant.deaths
## 16 Afghanistan 2000 Developing          54.8           321           88
## 49 Angola      2015 Developing          52.4           335           66
## 50 Angola      2014 Developing          51.7           348           67
## 51 Angola      2013 Developing          51.1           355           69
## 53 Angola      2011 Developing          51.0           361           75
## 54 Angola      2010 Developing          49.6           365           78
##      Alcohol percentage.expenditure Hepatitis.B Measles BMI under.five.deaths
## 16      0.01      10.42496          62      6532 12.2          122
## 49      NA      0.00000          64      118 23.3           98
## 50      8.33      23.96561          64      11699 22.7          101
## 51      8.10      35.95857          77      8523 22.1          105
## 53      8.06      239.89139          72      1449 21.0          115
## 54      7.80      191.65374          77      1190 2.4          121
##      Polio Total.expenditure Diphtheria HIV.AIDS GDP Population
## 16      24      8.20          24      0.1 114.5600 293756
## 49      7      NA          64      1.9 3695.7937 2785935
## 50      68      3.31          64      2.0 479.3122 2692466
## 51      67      4.26          77      2.3 484.6169 2599834
## 53      73      3.38          71      2.5 4299.1289 24218565
## 54      81      3.39          77      2.5 3529.5348 23369131
##      thinness..1.19.years thinness.5.9.years Income.composition.of.resources
```

```
## 16          2.3          2.5          0.338
## 49          8.3          8.2          0.531
## 50          8.5          8.3          0.527
## 51          8.6          8.5          0.523
## 53          8.9          8.8          0.495
## 54          9.1          9.0          0.488
##   Schooling
## 16          5.5
## 49         11.4
## 50         11.4
## 51         11.4
## 53          9.4
## 54          9.0
```

```
#View(status.of.countries)
WHONew<-status.of.countries
#resting the index values
row.names(WHONew) <- NULL
#View(WHONew)
dim(WHONew)
```

```
## [1] 347  22
```

```
##### CLEANING THE DATA #####
# For 347 rows running the for Loop for checking any NA values and replacing it with the mean of the
# particular country.
for(i in 1:347)
{
  if(is.na(WHONew$Alcohol[i]))
  {
    WHONew$Alcohol[i] <- with(WHONew, mean(WHONew$Alcohol[Country == WHONew$Country[i]], na.rm = TRUE))
  }
}
for(i in 1:347)
{
  if(is.na(WHONew$Hepatitis.B[i]))
  {
    WHONew$Hepatitis.B[i] <- with(WHONew, mean(WHONew$Hepatitis.B[Country == WHONew$Country[i]], na.rm = TRUE))
  }
}
for(i in 1:347)
{
  if(is.na(WHONew$Total.expenditure[i]))
  {
    WHONew$Total.expenditure[i] <- with(WHONew, mean(WHONew$Total.expenditure[Country == WHONew$Country[i]], na.rm = TRUE))
  }
}
dim(WHONew)
```

```
## [1] 347  22
```

```
#View(WHONew)

# Deleting the Empty rows where there is no data present.
new.life<- na.omit(WHONew)
dim(new.life)
```

```
## [1] 223  22
```

```
#View(new.life)

attach(new.life)
##### PCA #####

##Principal component analysis, or PCA, is a statistical procedure that allows you to summarize the information content in large data tables by means
##The main idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of many variables correlated with each
##Interpretation of the principal components is based on finding which variables are most strongly correlated with each component, i.e., which of the:

life1 <- new.life[,c(5,7,11,16,17,19,20,21,22)]
cor(life1)
```

```
##           Adult.Mortality    Alcohol    BMI
## Adult.Mortality    1.00000000 -0.19225074 -0.06721729
## Alcohol            -0.192250745  1.00000000  0.46694754
## BMI                -0.067217294  0.46694754  1.00000000
## HIV.AIDS           0.394715702 -0.11329837  0.09699188
## GDP                -0.231255371  0.42974887  0.57394953
## thinness..1.19.years 0.257498302 -0.05562543 -0.23693926
## thinness.5.9.years  0.273199893 -0.02054980 -0.16875654
## Income.composition.of.resources -0.078980518 0.51149300 0.66648649
## Schooling          -0.004568601 0.57827113 0.61719104
## HIV.AIDS           0.39471570 -0.2312554  0.25749830
## Adult.Mortality    0.39471570 -0.2312554  0.25749830
## Alcohol            -0.11329837  0.4297489  -0.05562543
## BMI                0.09699188  0.5739495  -0.23693926
## HIV.AIDS           1.00000000 -0.1665007  0.20223413
## GDP                -0.16650074  1.0000000  -0.30655386
## thinness..1.19.years 0.20223413 -0.3065539  1.00000000
```

```
## thinness.5.9.years      0.24995226 -0.2874579      0.85533628
## Income.composition.of.resources 0.04943368 0.5439926      -0.34061011
## Schooling              0.15846629 0.4589088      -0.20394176
##                        thinness.5.9.years
## Adult.Mortality        0.2731999
## Alcohol                -0.0205498
## BMI                    -0.1687565
## HIV.AIDS               0.2499523
## GDP                    -0.2874579
## thinness..1.19.years   0.8553363
## thinness.5.9.years     1.0000000
## Income.composition.of.resources -0.2793987
## Schooling              -0.1491131
##                        Income.composition.of.resources      Schooling
## Adult.Mortality        -0.07898052 -0.004568601
## Alcohol                0.51149300 0.578271132
## BMI                    0.66648649 0.617191043
## HIV.AIDS               0.04943368 0.158466293
## GDP                    0.54399258 0.458908802
## thinness..1.19.years   -0.34061011 -0.203941757
## thinness.5.9.years     -0.27939874 -0.149113133
## Income.composition.of.resources 1.00000000 0.867317964
## Schooling              0.86731796 1.000000000
```

```
# Using prcomp to compute the principal components (eigenvalues and eigenvectors). With scale=TRUE, variable means are set to zero, and variances set
life_pca <- prcomp(life1,scale=TRUE)
```

```
#####Analysis on PCA1 #####
```

```
#The first principal component increases with only two of the values, decreasing income composition and schooling. This component can be viewed as a
```

```
#####Analysis on PCA2 #####
```

```
#The second principal component is less Correlated with Alcohol and Income composition and Adult Mortality, BMI, Schooling are moderately correlated
```

```
#####Analysis on PCA3 #####
```

```
#The third principal component increases with increasing Adult Mortality and HIV/AIDs. This suggests that countries with high Adult Mortality and HI
life_pca
```

```
## Standard deviations (1, ..., p=9):
## [1] 1.9041882 1.4016711 1.0970509 0.7762820 0.7651177 0.6435997 0.5950811
## [8] 0.3760559 0.3287636
```

```
## Rotation (n x k) = (9 x 9):
```

```
##                        PC1      PC2      PC3
## Adult.Mortality      0.14827666 0.38241516 0.47846329
## Alcohol              -0.34081600 0.19187743 -0.40418673
## BMI                  -0.40656283 0.20461534 0.03047904
## HIV.AIDS             0.05922995 0.44136974 0.50881513
## GDP                  -0.39233464 -0.01980602 -0.15932739
## thinness..1.19.years 0.28556632 0.46136350 -0.40465670
## thinness.5.9.years   0.25874653 0.50203599 -0.37957956
## Income.composition.of.resources -0.45891114 0.17568938 0.09796028
## Schooling            -0.42430316 0.29001994 0.07123932
##                        PC4      PC5      PC6      PC7
## Adult.Mortality      -0.713801546 0.2630123 -0.15362555 0.01717352
## Alcohol              0.069911396 0.4213173 -0.69624393 0.04186678
## BMI                  -0.089329233 -0.4005610 0.02007955 0.78303921
## HIV.AIDS             0.545102708 -0.3077228 -0.33178317 -0.18530624
## GDP                  -0.396021560 -0.5892660 -0.15759772 -0.53707026
## thinness..1.19.years -0.037104579 -0.0943236 0.16650997 -0.06566490
## thinness.5.9.years   -0.005838548 -0.1080104 0.16810265 0.01569160
## Income.composition.of.resources 0.048855132 0.1843825 0.44765025 -0.12957487
## Schooling            0.140898321 0.3104502 0.31614627 -0.20167106
##                        PC8      PC9
## Adult.Mortality      -0.003374833 -0.01582092
## Alcohol              -0.015235161 -0.12051623
## BMI                  0.072871713 0.06795270
## HIV.AIDS             0.012225833 -0.07995943
## GDP                  -0.022684395 0.04932024
## thinness..1.19.years 0.692872013 -0.13951986
## thinness.5.9.years   -0.699952844 0.08240398
## Income.composition.of.resources -0.102977752 -0.69625358
## Schooling            0.114769915 0.67879063
```

```
summary(life_pca)
```

```
## Importance of components:
##                        PC1      PC2      PC3      PC4      PC5      PC6      PC7
## Standard deviation    1.9042 1.4017 1.0971 0.77628 0.76512 0.64360 0.59508
## Proportion of Variance 0.4029 0.2183 0.1337 0.06696 0.06505 0.04602 0.03935
## Cumulative Proportion 0.4029 0.6212 0.7549 0.82186 0.88691 0.93293 0.97228
##                        PC8      PC9
## Standard deviation    0.37606 0.32876
## Proportion of Variance 0.01571 0.01201
## Cumulative Proportion 0.98799 1.00000
```

```
(eigen_life <- life_pca$sdev^2)
```

```
## [1] 3.6259327 1.9646820 1.2035207 0.6026138 0.5854051 0.4142206 0.3541216
## [8] 0.1414180 0.1080855
```

```
names(eigen_life) <- paste("PC",1:9,sep="")
eigen_life
```

```
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7      PC8
## 3.6259327 1.9646820 1.2035207 0.6026138 0.5854051 0.4142206 0.3541216 0.1414180
##      PC9
## 0.1080855
```

```
sumlambdas <- sum(eigen_life)
sumlambdas
```

```
## [1] 9
```

```
propvar <- eigen_life/sumlambdas # eigen value/total variance
propvar #at this step we need to see till which PC we need to keep by adding the PC'S
```

```
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7
## 0.40288141 0.21829800 0.13372452 0.06695709 0.06504501 0.04602451 0.03934684
##      PC8      PC9
## 0.01571311 0.01200950
```

```
cumvar_life <- cumsum(propvar)
cumvar_life
```

```
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7      PC8
## 0.4028814 0.6211794 0.7549039 0.8218610 0.8869060 0.9329305 0.9722774 0.9879905
##      PC9
## 1.0000000
```

```
matlambdas <- rbind(eigen_life,propvar,cumvar_life)
rownames(matlambdas) <- c("Eigenvalues","Prop. variance","Cum. prop. variance")
round(matlambdas,4)
```

```
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7      PC8
## Eigenvalues      3.6259 1.9647 1.2035 0.6026 0.5854 0.4142 0.3541 0.1414
## Prop. variance    0.4029 0.2183 0.1337 0.0670 0.0650 0.0460 0.0393 0.0157
## Cum. prop. variance 0.4029 0.6212 0.7549 0.8219 0.8869 0.9329 0.9723 0.9880
##      PC9
## Eigenvalues      0.1081
## Prop. variance    0.0120
## Cum. prop. variance 1.0000
```

```
summary(life_pca)
```

```
## Importance of components:
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7
## Standard deviation      1.9042 1.4017 1.0971 0.77628 0.76512 0.64360 0.59508
## Proportion of Variance 0.4029 0.2183 0.1337 0.06696 0.06505 0.04602 0.03935
## Cumulative Proportion 0.4029 0.6212 0.7549 0.82186 0.88691 0.93293 0.97228
##      PC8      PC9
## Standard deviation      0.37606 0.32876
## Proportion of Variance 0.01571 0.01201
## Cumulative Proportion 0.98799 1.00000
```

```
life_pca$rotation
```

```
##      PC1      PC2      PC3
## Adult.Mortality      0.14827666 0.38241516 0.47846329
## Alcohol      -0.34081600 0.19187743 -0.40418673
## BMI      -0.40656283 0.20461534 0.03047904
## HIV.AIDS      0.05922995 0.44136974 0.50881513
## GDP      -0.39233464 -0.01980602 -0.15932739
## thinness..1.19.years      0.28556632 0.46136350 -0.40465670
## thinness.5.9.years      0.25874653 0.50203599 -0.37957956
## Income.composition.of.resources -0.45891114 0.17568938 0.09796028
## Schooling      -0.42430316 0.29001994 0.07123932
##      PC4      PC5      PC6      PC7
## Adult.Mortality      -0.713801546 0.2630123 -0.15362555 0.01717352
## Alcohol      0.069911396 0.4213173 -0.69624393 0.04186678
## BMI      -0.089329233 -0.4005610 0.02007955 0.78303921
## HIV.AIDS      0.545102708 -0.3077228 -0.33178317 -0.18530624
## GDP      -0.396021560 -0.5892660 -0.15759772 -0.53707026
## thinness..1.19.years      -0.037104579 -0.0943236 0.16650997 -0.06566490
## thinness.5.9.years      -0.005838548 -0.1080104 0.16810265 0.01569160
## Income.composition.of.resources 0.048855132 0.1843825 0.44765025 -0.12957487
## Schooling      0.140898321 0.3104502 0.31614627 -0.20167106
##      PC8      PC9
## Adult.Mortality      -0.003374833 -0.01582092
## Alcohol      -0.015235161 -0.12051623
## BMI      0.072871713 0.06795270
## HIV.AIDS      0.012225833 -0.07995943
## GDP      -0.022684395 0.04932024
## thinness..1.19.years      0.692872013 -0.13951986
## thinness.5.9.years      -0.699952844 0.08240398
```

```
## Income.composition.of.resources -0.102977752 -0.69625358
## Schooling 0.114769915 0.67879063
```

```
print(life_pca)
```

```
## Standard deviations (1, .., p=9):
## [1] 1.9041882 1.4016711 1.0970509 0.7762820 0.7651177 0.6435997 0.5950811
## [8] 0.3760559 0.3287636
##
## Rotation (n x k) = (9 x 9):
##
##      PC1      PC2      PC3
## Adult.Mortality 0.14827666 0.38241516 0.47846329
## Alcohol -0.34081600 0.19187743 -0.40418673
## BMI -0.40656283 0.20461534 0.03047904
## HIV.AIDS 0.05922995 0.44136974 0.50881513
## GDP -0.39233464 -0.01980602 -0.15932739
## thinness..1.19.years 0.28556632 0.46136350 -0.40465670
## thinness.5.9.years 0.25874653 0.50203599 -0.37957956
## Income.composition.of.resources -0.45891114 0.17568938 0.09796028
## Schooling -0.42430316 0.29001994 0.07123932
##
##      PC4      PC5      PC6      PC7
## Adult.Mortality -0.713801546 0.2630123 -0.15362555 0.01717352
## Alcohol 0.069911396 0.4213173 -0.69624393 0.04186678
## BMI -0.089329233 -0.4005610 0.02007955 0.78303921
## HIV.AIDS 0.545102708 -0.3077228 -0.33178317 -0.18530624
## GDP -0.396021560 -0.5892660 -0.15759772 -0.53707026
## thinness..1.19.years -0.037104579 -0.0943236 0.16650997 -0.06566490
## thinness.5.9.years -0.005838548 -0.1080104 0.16810265 0.01569160
## Income.composition.of.resources 0.048855132 0.1843825 0.44765025 -0.12957487
## Schooling 0.140898321 0.3104502 0.31614627 -0.20167106
##
##      PC8      PC9
## Adult.Mortality -0.003374833 -0.01582092
## Alcohol -0.015235161 -0.12051623
## BMI 0.072871713 0.06795270
## HIV.AIDS 0.012225833 -0.07995943
## GDP -0.022684395 0.04932024
## thinness..1.19.years 0.692872013 -0.13951986
## thinness.5.9.years -0.699952844 0.08240398
## Income.composition.of.resources -0.102977752 -0.69625358
## Schooling 0.114769915 0.67879063
```

```
life_pca$x # this gives the new data set for our table
```

```
##      PC1      PC2      PC3      PC4      PC5
## 1 0.91810581 -2.4301913899 0.793531298 -0.533230594 -0.0175328973
## 2 -0.57392169 0.4333515203 -0.793434928 -0.341606741 0.5782669139
## 3 -0.67248183 0.6476715726 -1.078724527 -0.203817667 1.1191605992
## 4 -0.59156828 0.6835643070 -1.058862820 -0.217214605 1.0980569937
## 5 -0.28962900 0.5339951360 -1.218390415 -0.466143294 0.6713093431
## 6 0.47405423 0.2316448022 -1.268192090 -0.346765205 1.2210175853
## 7 0.11915157 0.4749798502 -1.178959513 -0.521310879 0.5116376584
## 8 0.22901749 0.4785534202 -1.245295735 -0.562259488 0.4420342438
## 9 0.47083026 0.4261414199 -1.185820260 -0.574090941 0.3638281025
## 10 0.77259234 0.3756658089 -1.130857082 -0.537619431 0.3982003623
## 11 0.24074672 -0.8139515341 -0.106945601 -0.525913286 0.4163370336
## 12 -0.05400822 -2.1146446368 0.957498257 -0.532881908 0.5218295607
## 13 0.06350173 -2.1288489021 0.892830645 -0.593385947 0.4280641594
## 14 0.24179263 -2.1763774455 0.931429855 -0.636684257 0.3162000173
## 15 0.15961094 -2.8194280474 0.121556032 0.491540693 -0.1705449227
## 16 0.37010621 -2.8679905052 0.152638681 0.432605187 -0.3141871536
## 17 -4.06821259 -0.8547778602 0.043873650 1.304080152 3.1275144939
## 18 -6.64575654 -0.2802188680 -1.325149015 -0.696923365 -1.2865332194
## 19 -6.66448474 -0.2033388196 -1.185222178 -1.021489061 -1.3751417048
## 20 -7.06791306 -0.1905379137 -0.972201852 -0.899439726 -1.2263904883
## 21 -5.41091513 -0.1778042028 -0.227099501 0.661791844 1.0357444389
## 22 -0.97027646 1.8135566356 -0.256676319 -0.402366732 0.2310707264
## 23 -1.45913710 1.1132384994 1.065805280 -0.298023175 0.3687660074
## 24 -1.68704136 0.3422697809 2.557863866 -0.255692018 0.3516604441
## 25 -1.56386258 0.6561647482 2.635247469 -0.204691476 0.4156707838
## 26 -0.06544126 3.2998117025 0.676723162 -0.054463697 0.1721049935
## 27 0.89460798 2.9582740340 0.643297408 0.191098143 0.6644705051
## 28 0.11090756 3.4883815897 0.611366421 0.158009468 -0.3187223924
## 29 0.70190154 -1.8675768491 -0.942757339 0.541597223 -0.1936541729
## 30 1.85632464 -1.6531777408 -0.562276614 -0.473772896 -0.2017346375
## 31 1.36813183 -2.8448366908 0.360041103 -0.520666793 -0.0314499645
## 32 1.43016182 -2.7760648374 0.346164017 -0.535130258 -0.0315175812
## 33 2.24311340 -1.5635810597 -0.687775707 -0.633492519 -0.2782235800
## 34 3.07256819 -0.2602779692 -1.559830442 -0.679607244 -0.6830402148
## 35 1.09064097 -0.3562681004 -0.701198012 -0.420909136 0.2635627238
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## 65 0.01863446 -0.5211725236 -0.981661799 0.824462227 -0.1734359029
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## 16 -0.018959587 0.1952023191 -0.1572811460 -0.5934334131
## 17 1.224609380 -1.7931937987 0.0622515975 0.6091247149
## 18 -0.274792894 -0.6068028783 0.0146586842 -0.0293836787
## 19 -0.333385562 -0.7642179676 -0.0102925881 0.0040128540
## 20 -0.373410689 -0.1305624870 0.1115962040 0.1071612457
```

| | | | | |
|--------|--------------|---------------|---------------|---------------|
| ## 21 | 0.416928104 | 1.9759289915 | 0.2228614431 | -0.0604509585 |
| ## 22 | 0.382819937 | 0.2148727610 | 0.1132568033 | -0.1605886086 |
| ## 23 | -0.233023174 | 0.2681877422 | -1.6052630971 | 0.2028548690 |
| ## 24 | -0.598465313 | 0.1047036336 | 0.1063136951 | 0.0161118655 |
| ## 25 | -0.832693810 | 0.0672114355 | 0.1128171751 | 0.0078643240 |
| ## 26 | -0.186313685 | 0.0671588984 | 0.1434475711 | -0.1571296150 |
| ## 27 | -0.098952932 | -1.8461322856 | -0.0387797926 | -0.3104346216 |
| ## 28 | -0.028663215 | -0.2365086534 | 0.1332991217 | -0.1988971661 |
| ## 29 | -0.426644956 | 0.2705996268 | -1.7591273432 | -0.2447663573 |
| ## 30 | -1.513503513 | 0.5473745137 | -1.5695176886 | 0.9226634832 |
| ## 31 | -1.887772154 | 0.4797087599 | 0.0907540528 | 0.6417135123 |
| ## 32 | -1.905252876 | 0.4558585500 | 0.0851894954 | 0.6092194753 |
| ## 33 | -1.485206358 | 0.2883878740 | 1.7897770972 | 0.2107561991 |
| ## 34 | -0.921739908 | 0.2597204399 | 0.0681336188 | 0.3820317324 |
| ## 35 | -0.183521062 | 0.0195260796 | -0.0226650306 | 0.0456735317 |
| ## 36 | -0.362842603 | 0.0866872035 | -0.0806865820 | -0.1702305875 |
| ## 37 | -0.626071500 | 0.0967922309 | -0.0957631173 | -0.2663593370 |
| ## 38 | -0.730603891 | 0.0965248905 | -0.0899325824 | -0.3444079392 |
| ## 39 | -0.820376869 | 0.1102532806 | -0.1089177514 | -0.4540310904 |
| ## 40 | -0.885674387 | 0.1205776603 | -0.1168428342 | -0.4988834953 |
| ## 41 | -0.890638962 | 0.0930021722 | -0.1150181988 | -0.4841826723 |
| ## 58 | -0.061598053 | 0.4207197471 | 0.0106421665 | -0.1447450737 |
| ## 59 | -0.143610574 | 0.3596005408 | -0.0240071855 | -0.2065587197 |
| ## 60 | -0.145715990 | 0.4326664878 | -0.0274174387 | -0.3448237919 |
| ## 61 | -0.070233673 | 0.3801987857 | -0.0406130800 | -0.2967293717 |
| ## 62 | 0.256897624 | 0.2560649772 | -0.0341710698 | -0.2418075940 |
| ## 63 | 0.035625440 | 0.3010689462 | -0.0431366943 | -0.2877446975 |
| ## 64 | 0.033299454 | 0.2355071370 | -0.0487012801 | -0.2994329560 |
| ## 65 | 0.355199616 | 0.1576453698 | -0.0334985475 | -0.2107640486 |
| ## 66 | 0.228002164 | 0.2219602207 | -0.0942058148 | -0.4379551143 |
| ## 67 | 0.048386265 | -0.8615960443 | -0.1893266660 | -0.5805167752 |
| ## 68 | 0.534475740 | 0.4206817781 | 0.0115279383 | 0.0180410334 |
| ## 69 | 0.830645277 | 0.3091846798 | -0.0021225288 | -0.0464213843 |
| ## 70 | 0.839836204 | 0.2755809304 | 0.0170057418 | -0.0365201267 |
| ## 71 | 0.419589806 | -0.8468001925 | -0.1243016955 | -0.2464392152 |
| ## 72 | 0.363999171 | -0.8703252293 | -0.1094293409 | -0.2691838336 |
| ## 73 | 0.366125428 | 0.2346258668 | -0.0281796856 | -0.1909455164 |
| ## 74 | 0.315333974 | 0.2046097065 | -0.0101641032 | -0.1996274243 |
| ## 75 | 0.271027626 | 0.1850884152 | -0.0295795483 | -0.1969367314 |
| ## 76 | 0.530496384 | 0.1288435290 | -0.0271281208 | -0.1946289206 |
| ## 77 | 0.169150332 | 0.1313472431 | -0.0364431899 | -0.2446369849 |
| ## 78 | 0.134206708 | 0.1150366329 | -0.0421947379 | -0.2833513835 |
| ## 79 | -0.367929777 | 0.1717936326 | -0.0763724508 | -0.1367833536 |
| ## 80 | -0.394344620 | 0.1569503537 | -0.0652100621 | -0.1882183361 |
| ## 81 | -0.410186581 | 0.1300288763 | -0.0699879910 | -0.2166288360 |
| ## 82 | -0.422012303 | 0.1115780009 | -0.0736192619 | -0.2360037492 |
| ## 83 | 0.945208003 | 0.1308661488 | -0.0078758501 | -0.1037187460 |
| ## 84 | 1.032163360 | 0.1323690508 | 0.0145423676 | -0.0853434734 |
| ## 85 | 0.887149002 | 0.0645236735 | -0.0097650584 | -0.0954981336 |
| ## 86 | 0.879855099 | 0.0405715094 | -0.0070056756 | -0.0790390420 |
| ## 87 | 0.812535335 | 0.0546097491 | -0.0245171839 | -0.1738666040 |
| ## 88 | 0.813577794 | 0.0351586968 | -0.0198922789 | -0.1388927122 |
| ## 89 | 0.692241455 | 0.0398738575 | -0.0363459310 | -0.2215592516 |
| ## 90 | -0.204235683 | 0.2258383942 | -0.0638491817 | -0.0223499160 |
| ## 91 | -0.237372486 | 0.1787426211 | -0.0539403791 | -0.0636889807 |
| ## 92 | 0.066856527 | 0.1499045181 | -0.0460967693 | -0.0350223651 |
| ## 93 | 0.083199566 | 0.1116151125 | -0.0449604758 | -0.0152421967 |
| ## 94 | 0.026615158 | 0.1263927861 | -0.0439229176 | 0.0002911291 |
| ## 95 | 0.899548085 | -0.0056478456 | -0.0506556197 | -0.2914256741 |
| ## 96 | 0.931800890 | -0.0213146622 | -0.0574693052 | -0.3218092167 |
| ## 97 | 0.147405101 | 0.2063247817 | 0.1105452075 | 0.8251139550 |
| ## 124 | 0.736515544 | 1.8201006018 | 0.2090705896 | -0.0058250290 |
| ## 125 | 0.741857705 | 1.8022409128 | 0.2036530583 | -0.0244210819 |
| ## 126 | 0.600406740 | -1.5855917696 | -0.1119001558 | -0.3171284387 |
| ## 143 | -0.070599486 | -0.6052152022 | 0.1655865792 | 0.4787853893 |
| ## 144 | 0.466527459 | 0.3388678573 | 0.1352201309 | 0.2010796239 |
| ## 145 | 0.375751125 | 0.3617068795 | 0.1273212116 | 0.1578495962 |
| ## 146 | 0.834789723 | -0.3457638054 | 0.0180137110 | -0.0378173347 |
| ## 147 | 0.761486333 | 0.3461410663 | -0.0002923233 | -0.1444111688 |
| ## 148 | 0.623692555 | -0.3344920167 | -0.0401989678 | -0.2690173612 |
| ## 149 | 0.599840275 | -0.3950170104 | -0.0311281793 | -0.2237942146 |
| ## 150 | 0.569471217 | -0.4123805569 | -0.0325748229 | -0.2418981536 |
| ## 151 | 0.582429005 | -0.4548168017 | -0.0138901793 | -0.2558785612 |
| ## 152 | 0.701642979 | 0.6799030741 | 0.1503606461 | 0.2574770803 |
| ## 153 | 1.109977001 | 0.5604767876 | 0.1602818377 | 0.3625903184 |
| ## 154 | 1.146782486 | 0.4998655838 | 0.1730063719 | 0.4483821170 |
| ## 155 | 1.124880252 | -1.2128490676 | 0.0117112712 | 0.2962355164 |
| ## 156 | 0.935571628 | -1.2816287077 | 0.0127474932 | 0.2665833923 |
| ## 157 | 0.511183015 | 0.3857503807 | 0.1609334537 | 0.3356326398 |
| ## 158 | 0.348903344 | 0.3090956068 | -0.1659083263 | 0.3120163960 |
| ## 159 | 0.099676761 | 0.1569039870 | 0.1725345388 | 0.2452134648 |
| ## 160 | 0.023321453 | 0.0959014406 | 0.1541869744 | 0.2257252877 |
| ## 161 | -0.045136445 | 0.0013335371 | 0.1621808532 | 0.2265236540 |
| ## 162 | -0.045527636 | -0.0420507694 | 0.1604121730 | 0.2073630889 |
| ## 163 | 0.191297930 | -0.0842891693 | 0.1422683354 | 0.2249314170 |
| ## 164 | -0.600069616 | 0.0626136319 | 0.1342128607 | 0.3049963842 |
| ## 165 | -0.698878909 | 0.0582094924 | 0.1007773331 | 0.2278469131 |
| ## 166 | 0.219538135 | -0.0996990009 | 0.1126753916 | 0.0774117563 |
| ## 167 | 0.210092606 | -0.0728221427 | 0.0622821950 | -0.0897905812 |
| ## 172 | -1.402038067 | -3.6435322230 | -0.1428785568 | -0.1092664074 |
| ## 173 | 0.059166807 | 1.3948245400 | 0.0668280928 | -0.5744733018 |
| ## 174 | 0.802447378 | -0.2622686321 | 0.0809168933 | 0.3653156687 |
| ## 175 | 0.683990958 | -0.2861463175 | 0.0748522470 | 0.3158113442 |
| ## 176 | 0.560226778 | -0.2688365948 | 0.0720684538 | 0.2909666556 |
| ## 177 | 0.394464575 | -0.3061493586 | 0.0676916798 | 0.2624804805 |
| ## 178 | 0.315859720 | -0.3399951180 | 0.0804958780 | 0.3171918495 |
| ## 179 | 0.221366022 | -0.3917170039 | 0.1002697699 | 0.3148459510 |

180 0.596612918 -0.4631586667 0.1166851070 0.3917123055
181 0.190187899 -0.4874717594 0.1014586587 0.4287098068
182 0.209795175 -0.5244006588 0.1150370348 0.5032566314
183 0.669075192 -0.6277156434 0.1103235504 0.4545303681
184 0.244703172 -0.6037875521 0.1080489591 0.3410021107
185 0.321436666 -0.6729107832 0.1083176437 0.4549876124
186 0.865243842 0.2121300246 -0.0094493949 -0.2147659927
187 1.000051557 0.1866336060 -0.0120521403 -0.2221229991
188 -0.021777763 0.3225608156 -0.0624904385 -0.1459464496
189 -0.090966684 0.3198622790 -0.0674561987 -0.1624426998
190 0.066450992 0.2934077678 -0.0897537951 -0.1739330655
191 0.425820670 0.1133191913 1.6293052084 -0.5775494965
192 0.833615383 1.4661158617 0.2158650996 0.1442672915
195 0.670164847 0.1406748485 0.0694898974 0.3546453214
196 0.654562628 -1.0680759808 -0.0202986323 0.3237486326
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203 -0.356654267 0.0631241222 0.0041211463 -0.0015712529
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206 -0.078668197 0.1004307831 -0.0301252832 -0.1263914438
219 -0.020545381 0.2223000733 0.0163010124 -0.2958311113
220 1.301653737 0.2042992008 -1.6418294709 0.3568922241
221 -0.820592473 0.2571267326 0.0108227858 -0.1635833964
222 -0.882011382 0.2360016605 -0.0107721828 -0.1771829358
223 -0.520961650 0.0472683649 1.6987127748 -0.5355942948
224 -0.148013729 0.0665763027 0.0007683405 -0.3412538841
225 -0.149756295 0.1476606823 -0.0026583785 -0.3915069629
226 -0.300038358 0.0720945093 -0.0311057505 -0.4222387758
227 -0.023365628 0.0086798986 -0.0299157547 -0.4142975009
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230 -1.269571678 0.3107838867 0.1896746778 1.1437819453
231 -1.198192857 0.2634486617 0.1988239708 1.2050116310
232 -1.138727501 0.2596448554 0.1643288475 1.1267472654
237 0.636175345 -1.4216931643 -0.0218066204 0.0131484478
238 0.248139332 -2.3912307621 -0.0802569499 0.0223292651
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246 1.245401061 0.3397896616 0.0810169185 0.3176622934
247 1.501575498 0.2927615247 0.0853730386 0.3483610434
248 1.196671987 0.2778373631 0.0751350358 0.3199010643
249 0.382211957 0.3108131346 0.0539620303 0.1676648421
250 0.339679853 0.3128455275 0.0493886276 0.1427174955
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253 0.493448959 -0.9139370088 -0.0787432046 0.0506705769
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278 -0.068717887 0.5850027993 -0.2508985174 -0.0303068258
279 0.389576101 0.5296151345 -0.2639518334 0.0017668657
280 0.536391050 0.5377580061 -0.3033411281 -0.0180403000
281 0.719630324 0.5774310269 0.3087342965 -0.0584579572
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292 -0.144939967 0.7308653697 0.1718102148 0.1325579512
293 -0.084900964 0.3031117121 0.0519290762 0.0308599164
294 -0.101784443 0.0782387538 0.0825168555 -0.0542869947
295 -0.615400753 -0.1208795253 0.0517016902 -0.1443082759
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297 -0.938873629 -0.1616584245 0.0287124723 -0.3209162352
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299 -0.809979426 -0.2956721217 0.0265826592 -0.4259985785
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316 -1.158980050 -0.3725655160 0.0326332592 0.2633728593
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318 -1.400867028 -0.3491969280 -0.0023729041 0.0639644757
329 0.732411892 -0.2601717912 0.0774420737 0.2379730565
330 0.446096864 -0.3384277231 0.0727505672 0.2080884193
331 0.355230593 -0.3167736986 0.0705347690 0.1904367318
332 0.672807428 -0.3840548625 0.0732223880 0.2120663526
333 0.604346208 -0.3820927553 0.0697587958 0.1983231536
334 0.136200828 -0.3317368810 0.0384216311 0.1434583223
335 0.102370126 -0.3334474108 0.0329500363 0.1181813511
336 -0.257080073 0.5197949670 0.1062420764 0.1017389297
337 -0.226438301 0.4691224565 0.1147295523 0.1432494967
338 -0.224468784 0.4526291710 0.1247372724 0.1776789200

```
## 339 -0.086614142 0.3775434869 0.1013527864 0.1413218432
## 340 0.174307889 0.2667711359 0.1105613230 0.1485799084
## 341 0.003596959 0.2106684767 0.1101663936 0.1023728403
## 342 -0.499826069 0.1933050850 0.0963412681 -0.0021015315
## 343 -0.608693414 0.1227078328 0.0925235501 -0.0662285080
## 344 -0.523635226 0.0145686246 0.0814254333 -0.0581095237
## 345 -0.923919520 -0.0041801105 0.0887101944 0.1667386462
## 346 -0.859599992 -0.0643255552 0.0833341997 0.1522508661
## 347 0.003806081 -0.2466760635 0.0776493647 -0.0332585063
```

```
# Identifying the scores by their status
sparrrtyp_pca <- cbind(data.frame(Status),life_pca$x)
sparrrtyp_pca
```

| ## | Status | PC1 | PC2 | PC3 | PC4 |
|-------|------------|-------------|---------------|--------------|--------------|
| ## 1 | Developing | 0.91810581 | -2.4301913899 | 0.793531298 | -0.533230594 |
| ## 2 | Developing | -0.57392169 | 0.4333515203 | -0.793434928 | -0.341606741 |
| ## 3 | Developing | -0.67248183 | 0.6476715726 | -1.078724527 | -0.203817667 |
| ## 4 | Developing | -0.59156828 | 0.6835643070 | -1.058862820 | -0.217214605 |
| ## 5 | Developing | -0.28962900 | 0.5339951360 | -1.218390415 | -0.466143294 |
| ## 6 | Developing | 0.47405423 | 0.2316448022 | -1.268192090 | -0.346765205 |
| ## 7 | Developing | 0.11915157 | 0.4749798502 | -1.178959513 | -0.521310879 |
| ## 8 | Developing | 0.22901749 | 0.4785534202 | -1.245295735 | -0.562259488 |
| ## 9 | Developing | 0.47083026 | 0.4261414199 | -1.185820260 | -0.574090941 |
| ## 10 | Developing | 0.77259234 | 0.3756658089 | -1.130857082 | -0.537619431 |
| ## 11 | Developing | 0.24074672 | -0.8139515341 | -0.106945601 | -0.525913286 |
| ## 12 | Developing | -0.05400822 | -2.1146446368 | 0.957498257 | -0.532881908 |
| ## 13 | Developing | 0.06350173 | -2.1288489021 | 0.892830645 | -0.593385947 |
| ## 14 | Developing | 0.24179263 | -2.1763774455 | 0.931429855 | -0.636684257 |
| ## 15 | Developing | 0.15961094 | -2.8194280474 | 0.121556032 | 0.491540693 |
| ## 16 | Developing | 0.37010621 | -2.8679905052 | 0.152638681 | 0.432605187 |
| ## 17 | Developed | -4.06821259 | -0.8547778602 | 0.043873650 | 1.304080152 |
| ## 18 | Developed | -6.64575654 | -0.2802188680 | -1.325149015 | -0.696923365 |
| ## 19 | Developed | -6.66448474 | -0.2033388196 | -1.185222178 | -1.021489061 |
| ## 20 | Developed | -7.06791306 | -0.1905379137 | -0.972201852 | -0.899439726 |
| ## 21 | Developed | -5.41091513 | -0.1778042028 | -0.227099501 | 0.661791844 |
| ## 22 | Developing | -0.97027646 | 1.8135566356 | -0.256676319 | -0.402366732 |
| ## 23 | Developing | -1.45913710 | 1.1132384994 | 1.065805280 | -0.298023175 |
| ## 24 | Developing | -1.68704136 | 0.3422697809 | 2.557863866 | -0.255692018 |
| ## 25 | Developing | -1.56386258 | 0.6561647482 | 2.635247469 | -0.204691476 |
| ## 26 | Developing | -0.06544126 | 3.2998117025 | 0.676723162 | -0.054463697 |
| ## 27 | Developing | 0.89460798 | 2.9582740340 | 0.643297408 | 0.191098143 |
| ## 28 | Developing | 0.11090756 | 3.4883815897 | 0.611366421 | 0.158009468 |
| ## 29 | Developing | 0.70190154 | -1.8675768491 | -0.942757339 | 0.541597223 |
| ## 30 | Developing | 1.85632464 | -1.6531777408 | -0.562276614 | -0.473772896 |
| ## 31 | Developing | 1.36813183 | -2.8448366908 | 0.360041103 | -0.520666793 |
| ## 32 | Developing | 1.43016182 | -2.7760648374 | 0.346164017 | -0.535130258 |
| ## 33 | Developing | 2.24311340 | -1.5635810597 | -0.687775707 | -0.633492519 |
| ## 34 | Developing | 3.07256819 | -0.2602776962 | -1.559830442 | -0.679607244 |
| ## 35 | Developing | 1.09064097 | -0.3562681004 | -0.701198012 | -0.420909136 |
| ## 36 | Developing | 1.35781082 | -0.4421401763 | -0.742376312 | -0.494460167 |
| ## 37 | Developing | 1.34673543 | -0.3640955357 | -0.857577271 | -0.485721421 |
| ## 38 | Developing | 1.43962907 | -0.3316560582 | -0.886812843 | -0.514914988 |
| ## 39 | Developing | 1.53781103 | -0.3275796257 | -0.904103403 | -0.551849913 |
| ## 40 | Developing | 1.62277394 | -0.3036623388 | -0.971538950 | -0.562020551 |
| ## 41 | Developing | 1.62099423 | -0.2666948440 | -1.004953649 | -0.543584670 |
| ## 58 | Developing | -0.32765016 | -0.0628821353 | -0.178847737 | -0.248099034 |
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| ## 62 | Developing | -0.18754802 | -0.6989259294 | -1.041341540 | 0.941033509 |
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| ## 64 | Developing | 0.25507079 | 0.0566011033 | -0.143760747 | -0.414248546 |
| ## 65 | Developing | 0.01863446 | -0.5211725236 | -0.981661799 | 0.824462227 |
| ## 66 | Developing | 0.29079189 | -0.6440672180 | -1.043786855 | 0.785852506 |
| ## 67 | Developing | 1.26364288 | -0.3343459680 | -0.278204813 | -0.270008448 |
| ## 68 | Developing | 1.12376328 | -0.2191792263 | -0.192343733 | -0.648550991 |
| ## 69 | Developing | 1.31599452 | -0.0885534809 | 0.058894720 | -0.813765963 |
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## 97 Developing 3.00770460 -0.7723051211 -1.807726451 0.335840078
## 124 Developed -5.46876493 -0.1146148335 -0.159298136 0.715506687
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## 144 Developed -5.84522173 -0.7059455366 -0.233357913 -0.367477640
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## 146 Developing 0.68595109 0.4429568003 0.109820534 -0.190432591
## 147 Developing 0.91144883 0.4512008098 0.220460922 -0.226985463
## 148 Developing 1.07697950 0.4647015183 0.222403075 -0.219087689
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## 152 Developing -0.48885128 0.0710894653 0.899048586 -0.533677868
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## 174 Developing 0.36997386 0.0408378967 0.644550197 -0.267389719
## 175 Developing 0.53359534 0.1252587802 0.771864183 -0.250651292
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## 185 Developing 1.00147216 1.0364678740 1.249072016 -0.121499241
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## 187 Developing 1.52458002 -0.7984692636 -1.414332780 0.398091284
## 188 Developing 0.49239049 -2.6547883189 1.049416345 -0.394179204
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## 258 Developing 0.80049039 -0.8195308450 0.146193815 -1.070409392
## 259 Developing 0.16445063 -1.9250631895 1.083697898 -1.013304385
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## 291 Developed -5.16205199 -0.4196925700 -0.079335078 0.703115653
## 292 Developed -6.11764755 -0.4429237913 -0.554438787 -0.215305707
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## 332 Developing 0.19493070 -0.2115757131 -0.181826735 1.294205255
## 333 Developing 0.26884620 -0.1971183182 -0.207255356 1.279341213
## 334 Developing 0.69241120 0.7683025718 0.969532269 -0.523269439
## 335 Developing 0.76344033 0.7740136342 0.949520142 -0.537339205
## 336 Developing -0.41796026 0.6057570618 0.207844320 -0.273361479
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##
## PC5 PC6 PC7 PC8 PC9
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## 3 1.1191605992 0.117210462 0.1089494838 0.0723476109 0.0198809968
## 4 1.0980569937 0.153832950 0.0665278985 0.0537700989 0.0389523094
## 5 0.6713093431 -0.157382132 -0.0469467295 -0.0186962485 -0.2887434138
## 6 1.2210175853 -0.166596556 -1.1436135706 -0.1345982667 -0.4485775195
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## 8 0.4420342438 -0.109842021 -0.0466080297 -0.0552125883 -0.4579078212
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## 62 -0.2019853654 0.256897624 0.2560649772 -0.0341710698 -0.2418075940
## 63 0.3026319908 0.035625440 0.3010689462 -0.0431366943 0.2877446975
## 64 0.2404697599 0.033299454 0.235071370 0.0487012801 -0.2994329560
## 65 -0.1734359029 0.355199616 0.1576453698 -0.0334985475 -0.2107640486
## 66 -0.3392799185 0.228002164 0.2219602207 -0.0942058148 -0.4379551143
```

| | | | | | |
|--------|---------------|--------------|---------------|---------------|---------------|
| ## 67 | 0.6189094481 | 0.048386265 | -0.8615960443 | -0.1893266660 | -0.5805167752 |
| ## 68 | -0.3612474583 | 0.534475740 | 0.4206817781 | 0.0115279383 | 0.0180410334 |
| ## 69 | -0.4312579500 | 0.830645277 | 0.3091846798 | -0.0021225288 | -0.0464213843 |
| ## 70 | -0.4536915101 | 0.839836204 | 0.2755809304 | 0.0170057418 | -0.0365201267 |
| ## 71 | 0.2852113206 | 0.419589806 | -0.8468001925 | -0.1243016955 | -0.2464392152 |
| ## 72 | 0.2511512596 | 0.363999171 | -0.8703252293 | -0.1094293409 | -0.2691838336 |
| ## 73 | -0.3695354784 | 0.366125428 | 0.2346258668 | -0.0281796856 | -0.1909455164 |
| ## 74 | -0.3828490968 | 0.315333974 | 0.2046097065 | -0.0101641032 | -0.1996274243 |
| ## 75 | -0.3914003551 | 0.271027626 | 0.1850884152 | -0.0295795483 | -0.1969367314 |
| ## 76 | -0.9726862265 | 0.530496384 | 0.1288435290 | -0.0271281208 | -0.1946289206 |
| ## 77 | -0.4549783800 | 0.169150332 | 0.1313472431 | -0.0364431899 | -0.2446369849 |
| ## 78 | -0.4986175252 | 0.134206708 | 0.1150366329 | -0.0421947379 | -0.2833513835 |
| ## 79 | -0.5933490016 | -0.367929777 | 0.1717936326 | -0.0763724508 | -0.1367833536 |
| ## 80 | -0.6201175990 | -0.394344620 | 0.1569503537 | -0.0652100621 | -0.1882183361 |
| ## 81 | -0.6399520355 | -0.410186581 | 0.1300288763 | -0.0699879910 | -0.2166288360 |
| ## 82 | -0.6653726912 | -0.422012303 | 0.1115780009 | -0.0736192619 | -0.2360037492 |
| ## 83 | -0.3377499252 | 0.945208003 | 0.1308661488 | -0.0078758501 | -0.1037187460 |
| ## 84 | -0.3459685484 | 1.032163360 | 0.1323690508 | 0.0145423676 | -0.0853434734 |
| ## 85 | -0.3105120598 | 0.887149002 | 0.0645236735 | -0.0097650584 | -0.0954981336 |
| ## 86 | -0.3310778393 | 0.879855099 | 0.0405715094 | -0.0070056756 | -0.0790390420 |
| ## 87 | -0.4201972397 | 0.812535335 | 0.0546097491 | -0.0245171839 | -0.1738666040 |
| ## 88 | -0.4374709452 | 0.813577794 | 0.0351586968 | -0.0198922789 | -0.1388927122 |
| ## 89 | -0.5176271975 | 0.692241455 | 0.0398738575 | -0.0363459310 | -0.2215592516 |
| ## 90 | -0.0535134285 | -0.204235683 | 0.2258383942 | -0.0638491817 | -0.0223499160 |
| ## 91 | -0.0941116430 | -0.237372486 | 0.1787426211 | -0.0539403791 | -0.0636889807 |
| ## 92 | -0.4992902257 | 0.066856527 | 0.1499045181 | -0.0460967693 | -0.0350223651 |
| ## 93 | -0.5384801241 | 0.083199566 | 0.1116151125 | -0.0449604758 | -0.0152421967 |
| ## 94 | -0.5593901024 | 0.026615158 | 0.1263927861 | -0.0439229176 | 0.0002911291 |
| ## 95 | -1.0531883557 | 0.899548085 | -0.0056478456 | -0.0506556197 | -0.2914256741 |
| ## 96 | -1.1381284181 | 0.931800890 | -0.0213146622 | -0.0574693052 | -0.3218092167 |
| ## 97 | -1.4303531638 | 0.147405101 | 0.2063247817 | 0.1105452075 | 0.8251139550 |
| ## 124 | 1.0570222874 | 0.736515544 | 1.8201006018 | 0.2090705896 | -0.0058250290 |
| ## 125 | 1.0606292400 | 0.741857705 | 1.8022409128 | 0.2036530583 | -0.0244210819 |
| ## 126 | 2.8381624070 | 0.600406740 | -1.5855917696 | -0.1119001558 | -0.3171284387 |
| ## 143 | -0.9893001847 | -0.070599486 | -0.6052152022 | 0.1655865792 | 0.4787853893 |
| ## 144 | -0.7780745837 | 0.466527459 | 0.3388678573 | 0.1352201309 | 0.2010796239 |
| ## 145 | -0.7004846525 | 0.375751125 | 0.3617068795 | 0.1273212116 | 0.1578495962 |
| ## 146 | 0.1046170878 | 0.834789723 | -0.3457638054 | 0.0180137110 | -0.0378173347 |
| ## 147 | -0.0297821792 | 0.761486333 | -0.3461410663 | -0.0002923233 | -0.1444111688 |
| ## 148 | -0.1254271710 | 0.623692555 | -0.3344920167 | -0.0401989678 | -0.2690173612 |
| ## 149 | -0.0925551007 | 0.599840275 | -0.3950170104 | -0.0311281793 | -0.2237942146 |
| ## 150 | -0.1170667491 | 0.569471217 | -0.4123805569 | -0.0325748229 | -0.2418981536 |
| ## 151 | -0.1663172844 | 0.582429005 | -0.4548168017 | -0.0138901793 | -0.2558785612 |
| ## 152 | 0.0917126823 | 0.701642979 | 0.6799030741 | 0.1503606461 | 0.2574770803 |
| ## 153 | -0.1685032947 | 1.109977001 | 0.5604767876 | 0.1602818377 | 0.3625903184 |
| ## 154 | -0.1536231954 | 1.146782486 | 0.4998655838 | 0.1730063719 | 0.4483821170 |
| ## 155 | 0.6997287932 | 1.124880252 | -1.2128490676 | 0.0117112712 | 0.2962355164 |
| ## 156 | 0.3759787047 | 0.935571628 | -1.2816287077 | 0.0127474932 | 0.2665833923 |
| ## 157 | 0.0533678575 | 0.511183015 | 0.3857503807 | 0.1609334537 | 0.3356326398 |
| ## 158 | -0.0255455120 | 0.348903344 | 0.3090956068 | 0.1659083263 | 0.3120163960 |
| ## 159 | -0.2430156635 | 0.099676761 | 0.1569039870 | 0.1725345388 | 0.2452134648 |
| ## 160 | -0.2919823634 | 0.023321453 | 0.0959014406 | 0.1541869744 | 0.2257252877 |
| ## 161 | -0.3786823675 | -0.045136445 | 0.0013335371 | 0.1621808532 | 0.2265236540 |
| ## 162 | -0.3712452475 | -0.045527636 | -0.0420507694 | 0.1604121730 | 0.2073630889 |
| ## 163 | -0.4878414249 | 0.191297930 | -0.0842891693 | 0.1422683354 | 0.2249314170 |
| ## 164 | 0.0396225558 | -0.600069616 | 0.0626136319 | 0.1342128607 | 0.3049963842 |
| ## 165 | 0.1469501407 | -0.698878909 | 0.0582094924 | 0.1007773331 | 0.2278469131 |
| ## 166 | -0.4176868590 | 0.219538135 | -0.0996990009 | 0.1126753916 | 0.0774117563 |
| ## 167 | -0.4865064591 | 0.210092606 | -0.0728221427 | 0.0622821950 | -0.0897905812 |
| ## 172 | -5.2330004274 | -1.402038067 | -3.6435322230 | -0.1428785568 | -0.1092664074 |
| ## 173 | 0.2672143002 | 0.059166807 | 1.3948245400 | 0.0668280928 | -0.5744733018 |
| ## 174 | 0.2007331104 | 0.802447378 | -0.2622686321 | 0.0809168933 | 0.3653156687 |
| ## 175 | 0.1012385262 | 0.683990958 | -0.2861463175 | 0.0748522470 | 0.3158113442 |
| ## 176 | 0.0978618246 | 0.560226778 | -0.2688365948 | 0.0720684538 | 0.2909666556 |
| ## 177 | 0.0469609969 | 0.394464575 | -0.3061493586 | 0.0676916798 | 0.2624804805 |
| ## 178 | 0.0379248169 | 0.315859720 | -0.3399951180 | 0.0804958780 | 0.3171918495 |
| ## 179 | -0.0024807695 | 0.221366022 | -0.3917170039 | 0.1002697699 | 0.3148459510 |
| ## 180 | -0.6680529575 | 0.596612918 | -0.4631586667 | 0.1166851070 | 0.3917123055 |
| ## 181 | 0.0057044456 | 0.190187899 | -0.4874717594 | 0.1014586587 | 0.4287098068 |
| ## 182 | 0.0239803129 | 0.209795175 | -0.5244006588 | 0.1150370348 | 0.5032566314 |
| ## 183 | -0.6107957776 | 0.669075192 | -0.6277156434 | 0.1103235504 | 0.4545303681 |
| ## 184 | 0.0047948980 | 0.244703172 | -0.6037875521 | 0.1080489591 | 0.3410021107 |
| ## 185 | 0.0514280819 | 0.321436666 | -0.6729107832 | 0.1083176437 | 0.4549876124 |
| ## 186 | -0.5800290759 | 0.865243842 | 0.2121300246 | -0.0094493949 | -0.2147659927 |
| ## 187 | -0.9341047238 | 1.000051557 | 0.1866336060 | -0.0120521403 | -0.2221229991 |
| ## 188 | -0.1527811157 | -0.021777763 | 0.3225608156 | -0.0624904385 | -0.1459464496 |
| ## 189 | -0.1866202990 | -0.090966684 | 0.3198622790 | -0.0674561987 | -0.1624426998 |
| ## 190 | -0.5549488986 | 0.066450992 | 0.2934077678 | -0.0897537951 | -0.1739330655 |
| ## 191 | -0.8543101155 | 0.425820670 | 0.1133191913 | 1.6293052084 | -0.5775494965 |
| ## 192 | -0.9560389403 | 0.833615383 | 1.4661158617 | 0.2158650996 | 0.1442672915 |
| ## 195 | -0.3079895498 | 0.670164847 | 0.1406748485 | 0.0694898974 | 0.3546453214 |
| ## 196 | 0.2052894233 | 0.654562628 | -1.0680759808 | -0.0202986323 | 0.3237486326 |
| ## 197 | 0.1692593396 | 0.580985375 | -1.0867029329 | -0.0247270304 | 0.2960654757 |
| ## 198 | 0.1232871299 | 0.521226928 | -1.1094577657 | -0.0260221093 | 0.2958748466 |
| ## 199 | -0.4147611633 | 0.367484584 | 0.0320057492 | 0.0483533202 | 0.3203052720 |
| ## 200 | -0.1252399937 | 0.053487406 | 0.0381370596 | 0.0462471330 | 0.2085195240 |
| ## 201 | -0.1701837163 | -0.095182449 | 0.0103992035 | 0.0380584483 | 0.1465119822 |
| ## 202 | -0.2154085279 | -0.289548193 | 0.0464204596 | 0.0103311801 | 0.0142926759 |
| ## 203 | -0.2246448100 | -0.356654267 | 0.0631241222 | 0.0041211463 | -0.0015712529 |
| ## 204 | -0.2025433197 | -0.494000129 | 0.0950179687 | -0.0345254343 | -0.0965263180 |
| ## 205 | -0.6796270504 | -0.257720788 | 0.0905894470 | -0.0201779351 | -0.1032394714 |
| ## 206 | -0.8164527054 | -0.078668197 | 0.1004307831 | -0.0301252832 | -0.1263914438 |
| ## 219 | 0.6721627512 | -0.020545381 | 0.2223000733 | 0.0163010124 | -0.2958311113 |
| ## 220 | -0.1623710099 | 1.301653737 | 0.2042992008 | -1.6418294709 | 0.3568922241 |
| ## 221 | 1.1228018079 | -0.820592473 | 0.2571267326 | 0.0108227858 | -0.1635833964 |
| ## 222 | 1.1444037754 | -0.882011382 | 0.2360016605 | -0.0107721828 | -0.1771829358 |
| ## 223 | 0.9319622183 | -0.520961650 | 0.0472683649 | 1.6987127748 | -0.5355942948 |

```
## 224 0.6802819407 -0.148013729 0.0665763027 0.0007683405 -0.3412538841
## 225 0.7873635813 -0.149756295 0.1476606823 -0.0026583785 -0.3915069629
## 226 0.8313210925 -0.300038358 0.0720945093 -0.0311057505 -0.4222387758
## 227 0.3453183840 -0.023365628 0.0086798986 -0.0299157547 -0.4142975009
## 228 0.3131739227 -0.133833946 -0.0108494219 -0.0388029471 -0.4416176883
## 229 -0.2019115565 -1.276461867 0.3170287984 0.1877260894 1.2379213336
## 230 -0.2425162827 -1.269571678 0.3107838867 0.1896746778 1.1437819453
## 231 -0.2066060119 -1.198192857 0.2634486617 0.1988239708 1.2050116310
## 232 -0.2922791111 -1.138727501 0.2596448554 0.1643288475 1.1267472654
## 237 2.7395543086 0.636175345 -1.4216931643 -0.0218066204 0.0131484478
## 238 1.6545320889 0.248139332 -2.3912307621 -0.0802569499 0.0223292651
## 239 0.6911484503 -0.612431597 -0.1141682646 -0.0675824810 -0.0638911373
## 240 0.1739588144 -0.434174764 -0.1252195297 -0.0977575723 -0.1250521365
## 241 0.4759157015 -0.612791887 -0.0992047334 -0.0683994486 -0.1403292929
## 242 0.5551439987 -0.977543426 -0.0888806269 -0.0876834824 -0.2527802739
## 245 0.2948836920 -0.635319051 0.3857436780 0.0668497109 0.1974861625
## 246 -0.0006585536 1.245400101 0.3397896616 0.0810169185 0.3176622934
## 247 -0.5445926724 1.501575498 0.2927615247 0.0853730386 0.3483610434
## 248 -0.1523656521 1.196671987 0.2778373631 0.0751350358 0.3199010643
## 249 0.2963568824 0.382211957 0.3108131346 0.0539620303 0.1676648421
## 250 0.3019454697 0.339679853 0.3128455275 0.0493886276 0.1427174955
## 251 0.2825838057 0.272333677 0.2821491077 0.0432632996 0.1237664936
## 252 0.8472420761 0.230594982 -0.8416026379 -0.0844317511 0.0085119922
## 253 0.3150164030 0.493448959 -0.9139370088 -0.0787432046 0.0506705769
## 254 0.2237378818 0.208501961 0.2303986665 0.0148298907 0.1046049284
## 255 -0.3036960535 0.479588688 0.1836426676 0.0153782908 0.1114650885
## 256 0.2413834160 0.102498473 0.2163878162 0.0033856463 0.0591537459
## 257 -0.3143509589 0.381559599 0.1784858397 -0.0126907619 0.0820877194
## 258 0.4787688833 -0.389245547 0.1716441019 1.6752162639 -0.1363710643
## 259 0.7212266109 -0.843812120 0.3288399317 -0.0456391343 0.1699016683
## 260 0.6782331581 -0.834385821 0.3416434151 -0.0516611225 0.1470501310
## 276 -0.2003681516 -0.122054806 0.7017769239 -0.1949777398 0.0206843082
## 277 -0.0031092722 -0.500482151 0.8117089224 -1.9436261336 0.3491196647
## 278 -0.2681420635 -0.068717887 0.5850027993 -0.2508985174 -0.0303068258
## 279 -0.4924058077 0.389576101 0.5296151345 -0.2639518334 0.0017668657
## 280 -0.4623520886 0.536391050 0.5377580061 -0.3033411281 -0.0180403000
## 281 -0.3836109860 0.719630324 0.5774310269 -0.3087342965 -0.0584579572
## 291 1.0061824008 0.416374996 2.0092014824 0.2330455454 0.0512028313
## 292 -0.2721194808 -0.144939967 0.7308653697 0.1718102148 0.1325579512
## 293 0.2488430123 -0.084900964 0.3031117121 0.0519290762 0.0308599164
## 294 -0.5868775670 -0.101784443 0.0782387538 0.0825168555 -0.0542869947
## 295 -0.3913391169 -0.615400753 -0.1208795253 0.0517016902 -0.1443082759
## 296 -0.7303708448 -0.416404218 -0.0485450530 0.0593111327 -0.1586898885
## 297 -0.3992459141 -0.938873629 -0.1616584245 0.0287124723 -0.3209162352
## 298 -1.2355161239 -0.632213818 -0.2959084422 0.0390321776 -0.3279261486
## 299 -1.1946445442 -0.809979426 -0.2956721217 0.0265826592 -0.4259985785
## 300 -1.2052246079 -0.692828035 -0.1878183109 0.0210545815 -0.5107021146
## 301 -0.5525968233 -1.013812896 -0.2415150070 0.0059536637 -0.5607192471
## 302 -0.4008214881 -1.162820461 -0.2577099731 -0.0006077228 -0.5967291894
## 303 -0.3222992394 -1.104167037 -0.2735907198 -0.0086716733 -0.6210712572
## 312 0.9548458326 -0.655095750 -0.3289942717 0.0143945031 0.1351904014
## 313 1.5144733348 -0.978147488 -0.3298073975 0.0196016073 0.1781774955
## 314 1.6073932680 -0.893744765 -0.3957038318 0.0461424094 0.3417520118
## 315 1.0859546619 -0.676983452 -0.4386452730 0.0523048013 0.3709635470
## 316 1.6301280887 -1.158980050 -0.3725655160 0.0326332592 0.2633728593
## 317 1.6124681018 -1.258121610 -0.3927161158 0.0276664010 0.2368110660
## 318 1.4849647439 -1.400867028 -0.3491969280 -0.0023729041 0.0639644757
## 329 0.3781098121 0.732411892 -0.2601717912 0.0774420737 0.2379730565
## 330 0.3237606373 0.446096864 -0.3384277231 0.0727505672 0.2080884193
## 331 0.3649610920 0.355230593 -0.3167736986 0.0705347690 0.1904367318
## 332 -0.3540249814 0.672807428 -0.3840548625 0.0732223880 0.2120663526
## 333 -0.3631280734 0.604346208 -0.3820927553 0.0697587958 0.1983231536
## 334 0.2914331543 0.136200828 -0.3317368810 0.0384216311 0.1434583223
## 335 0.2732614296 0.102370126 -0.3334474108 0.0329500363 0.1181813511
## 336 0.3241512573 -0.257080073 0.5197949670 0.1062420764 0.1017389297
## 337 0.2237718964 -0.226438301 0.4691224565 0.1147295523 0.1432494967
## 338 0.1659383216 -0.224468784 0.4526291710 0.1247372724 0.1776789200
## 339 -0.0110511685 -0.086614142 0.3775434869 0.1013527864 0.1413218432
## 340 -0.7734405019 0.174307889 0.2667711359 0.1105613230 0.1485799084
## 341 -0.8671777329 0.003596959 0.2106684767 0.1101663936 0.1023728403
## 342 -0.1688662322 -0.499826069 0.1933050850 0.0963412681 -0.0021015315
## 343 -0.2339196688 -0.608693414 0.1227078328 0.0925235501 -0.0662285080
## 344 -0.3268556787 -0.523635226 0.0145686246 0.0814254333 -0.0581095237
## 345 -0.5764605498 -0.923919520 -0.0041801105 0.0887101944 0.1667386462
## 346 -0.2742532435 -0.859599992 -0.0643255552 0.0833341997 0.1522508661
## 347 -0.8388175966 0.003806081 -0.2466760635 0.0776493647 -0.0332585063
```

```
# Means of scores for all the PC's classified by status
tabmeansPC <- aggregate(sparrtyp_pca[,2:10],by=list(Status=new.life$Status),mean)# this tells mean which is a kind of t testS
tabmeansPC
```

```
##      Status      PC1      PC2      PC3      PC4      PC5
## 1 Developed -5.6410454 -0.56681284 -0.48999157 -0.061933504 0.109415127
## 2 Developing 0.4953113 0.04976893 0.04302365 0.005438064 -0.009607182
##      PC6      PC7      PC8      PC9
## 1 0.23093896 -0.057899320 0.087368532 0.044476129
## 2 -0.02027757 0.005083843 -0.007671383 -0.003905221
```

```
tabmeansPC <- tabmeansPC[rev(order(tabmeansPC$Status)),]
tabmeansPC
```

```
##      Status      PC1      PC2      PC3      PC4      PC5
## 2 Developing 0.4953113 0.04976893 0.04302365 0.005438064 -0.009607182
## 1 Developed -5.6410454 -0.56681284 -0.48999157 -0.061933504 0.109415127
```

```
##          PC6          PC7          PC8          PC9
## 2 -0.02027757  0.005083843 -0.007671383 -0.003905221
## 1  0.23093896 -0.057899320  0.087368532  0.044476129
```

```
tabfmeans <- t(tabmeansPC[,-1])
tabfmeans
```

```
##          2          1
## PC1  0.495311302 -5.64104538
## PC2  0.049768932 -0.56681284
## PC3  0.043023650 -0.48999157
## PC4  0.005438064 -0.06193350
## PC5 -0.009607182  0.10941513
## PC6 -0.020277567  0.23093896
## PC7  0.005083843 -0.05789932
## PC8 -0.007671383  0.08736853
## PC9 -0.003905221  0.04447613
```

```
colnames(tabfmeans) <- t(as.vector(tabmeansPC[1]))
tabfmeans
```

```
##          Developing   Developed
## PC1  0.495311302 -5.64104538
## PC2  0.049768932 -0.56681284
## PC3  0.043023650 -0.48999157
## PC4  0.005438064 -0.06193350
## PC5 -0.009607182  0.10941513
## PC6 -0.020277567  0.23093896
## PC7  0.005083843 -0.05789932
## PC8 -0.007671383  0.08736853
## PC9 -0.003905221  0.04447613
```

```
# Standard deviations of scores for all the PC's classified by status
tabstdsPC <- aggregate(sparrrtyp_pca[,2:10],by=list(Status=new.life$Status),sd)
tabstds <- t(tabstdsPC[,-1])
colnames(tabstds) <- t(as.vector(tabstdsPC[1]))
tabstds
```

```
##          Developed Developing
## PC1  1.4163380  0.8511136
## PC2  0.3873938  1.4473055
## PC3  0.5348674  1.1237566
## PC4  1.1343755  0.7403941
## PC5  1.9964649  0.5511383
## PC6  0.6030077  0.6444757
## PC7  1.6697355  0.3907827
## PC8  0.1214527  0.3897874
## PC9  0.2579177  0.3344983
```

```
t.test(PC1~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC1 by new.life$Status
## t = -18.097, df = 18.094, p-value = 4.88e-13
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -6.848484 -5.424229
## sample estimates:
## mean in group Developed mean in group Developing
##          -5.6410454          0.4953113
```

```
t.test(PC2~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC2 by new.life$Status
## t = -4.5264, df = 74.836, p-value = 2.219e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.8879525 -0.3452110
## sample estimates:
## mean in group Developed mean in group Developing
##          -0.56681284          0.04976893
```

```
t.test(PC3~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC3 by new.life$Status
## t = -3.5892, df = 32.327, p-value = 0.001082
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.8353894 -0.2306410
```

```
## sample estimates:
## mean in group Developed mean in group Developing
##      -0.48999157      0.04302365
```

```
t.test(PC4~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC4 by new.life$Status
## t = -0.24739, df = 18.293, p-value = 0.8074
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.6388576  0.5041145
## sample estimates:
## mean in group Developed mean in group Developing
##      -0.061933504      0.005438064
```

```
t.test(PC5~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC5 by new.life$Status
## t = 0.25209, df = 17.228, p-value = 0.804
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.8761083  1.1141529
## sample estimates:
## mean in group Developed mean in group Developing
##      0.109415127      -0.009607182
```

```
t.test(PC6~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC6 by new.life$Status
## t = 1.685, df = 20.564, p-value = 0.1071
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.05922897  0.56166202
## sample estimates:
## mean in group Developed mean in group Developing
##      0.23093896      -0.02027757
```

```
t.test(PC7~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC7 by new.life$Status
## t = -0.15965, df = 17.164, p-value = 0.875
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.8947124  0.7687461
## sample estimates:
## mean in group Developed mean in group Developing
##      -0.057899320      0.005083843
```

```
t.test(PC8~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC8 by new.life$Status
## t = 2.4058, df = 57.72, p-value = 0.01936
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.01595432 0.17412552
## sample estimates:
## mean in group Developed mean in group Developing
##      0.087368532      -0.007671383
```

```
t.test(PC9~new.life$Status,data=sparrrtp_pca)
```

```
##
##      Welch Two Sample t-test
##
## data:  PC9 by new.life$Status
## t = 0.74288, df = 22.352, p-value = 0.4653
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.08655939 0.18332209
## sample estimates:
## mean in group Developed mean in group Developing
##      0.044476129      -0.003905221
```



```
# F ratio tests
var.test(PC1~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC1 by new.life$Status
## F = 2.7692, num df = 17, denom df = 204, p-value = 0.0007142
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.502879 6.335374
## sample estimates:
## ratio of variances
##      2.769229
```

```
var.test(PC2~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC2 by new.life$Status
## F = 0.071645, num df = 17, denom df = 204, p-value = 1.867e-07
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.03888213 0.16390732
## sample estimates:
## ratio of variances
##      0.07164484
```

```
var.test(PC3~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC3 by new.life$Status
## F = 0.22654, num df = 17, denom df = 204, p-value = 0.0009568
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.1229456 0.5182762
## sample estimates:
## ratio of variances
##      0.2265415
```

```
var.test(PC4~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC4 by new.life$Status
## F = 2.3474, num df = 17, denom df = 204, p-value = 0.005308
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.273951 5.370332
## sample estimates:
## ratio of variances
##      2.347403
```

```
var.test(PC5~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC5 by new.life$Status
## F = 13.122, num df = 17, denom df = 204, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  7.121432 30.020340
## sample estimates:
## ratio of variances
##      13.12207
```

```
var.test(PC6~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC6 by new.life$Status
## F = 0.87545, num df = 17, denom df = 204, p-value = 0.7926
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4751139 2.0028389
## sample estimates:
## ratio of variances
##      0.8754525
```

```
var.test(PC7~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC7 by new.life$Status
## F = 18.257, num df = 17, denom df = 204, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##   9.908087 41.767464
## sample estimates:
## ratio of variances
##      18.2568
```

```
var.test(PC8~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC8 by new.life$Status
## F = 0.097086, num df = 17, denom df = 204, p-value = 2.01e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##   0.05268948 0.22211208
## sample estimates:
## ratio of variances
##   0.09708648
```

```
var.test(PC9~new.life$Status,data=sparrrtyp_pca)
```

```
##
##      F test to compare two variances
##
## data:  PC9 by new.life$Status
## F = 0.59453, num df = 17, denom df = 204, p-value = 0.212
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##   0.3226559 1.3601532
## sample estimates:
## ratio of variances
##   0.5945309
```

You can also embed plots, for example:

```
library(corrplot)
```

```
## corrplot 0.84 Loaded
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##   filter, lag
```

```
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
#For plotting the scatter density plots
library(GGally)
```

```
## Loading required package: ggplot2
```

```
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg      ggplot2
```

```
##
## Attaching package: 'GGally'
```

```
## The following object is masked from 'package:dplyr':
##
##   nasa
```

```
library(car)
```

```
## Loading required package: carData
```

```
##
## Attaching package: 'car'

## The following object is masked from 'package:dplyr':
##
##      recode

(LTPC1 <- leveneTest(PC1~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1  6.3462 0.01247 *
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(LTPC1 <- leveneTest(PC1~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1  6.3462 0.01247 *
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(p_PC1_1sided <- LTPC1[[3]][1]/2)

## [1] 0.006235298

(LTPC2 <- leveneTest(PC2~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1 10.572 0.001327 **
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(p_PC2_1sided=LTPC2[[3]][1]/2)

## [1] 0.0006636975

(LTPC3 <- leveneTest(PC3~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1  8.8989 0.003174 **
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(p_PC3_1sided <- LTPC3[[3]][1]/2)

## [1] 0.001586892

(LTPC4 <- leveneTest(PC4~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1  4.0487 0.04542 *
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(p_PC4_1sided <- LTPC4[[3]][1]/2)

## [1] 0.02271001

(LTPC5 <- leveneTest(PC5~new.life$Status,data=sparrrtyp_pca))

## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1 89.333 < 2.2e-16 ***
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(p_PC5_1sided <- LTPC5[[3]][1]/2)
```

```
## [1] 2.524963e-18
```

```
(LTPC6 <- leveneTest(PC6~new.life$Status,data=sparrrtyp_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group 1  0.4622 0.4973
##      221
```

```
(p_PC6_1sided <- LTPC6[[3]][1]/2)
```

```
## [1] 0.2486571
```

```
(LTPC7 <- leveneTest(PC7~new.life$Status,data=sparrrtyp_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value   Pr(>F)
## group 1 143.5 < 2.2e-16 ***
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC7_1sided <- LTPC7[[3]][1]/2)
```

```
## [1] 4.128881e-26
```

```
(LTPC8 <- leveneTest(PC8~new.life$Status,data=sparrrtyp_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group 1  0.3835 0.5364
##      221
```

```
(p_PC8_1sided <- LTPC8[[3]][1]/2)
```

```
## [1] 0.2681752
```

```
(LTPC9 <- leveneTest(PC9~new.life$Status,data=sparrrtyp_pca))
```

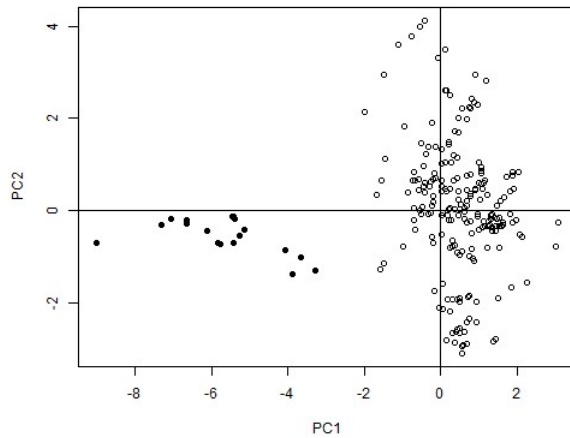
```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value   Pr(>F)
## group 1  3.2126 0.07444 .
##      221
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC9_1sided <- LTPC9[[3]][1]/2)
```

```
## [1] 0.03721944
```

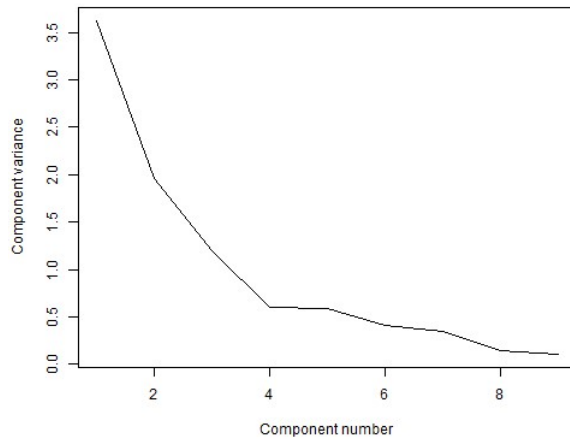
```
# Plotting the scores for the first and second components
# Legend("bottomLeft", legend=c("Developing", "Developed"), pch=c(1,16))
plot(sparrrtyp_pca$PC1, sparrrtyp_pca$PC2, pch=ifelse(sparrrtyp_pca$Status == "Developing", 1, 16), xlab="PC1", ylab="PC2", main="Life Expectancy against va.
abline(h=0)
abline(v=0)
```

Life Expectancy against values for PC1 & PC2



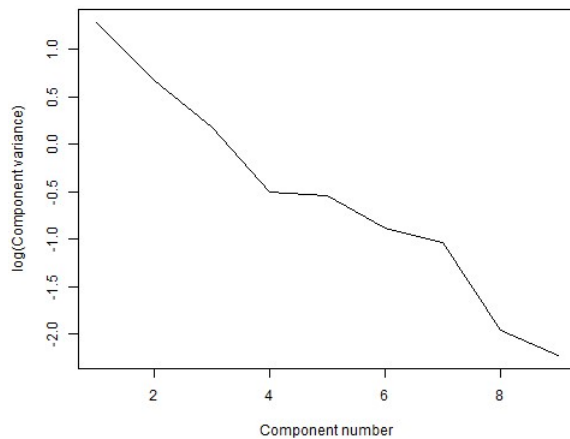
#####CONCLUSION#####
 #As we can see in the Scree diagram we have 1 to 8 PCA components on the x-axis and their respective Component variance on the Y-axis. The PCA1 remain
`plot(eigen_life, xlab = "Component number", ylab = "Component variance", type = "l", main = "Scree diagram")`

Scree diagram



`plot(log(eigen_life), xlab = "Component number", ylab = "log(Component variance)", type="l", main = "Log(eigenvalue) diagram")`

Log(eigenvalue) diagram



`print(summary(life_pca))`

Importance of components:
 ## PC1 PC2 PC3 PC4 PC5 PC6 PC7

```
## Standard deviation      1.9042 1.4017 1.0971 0.77628 0.76512 0.64360 0.59508
## Proportion of Variance 0.4029 0.2183 0.1337 0.06696 0.06505 0.04602 0.03935
## Cumulative Proportion  0.4029 0.6212 0.7549 0.82186 0.88691 0.93293 0.97228
##                          PC8      PC9
## Standard deviation      0.37606 0.32876
## Proportion of Variance  0.01571 0.01201
## Cumulative Proportion   0.98799 1.00000
```

```
#View(life_pca)
diag(cov(life_pca$x))
```

```
##          PC1          PC2          PC3          PC4          PC5          PC6          PC7          PC8
## 3.6259327 1.9646820 1.2035207 0.6026138 0.5854051 0.4142206 0.3541216 0.1414180
##          PC9
## 0.1080855
```

```
xlim <- range(life_pca$x[,1])
life_pca$x[,1]
```

```
##          1          2          3          4          5          6
## 0.91810581 -0.57392169 -0.67248183 -0.59156828 -0.28962900 0.47405423
##          7          8          9         10         11         12
## 0.11915157 0.22901749 0.47083026 0.77259234 0.24074672 -0.05400822
##          13         14         15         16         17         18
## 0.06350173 0.24179263 0.15961094 0.37010621 -4.06821259 -6.64575654
##          19         20         21         22         23         24
## -6.66448474 -7.06791306 -5.41091513 -0.97027646 -1.45913710 -1.68704136
##          25         26         27         28         29         30
## -1.56386258 -0.06544126 0.89460798 0.11090756 0.70190154 1.85632464
##          31         32         33         34         35         36
## 1.36813183 1.43016182 2.24311340 3.07256819 1.09064097 1.35781082
##          37         38         39         40         41         58
## 1.34673543 1.43962907 1.53781103 1.62277394 1.62099423 -0.32765016
##          59         60         61         62         63         64
## -0.24903772 0.02520158 0.06453709 -0.18754802 0.20620013 0.25507079
##          65         66         67         68         69         70
## 0.01863446 0.29079189 1.26364288 1.12376328 1.31599452 1.34838012
##          71         72         73         74         75         76
## 1.86467879 1.96164145 1.47824331 1.57126607 1.66089873 1.44867232
##          77         78         79         80         81         82
## 1.82595389 1.90864171 0.30884625 0.38258231 0.43667946 0.47981938
##          83         84         85         86         87         88
## 1.16660836 1.28108579 1.23588756 1.29651729 1.45707752 1.53560576
##          89         90         91         92         93         94
## 1.80024122 0.67456051 0.75346185 0.53959919 0.58522812 0.69312788
##          95         96         97         124        125        126
## 2.07582865 2.12265740 3.00770460 -5.46876493 -5.42049706 -3.66324483
##          143        144        145        146        147        148
## -7.31538135 -5.84522173 -5.78925731 0.68595109 0.91144883 1.07697950
##          149        150        151        152        153        154
## 1.05039772 1.12215879 1.16540133 -0.48885128 -0.22950006 -0.19162786
##          155        156        157        158        159        160
## 0.76510260 0.31652912 -0.13962970 0.03337833 0.19576415 0.35819872
##          161        162        163        164        165        166
## 0.46635022 0.57032663 0.73074239 -0.50263072 -0.54208710 0.86656682
##          167        172        173        174        175        176
## 0.97942624 -9.02562668 -5.25884243 0.36997386 0.53359534 0.67221833
##          177        178        179        180        181        182
## 0.79101714 0.89210492 0.98607533 0.68221937 1.05662917 1.06435280
##          183        184        185        186        187        188
## 0.63253325 1.07304407 1.00147216 1.58483777 1.52458002 0.49239049
##          189        190        191        192        195        196
## 0.61915136 0.55826890 1.48827359 -5.41631717 -0.17544390 0.44051708
##          197        198        199        200        201        202
## 0.50730971 0.50410397 0.04191401 0.47942874 0.55342265 0.73700693
##          203        204        205        206        219        220
## 0.82491605 0.87610956 0.73441103 0.92190285 -0.45430961 -0.24079452
##          221        222        223        224        225        226
## -1.57917705 -1.48410334 -0.68941944 0.02833083 0.21264910 0.46221905
##          227        228        229        230        231        232
## 0.27344995 0.44130499 1.73563411 1.86610689 1.89026381 2.02670387
##          237        238        239        240        241        242
## -3.29942717 -3.89925457 0.45538889 0.37573157 0.95872356 0.95573234
##          245        246        247        248        249        250
## 0.18753324 0.60468345 0.42604787 0.76876795 0.49812938 0.60700721
##          251        252        253        254        255        256
## 0.68519375 1.39556635 1.20278028 1.01375678 0.81642199 1.20465062
##          257        258        259        260        276        277
## 0.99575970 0.80049039 0.16445063 0.30748555 -1.50764914 -2.00482756
##          278        279        280        281        291        292
## -1.12432188 -0.75753303 -0.56217116 -0.40694303 -5.16205199 -6.11764755
##          293        294        295        296        297        298
## -0.74938015 -0.86993157 -0.52461999 -0.69208560 -0.24755224 -0.40251319
##          299        300        301        302        303        312
## -0.32860411 -0.14311146 0.25544310 0.16013776 0.10413837 -0.68237851
##          313        314        315        316        317        318
## -0.43336197 -0.45207083 -0.71163375 -0.27114456 -0.20567418 0.01832607
##          329        330        331        332        333        334
## 0.13714644 0.33025929 0.44448212 0.19493070 0.26884620 0.69241120
##          335        336        337        338        339        340
## 0.76344033 -0.41796026 -0.16244534 0.10214176 0.33060633 0.02475298
##          341        342        343        344        345        346
## 0.02653253 0.68145456 0.76220996 0.80996501 -0.99599472 -0.20674409
```

347
1.18300122

life_pca\$x

| ## | PC1 | PC2 | PC3 | PC4 | PC5 |
|-------|-------------|---------------|--------------|--------------|---------------|
| ## 1 | 0.91810581 | -2.4301913899 | 0.793531298 | -0.533230594 | -0.0175328973 |
| ## 2 | -0.57392169 | 0.4333515203 | -0.793434928 | -0.341606741 | 0.5782669139 |
| ## 3 | -0.67248183 | 0.6476715726 | -1.078724527 | -0.203817667 | 1.1191605992 |
| ## 4 | -0.59156828 | 0.6835643070 | -1.058862820 | -0.217214605 | 1.0980569937 |
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| ## 16 | 0.37010621 | -2.8679905052 | 0.152638681 | 0.432605187 | -0.3141871536 |
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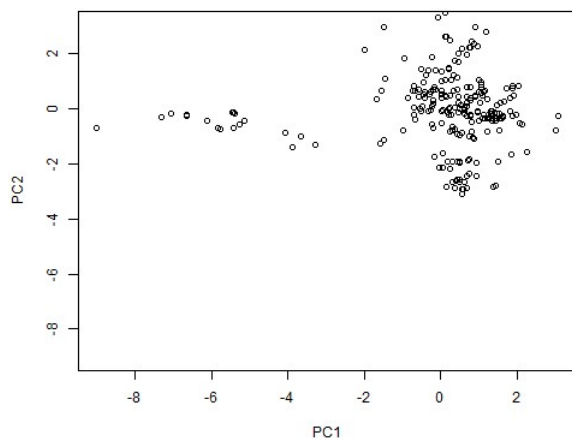
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| ## | 293 | -0.74938015 | 0.6566609674 | 0.995925650 | 0.177794571 | 0.2488430123 |
| ## | 294 | -0.86993157 | 0.4054019300 | 0.485763699 | 2.066528273 | -0.5868775670 |
| ## | 295 | -0.52461999 | 1.4576663196 | 1.594491612 | 0.809207639 | -0.3913391169 |
| ## | 296 | -0.69208560 | 0.8412515347 | 0.528162914 | 2.346942737 | -0.7303708448 |
| ## | 297 | -0.24755224 | 1.8923667696 | 1.654879182 | 0.641464668 | -0.3992459141 |
| ## | 298 | -0.40251319 | 1.2354547147 | 0.715447735 | 2.523636294 | -1.2355161239 |
| ## | 299 | -0.32860411 | 1.3952198829 | 0.604118862 | 2.566314840 | -1.1946445442 |
| ## | 300 | -0.14311146 | 1.3891574456 | 0.414559854 | 2.861531441 | -1.2052246079 |
| ## | 301 | 0.25544310 | 2.5077644594 | 1.599865772 | 0.851626763 | -0.5525968233 |
| ## | 302 | 0.16013776 | 2.6146873146 | 1.286455132 | 0.891601508 | -0.4008214881 |
| ## | 303 | 0.10413837 | 2.6172961494 | 0.980455729 | 0.901829871 | -0.3222992394 |
| ## | 312 | -0.68237851 | -0.4053487390 | -1.333147875 | 1.158062242 | 0.9548458326 |
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| ## | 314 | -0.45207083 | 0.5324233909 | -0.363749492 | -0.257284363 | 1.6073932680 |
| ## | 315 | -0.71163375 | -0.2023537274 | -1.368326110 | 1.203733834 | 1.0859546619 |
| ## | 316 | -0.27114456 | 0.6316536967 | -0.364706366 | -0.347632474 | 1.6301280887 |
| ## | 317 | -0.20567418 | 0.6906078360 | -0.348826653 | -0.381381532 | 1.6124681018 |
| ## | 318 | 0.01832607 | 0.6517634645 | -0.324661038 | -0.448703430 | 1.4849647439 |
| ## | 329 | 0.13714644 | 0.4239099515 | 0.747877393 | -0.258484485 | 0.3781098121 |
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| ## | 331 | 0.44448212 | 0.7140503434 | 0.967476645 | -0.410490737 | 0.3649610920 |
| ## | 332 | 0.19493070 | -0.2115757131 | -0.181826735 | 1.294205255 | -0.3540249814 |
| ## | 333 | 0.26884620 | -0.1971183182 | -0.207255356 | 1.279341213 | -0.3631280734 |
| ## | 334 | 0.69241120 | 0.7683025718 | 0.969532269 | -0.523269439 | 0.2914331543 |
| ## | 335 | 0.76344033 | 0.7740136342 | 0.949520142 | -0.537339205 | 0.2732614296 |
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| ## | 339 | 0.33060633 | 1.2062096295 | 0.919500588 | -0.581245615 | -0.0110511685 |
| ## | 340 | 0.02475298 | 0.4106821113 | -0.343331976 | 1.434003937 | -0.7734405019 |
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| ## | 344 | 0.80996501 | 2.4358852536 | 1.251748335 | -0.168973598 | -0.3268556787 |
| ## | 345 | -0.99599472 | -0.7804000440 | 1.757005996 | 2.254637244 | -0.5764605498 |
| ## | 346 | -0.20674409 | 0.3185905541 | 3.442801704 | 0.228757981 | -0.2742532435 |
| ## | 347 | 1.18300122 | 2.8037016820 | 1.444887966 | 0.252730964 | -0.8388175966 |
| ## | | PC6 | PC7 | PC8 | PC9 | |
| ## | 1 | 0.240938682 | 0.0130295440 | -0.1498950075 | -0.1814814097 | |
| ## | 2 | 0.647841484 | -0.0480854802 | 0.0600008331 | 0.1273928995 | |
| ## | 3 | 0.117210462 | 0.1089494838 | 0.0723476109 | 0.0198809968 | |
| ## | 4 | 0.153832950 | 0.0665278985 | 0.0537700989 | 0.0389523094 | |
| ## | 5 | -0.157382132 | -0.0469467295 | -0.0186962485 | -0.2887434138 | |
| ## | 6 | -0.166596556 | -1.1436135706 | -0.1345982667 | -0.4485775195 | |
| ## | 7 | -0.030921034 | -0.0213842095 | -0.0433820183 | -0.4101327038 | |
| ## | 8 | -0.109842021 | -0.0466080297 | -0.0552125883 | -0.4579078212 | |
| ## | 9 | -0.014901352 | -0.0009488186 | -0.0783265225 | -0.4726062394 | |
| ## | 10 | 0.048958780 | 0.1292403521 | -0.0649603586 | -0.5266488410 | |
| ## | 11 | -0.276536086 | 0.2233142445 | -1.7865322105 | -0.1918587370 | |
| ## | 12 | -0.407156707 | 0.2342807212 | -0.0924351053 | -0.3947138707 | |
| ## | 13 | 0.464506547 | 0.2155640220 | -0.1092140953 | -0.4708278899 | |
| ## | 14 | -0.366940431 | 0.2104457030 | -0.1398881380 | -0.5182338388 | |
| ## | 15 | -0.110801420 | 0.1918281522 | -0.1448572680 | -0.5389011252 | |
| ## | 16 | -0.018959587 | 0.1952023191 | -0.1572811460 | -0.5934334131 | |
| ## | 17 | 1.224609380 | -1.7931937987 | 0.0622515975 | 0.6091247149 | |
| ## | 18 | -0.274792894 | -0.6068028783 | 0.0146586842 | -0.0293836787 | |
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| ## | 22 | 0.382819937 | 0.2148727610 | 0.1132568033 | -0.1605886086 | |
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| ## | 26 | -0.186313685 | 0.0671588984 | 0.1434475711 | -0.1571296150 | |
| ## | 27 | -0.098952932 | -1.8461322856 | -0.0387797926 | -0.3104346216 | |
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| ## | 30 | -1.513503513 | 0.5473745137 | -1.5695176886 | 0.9226634832 | |
| ## | 31 | -1.887772154 | 0.4797087599 | 0.0907540528 | 0.6417135123 | |
| ## | 32 | -1.905252876 | 0.4558585500 | 0.0851894954 | 0.6092194753 | |
| ## | 33 | -1.485206358 | 0.2883878740 | 1.7897770972 | 0.2107561991 | |
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| ## | 36 | -0.362842603 | 0.0866872035 | -0.0806865820 | -0.1702305875 | |
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| ## | 40 | -0.885674387 | 0.1205776603 | -0.1168428342 | -0.4988834953 | |
| ## | 41 | -0.890638962 | 0.0930021722 | -0.1150181988 | -0.4841826723 | |
| ## | 48 | -0.061598053 | 0.4207197471 | 0.0106421665 | -0.1447450737 | |
| ## | 59 | -0.143610574 | 0.3596005408 | -0.0240071855 | -0.2065587197 | |
| ## | 60 | -0.145715990 | 0.4326664878 | -0.0274174387 | -0.3448237919 | |
| ## | 61 | -0.070233673 | 0.3801987857 | -0.0406130800 | -0.2967293717 | |
| ## | 62 | 0.256897624 | 0.2560649772 | -0.0341710698 | -0.2418075940 | |
| ## | 63 | 0.035625440 | 0.3010689462 | -0.0431366943 | -0.2877446975 | |
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| ## | 67 | 0.048386265 | -0.8615960443 | -0.1893266660 | -0.5805167752 | |
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| ## | 69 | 0.830645277 | 0.3091846798 | -0.0021225288 | -0.0464213843 | |
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| | | | | | |
|----|-----|--------------|---------------|---------------|---------------|
| ## | 76 | 0.530496384 | 0.1288435290 | -0.0271281208 | -0.1946289206 |
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| ## | 167 | 0.210092606 | -0.0728221427 | 0.0622821950 | -0.0897905812 |
| ## | 172 | -1.402038067 | -3.6435322230 | -0.1428785568 | -0.1092664074 |
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## 237 0.636175345 -1.4216931643 -0.0218066204 0.0131484478
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## 257 0.381559599 0.1784858397 -0.0126907619 0.0820877194
## 258 -0.389245547 0.1716441019 1.6752162639 -0.1363710643
## 259 -0.843812120 0.3288399317 -0.0456391343 0.1699016683
## 260 -0.834385821 0.3416434151 -0.0516611225 0.1470501310
## 266 -0.122054806 0.7017769239 -0.1949777398 0.0206843082
## 277 -0.500482151 0.8117089224 -1.9436261336 0.3491196647
## 278 -0.068717887 0.5850027993 -0.2508985174 -0.0303068258
## 279 0.389576101 0.5296151345 -0.2639518334 0.0017668657
## 280 0.536391050 0.5377580061 -0.3033411281 -0.0180403000
## 281 0.719630324 0.5774310269 -0.3087342965 -0.0584579572
## 291 0.416374996 2.0092014824 0.2330455454 0.0512028313
## 292 -0.144939967 0.7308653697 0.1718102148 0.1325579512
## 293 -0.084900964 0.3031117121 0.0519290762 0.0308599164
## 294 -0.101784443 0.0782387538 0.0825168555 -0.0542869947
## 295 -0.615400753 -0.1208795253 0.0517016902 -0.1443082759
## 296 -0.416404218 -0.0485450530 0.0593111327 -0.1586898885
## 297 -0.938873629 -0.1616584245 0.0287124723 -0.3209162352
## 298 -0.632213818 -0.2959084422 0.0390321776 -0.3279261486
## 299 -0.809979426 -0.2956721217 0.0265826592 -0.4259985785
## 300 -0.692828035 -0.1878183109 0.0210545815 -0.5107021146
## 301 -1.013812896 -0.2415150070 0.0059536637 -0.5607192471
## 302 -1.162820461 -0.2577099731 -0.0006077228 -0.5967291894
## 303 -1.104167037 -0.2735907198 -0.0086716733 -0.6210712572
## 312 -0.655095750 -0.3289942717 0.0143945031 0.1351904014
## 313 -0.978147488 -0.3298073975 0.0196016073 0.1781774955
## 314 -0.893744765 -0.3957038318 0.0461424094 0.3417520118
## 315 -0.676983452 -0.4386452730 0.0523048013 0.3709635470
## 316 -1.158980050 -0.3725655160 0.0326332592 0.2633728593
## 317 -1.258121610 -0.3927161158 0.0276664010 0.2368110660
## 318 -1.400867028 -0.3491969280 -0.0023729041 0.0639644757
## 329 0.732411892 -0.2601717912 0.0774420737 0.2379730565
## 330 0.446096864 -0.3384277231 0.0727505672 0.2080884193
## 331 0.355230593 -0.3167736986 0.0705347690 0.1904367318
## 332 0.672807428 -0.3840548625 0.0732223880 0.2120663526
## 333 0.604346208 -0.3820927553 0.0697587958 0.1983231536
## 334 0.136200828 -0.3317368810 0.0384216311 0.1434583223
## 335 0.102370126 -0.3334474108 0.0329500363 0.1181813511
## 336 -0.257080073 0.5197949670 0.1062420764 0.1017389297
## 337 -0.226438301 0.4691224565 0.1147295523 0.1432494967
## 338 -0.224468784 0.4526291710 0.1247372724 0.1776789200
## 339 -0.086614142 0.3775434869 0.1013527864 0.1413218432
## 340 0.174307889 0.2667711359 0.1105613230 0.1485799084
## 341 0.003596959 0.2106684767 0.1101663936 0.1023728403
## 342 -0.499826069 0.1933050850 0.0963412681 -0.0021015315
## 343 -0.608693414 0.1227078328 0.0925235501 -0.0662285080
## 344 -0.523635226 0.0145686246 0.0814254333 -0.0581095237
## 345 -0.923919520 -0.0041801105 0.0887101944 0.1667386462
## 346 -0.859599992 -0.0643255552 0.0833341997 0.1522508661
## 347 0.003806081 -0.2466760635 0.0776493647 -0.0332585063
```

```
plot(life_pca$x, xlim=xlim, ylim=ylim)
```



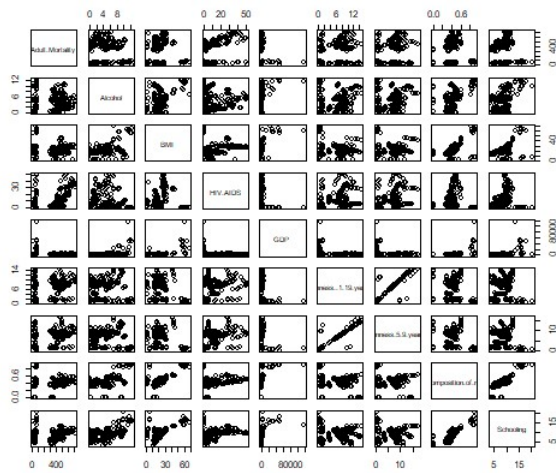
```
life_pca$rotation[,1]
```

```
##           Adult.Mortality           Alcohol
##           0.14827666           -0.34081600
##           BMI           HIV.AIDS
##           -0.40656283           0.05922995
##           GDP           thinness..1.19.years
##           -0.39233464           0.28556632
##           thinness.5.9.years Income.composition.of.resources
##           0.25874653           -0.45891114
##           Schooling
##           -0.42430316
```

```
life_pca$rotation
```

```
##           PC1           PC2           PC3
## Adult.Mortality  0.14827666  0.38241516  0.47846329
## Alcohol         -0.34081600  0.19187743 -0.40418673
## BMI             -0.40656283  0.20461534  0.03047904
## HIV.AIDS        0.05922995  0.44136974  0.50881513
## GDP            -0.39233464 -0.01980602 -0.15932739
## thinness..1.19.years  0.28556632  0.46136350 -0.40465670
## thinness.5.9.years  0.25874653  0.50203599 -0.37957956
## Income.composition.of.resources -0.45891114  0.17568938  0.09796028
## Schooling       -0.42430316  0.29001994  0.07123932
##           PC4           PC5           PC6           PC7
## Adult.Mortality -0.713801546  0.2630123 -0.15362555  0.01717352
## Alcohol         0.069911396  0.4213173 -0.69624393  0.04186678
## BMI             -0.089329233 -0.4005610  0.02007955  0.78303921
## HIV.AIDS        0.545102708 -0.3077228 -0.33178317 -0.18530624
## GDP            -0.396021560 -0.5892660 -0.15759772 -0.53707026
## thinness..1.19.years -0.037104579 -0.0943236  0.16650997 -0.06566490
## thinness.5.9.years -0.005838548 -0.1080104  0.16810265  0.01569160
## Income.composition.of.resources 0.048855132  0.1843825  0.44765025 -0.12957487
## Schooling       0.140898321  0.3104502  0.31614627 -0.20167106
##           PC8           PC9
## Adult.Mortality -0.003374833 -0.01582092
## Alcohol         -0.015235161 -0.12051623
## BMI             0.072871713  0.06795270
## HIV.AIDS        0.012225833 -0.07995943
## GDP            -0.022684395  0.04932024
## thinness..1.19.years  0.692872013 -0.13951986
## thinness.5.9.years -0.699952844  0.08240398
## Income.composition.of.resources -0.102977752 -0.69625358
## Schooling       0.114769915  0.67879063
```

```
plot(life1)
```



life_pca\$x

| ## | PC1 | PC2 | PC3 | PC4 | PC5 |
|-------|-------------|---------------|--------------|--------------|---------------|
| ## 1 | 0.91810581 | -2.4301913899 | 0.793531298 | -0.533230594 | -0.0175328973 |
| ## 2 | -0.57392169 | 0.4333515203 | -0.793434928 | -0.341606741 | 0.5782669139 |
| ## 3 | -0.67248183 | 0.6476715726 | -1.078724527 | -0.203817667 | 1.1191605992 |
| ## 4 | -0.59156828 | 0.6835643070 | -1.058862820 | -0.217214605 | 1.0980569937 |
| ## 5 | -0.28962900 | 0.5339951360 | -1.218390415 | -0.466143294 | 0.6713093431 |
| ## 6 | 0.47405423 | 0.2316448022 | -1.268192090 | -0.346765205 | 1.2210175853 |
| ## 7 | 0.11915157 | 0.4749798502 | -1.178959513 | -0.521310879 | 0.5116376584 |
| ## 8 | 0.22901749 | 0.4785534202 | -1.245295735 | -0.562259488 | 0.4420342438 |
| ## 9 | 0.47083026 | 0.4261414199 | -1.185820260 | -0.574090941 | 0.3638281025 |
| ## 10 | 0.77259234 | 0.3756658089 | -1.130857082 | -0.537619431 | 0.3982003623 |
| ## 11 | 0.24074672 | -0.8139515341 | -0.106945601 | -0.525913286 | 0.4163370336 |
| ## 12 | -0.05400822 | -2.1146446368 | 0.957498257 | -0.532881908 | 0.5218295607 |
| ## 13 | 0.06350173 | -2.1288489021 | 0.892830645 | -0.593385947 | 0.4280641594 |
| ## 14 | 0.24179263 | -2.1763774455 | 0.931429855 | -0.636684257 | 0.3162000173 |
| ## 15 | 0.15961094 | -2.8194280474 | 0.121556032 | 0.491540693 | -0.1705449227 |
| ## 16 | 0.37010621 | -2.8679905052 | 0.152638681 | 0.432605187 | -0.3141871536 |
| ## 17 | -4.06821259 | -0.8547778602 | 0.043873650 | 1.304080152 | 3.1275144939 |
| ## 18 | -6.64575654 | -0.2802188680 | -1.325149015 | -0.696923365 | -1.2865332194 |
| ## 19 | -6.66448474 | -0.2033388196 | -1.185222178 | -1.021489061 | -1.3751417048 |
| ## 20 | -7.06791306 | -0.1905379137 | -0.972201852 | -0.899439726 | -1.2263904883 |
| ## 21 | -5.41091513 | -0.1778042028 | -0.227099501 | 0.661791844 | 1.0357444389 |
| ## 22 | -0.97027646 | 1.8135566356 | -0.256676319 | -0.402366732 | 0.2310707264 |
| ## 23 | -1.45913710 | 1.1132384994 | 1.065805280 | -0.298023175 | 0.3687660074 |
| ## 24 | -1.68704136 | 0.3422697809 | 2.557863866 | -0.255692018 | 0.3516604441 |
| ## 25 | -1.56386258 | 0.6561647482 | 2.635247469 | -0.204691476 | 0.4156707838 |
| ## 26 | -0.06544126 | 3.2998117025 | 0.676723162 | -0.054463697 | 0.1721049935 |
| ## 27 | 0.89460798 | 2.9582740340 | 0.643297408 | 0.191098143 | 0.6644705051 |
| ## 28 | 0.11090756 | 3.4883815897 | 0.611366421 | 0.158009468 | -0.3187223924 |
| ## 29 | 0.70190154 | -1.8675768491 | -0.942757339 | 0.541597223 | -0.1936541729 |
| ## 30 | 1.85632464 | -1.6531777408 | -0.562276614 | -0.473772896 | -0.2017346375 |
| ## 31 | 1.36813183 | -2.8448366908 | 0.360041103 | -0.520666793 | -0.0314499645 |
| ## 32 | 1.43016182 | -2.7760648374 | 0.346164017 | -0.535130258 | -0.0315175812 |
| ## 33 | 2.24311340 | -1.5635810597 | -0.687775707 | -0.633492519 | -0.2782235800 |
| ## 34 | 3.07256819 | -0.2602776962 | -1.559830442 | -0.679607244 | -0.6830402148 |
| ## 35 | 1.09064097 | -0.3562681004 | -0.701198012 | -0.420909136 | 0.2635627238 |
| ## 36 | 1.35781082 | -0.4421401763 | -0.742376312 | -0.494460167 | 0.0966252232 |
| ## 37 | 1.34673543 | -0.3640955357 | -0.857577271 | -0.485721421 | 0.2041438617 |
| ## 38 | 1.43962907 | -0.3316560582 | -0.886812843 | -0.514914988 | 0.1724852393 |
| ## 39 | 1.53781103 | -0.3275796257 | -0.904103403 | -0.551849913 | 0.1418343969 |
| ## 40 | 1.62277394 | -0.3036623388 | -0.971538950 | -0.562020551 | 0.1126199590 |
| ## 41 | 1.62099423 | -0.2666948440 | -1.004953649 | -0.543584670 | 0.1350396673 |
| ## 42 | -0.32765016 | -0.0628821353 | -0.178847737 | -0.248099034 | 0.5084790067 |
| ## 43 | -0.24903772 | -0.0478410540 | -0.206282733 | -0.319697630 | 0.4093923695 |
| ## 44 | 0.02520158 | -0.0936089839 | -0.151612361 | -0.356479861 | 0.3382001226 |
| ## 45 | 0.06453709 | -0.0516723207 | -0.146379597 | -0.333170388 | 0.3412978409 |
| ## 46 | -0.18754802 | -0.6989259294 | -1.041341540 | 0.941033509 | -0.2019853654 |
| ## 47 | 0.20620013 | 0.0232058609 | -0.101444072 | -0.390230553 | 0.3026319908 |
| ## 48 | 0.25507079 | 0.0566011033 | -0.143760747 | -0.414248546 | 0.2404697599 |
| ## 49 | 0.01863446 | -0.5211725236 | -0.981661799 | 0.824462227 | -0.1734359029 |
| ## 50 | 0.29079189 | -0.6440672180 | -1.043786855 | 0.785852506 | -0.3392799185 |
| ## 51 | 1.26364288 | -0.3343459680 | -0.278204813 | -0.270080448 | 0.6189094481 |
| ## 52 | 1.12376328 | -0.2191792263 | -0.192343733 | -0.648550991 | -0.3612474583 |
| ## 53 | 1.31599452 | -0.0885534809 | 0.058894720 | -0.813765963 | -0.4312579500 |
| ## 54 | 1.34838012 | -0.0819188811 | -0.005755765 | -0.779780498 | -0.4536915101 |
| ## 55 | 1.86467879 | -0.2525182467 | -0.251607808 | -0.613832948 | 0.2852113206 |
| ## 56 | 1.96164145 | -0.2157903577 | -0.256368399 | -0.597523626 | 0.2511512596 |
| ## 57 | 1.47824331 | 0.1158020886 | -0.196711533 | -0.730730455 | -0.3695354784 |
| ## 58 | 1.57126607 | 0.2072463133 | -0.137659189 | -0.774225471 | -0.3828490968 |
| ## 59 | 1.66089873 | 0.2785369251 | -0.105210063 | -0.807316908 | -0.3914003551 |
| ## 60 | 1.44867232 | -0.4471227297 | -1.100533602 | 0.689406092 | -0.9726862265 |
| ## 61 | 1.82595389 | 0.4104047190 | -0.058457170 | -0.777283112 | -0.4549783800 |
| ## 62 | 1.90864171 | 0.4647438253 | -0.073921093 | -0.755959738 | -0.4986175252 |
| ## 63 | 0.30884625 | -2.6619941820 | 0.817099866 | 0.917208003 | -0.5933490016 |
| ## 64 | 0.38258231 | -2.6155787283 | 0.821481296 | 0.911146373 | -0.6201175990 |

| | | | | | |
|--------|-------------|---------------|--------------|--------------|---------------|
| ## 81 | 0.43667946 | -2.5669689778 | 0.780474298 | 0.943178774 | -0.6399520355 |
| ## 82 | 0.47981938 | -2.5526347814 | 0.761188568 | 0.972740794 | -0.6653726912 |
| ## 83 | 1.16660836 | -0.3282692893 | -0.277867445 | -0.571472898 | -0.3377499252 |
| ## 84 | 1.28108579 | -0.3070162800 | -0.239079100 | -0.571727427 | -0.3459685484 |
| ## 85 | 1.23588756 | -0.2302604693 | -0.344369988 | -0.593723045 | -0.3105120598 |
| ## 86 | 1.29651729 | -0.1705666724 | -0.366067306 | -0.577187292 | -0.3310778393 |
| ## 87 | 1.45707752 | -0.1893638918 | -0.415297522 | -0.589663717 | -0.4201972397 |
| ## 88 | 1.53560576 | -0.1515520328 | -0.450143335 | -0.577771661 | -0.4374709452 |
| ## 89 | 1.80024122 | -0.0753081796 | -0.469168830 | -0.692106090 | -0.5176271975 |
| ## 90 | 0.67456051 | -2.4250099938 | 1.396496216 | -0.570079595 | -0.0535134285 |
| ## 91 | 0.75346185 | -2.3475826772 | 1.379945143 | -0.662062771 | -0.0941116430 |
| ## 92 | 0.53959919 | -2.9385916192 | 0.531881439 | 0.596597796 | -0.4992902257 |
| ## 93 | 0.58522812 | -2.9031683875 | 0.487220729 | 0.582328699 | -0.5384801241 |
| ## 94 | 0.69312788 | -2.8940877842 | 0.413968404 | 0.578052965 | -0.5593901024 |
| ## 95 | 2.07582865 | -0.5072683959 | -1.538896975 | 0.468490728 | -1.0531883557 |
| ## 96 | 2.12265740 | -0.5621513859 | -1.679216890 | 0.571652790 | -1.1381284181 |
| ## 97 | 3.00770460 | -0.7723051211 | -1.807726451 | 0.335840078 | -1.4303531638 |
| ## 124 | -5.46876493 | -0.1146148335 | -0.159298136 | 0.715506687 | 1.0570222874 |
| ## 125 | -5.42049706 | -0.1345702368 | -0.146161752 | 0.710768112 | 1.0606292400 |
| ## 126 | -3.66324483 | -1.0127525953 | -0.306091010 | 1.109993121 | 2.8381624070 |
| ## 143 | -7.31538135 | -0.3197903806 | -0.717951071 | -0.795122815 | -0.9893001847 |
| ## 144 | -5.84522173 | -0.7059455366 | -0.233357913 | -0.367477640 | -0.7780745837 |
| ## 145 | -5.78925731 | -0.7196844830 | -0.269987223 | -0.338094191 | -0.7004846525 |
| ## 146 | 0.68595109 | 0.4429568003 | 0.109820534 | -0.190432591 | 0.1046170878 |
| ## 147 | 0.91144883 | 0.4512008098 | 0.220460922 | -0.226985463 | -0.0297821792 |
| ## 148 | 1.07697950 | 0.4647015183 | 0.222403075 | -0.219087689 | -0.1254271710 |
| ## 149 | 1.05039772 | 0.5658093532 | 0.236639133 | -0.146154659 | -0.0925551007 |
| ## 150 | 1.12215879 | 0.6077078274 | 0.260512844 | -0.075703303 | -0.1170667491 |
| ## 151 | 1.16540133 | 0.6673606838 | 0.277403345 | -0.005974872 | -0.1663172844 |
| ## 152 | -0.48885128 | 0.0710894653 | 0.899048586 | -0.533677868 | 0.0917126823 |
| ## 153 | -0.22950006 | 0.0972779142 | 1.155226149 | -0.731341190 | -0.1685032947 |
| ## 154 | -0.19162786 | 0.1874337983 | 1.091722476 | -0.697464872 | -0.1536231954 |
| ## 155 | 0.76510260 | -0.2289771404 | 0.918775322 | -0.523000421 | 0.6997287932 |
| ## 156 | 0.31652912 | -0.7789580641 | -0.426270298 | 1.119955431 | 0.3759787047 |
| ## 157 | -0.13962970 | 0.7110476648 | 0.689562222 | -0.521635838 | 0.0533678575 |
| ## 158 | 0.03337833 | 1.0280403561 | 0.874964106 | -0.441894856 | -0.0255455120 |
| ## 159 | 0.19576415 | 1.4768980630 | 1.209522731 | -0.142007998 | -0.2430156635 |
| ## 160 | 0.35819872 | 1.7350943740 | 1.314768365 | -0.169822210 | -0.2919823634 |
| ## 161 | 0.46635022 | 2.0168572971 | 1.451681671 | -0.061375649 | -0.3786823675 |
| ## 162 | 0.57032663 | 2.2051843366 | 1.412654899 | -0.100030306 | -0.3712452475 |
| ## 163 | 0.73074239 | 2.2451377818 | 1.393745864 | -0.094427918 | -0.4878414249 |
| ## 164 | -0.50263072 | -0.0686190010 | 3.127366974 | 0.055907625 | 0.0396225558 |
| ## 165 | -0.54208710 | 0.0002955803 | 2.806731541 | 0.102153753 | 0.1469501407 |
| ## 166 | 0.86656682 | 2.3516651241 | 0.646795271 | 0.035662204 | -0.4176868590 |
| ## 167 | 0.97942624 | 2.2847456926 | 0.352944490 | 0.088490229 | -0.4865064591 |
| ## 172 | -9.02562668 | -0.6987070657 | -1.906122220 | -3.511676420 | -5.2330004274 |
| ## 173 | -5.25884243 | -0.5544514492 | -0.402012201 | 0.192454027 | 0.2672143002 |
| ## 174 | 0.36997386 | 0.0408378967 | 0.644550197 | -0.267389719 | 0.2007331104 |
| ## 175 | 0.53359534 | 0.1252587802 | 0.771864183 | -0.250651292 | 0.1012385262 |
| ## 176 | 0.67221833 | 0.2020887211 | 0.844345394 | -0.295207330 | 0.0978618246 |
| ## 177 | 0.79101714 | 0.3146431225 | 0.945500191 | -0.347887657 | 0.0469609969 |
| ## 178 | 0.89210492 | 0.4729088949 | 1.107382791 | -0.344225670 | 0.0379248169 |
| ## 179 | 0.98607533 | 0.5983738710 | 1.197485695 | -0.375865760 | -0.0024807695 |
| ## 180 | 0.68221937 | -0.2677459818 | 0.085221946 | 1.425871879 | -0.6680529575 |
| ## 181 | 1.05662917 | 0.8067261117 | 1.310451202 | -0.351908886 | 0.0057044456 |
| ## 182 | 1.06435280 | 0.8758743131 | 1.328374323 | -0.288268685 | 0.0239803129 |
| ## 183 | 0.63253325 | -0.0238430059 | 0.122486863 | 1.564846218 | -0.6107957776 |
| ## 184 | 1.07304407 | 0.9443751737 | 1.277084871 | -0.205538191 | 0.0047948980 |
| ## 185 | 1.00147216 | 1.0364678740 | 1.249072016 | -0.121499241 | 0.0514280819 |
| ## 186 | 1.58483777 | -0.3448498978 | -0.780950728 | -0.454058807 | -0.5800290759 |
| ## 187 | 1.52458002 | -0.7984692636 | -1.414332780 | 0.398091284 | -0.9341047238 |
| ## 188 | 0.49239049 | -2.6547883189 | 1.049416345 | -0.394179204 | -0.1527811157 |
| ## 189 | 0.61915136 | -2.6389287911 | 0.999649089 | -0.409563758 | -0.1866202990 |
| ## 190 | 0.55826890 | -3.0947262736 | 0.341018870 | 0.473210647 | -0.5549488986 |
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## PC6 PC7 PC8 PC9
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plot(life_pca)

