f2

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setwd("/Users/auzzer\_pang")  
data = read.csv("f2.csv")

#计算相关矩阵  
round(cor(data[,2:8]),3)

## X1 X2 X3 X4 X5 X6 X7  
## X1 1.000 0.850 0.856 0.860 -0.054 0.585 0.493  
## X2 0.850 1.000 0.902 0.849 -0.265 0.904 0.598  
## X3 0.856 0.902 1.000 0.988 -0.106 0.767 0.329  
## X4 0.860 0.849 0.988 1.000 -0.103 0.683 0.265  
## X5 -0.054 -0.265 -0.106 -0.103 1.000 -0.321 -0.434  
## X6 0.585 0.904 0.767 0.683 -0.321 1.000 0.497  
## X7 0.493 0.598 0.329 0.265 -0.434 0.497 1.000

PCA=princomp(data[,2:8],cor=T)  
summary(PCA,loadings=T)

## Importance of components:  
## Comp.1 Comp.2 Comp.3 Comp.4 Comp.5  
## Standard deviation 2.1536379 1.1336606 0.76583793 0.62292326 0.29539325  
## Proportion of Variance 0.6625937 0.1835981 0.08378682 0.05543334 0.01246531  
## Cumulative Proportion 0.6625937 0.8461918 0.92997862 0.98541196 0.99787727  
## Comp.6 Comp.7  
## Standard deviation 0.112155903 0.0477512510  
## Proportion of Variance 0.001796992 0.0003257403  
## Cumulative Proportion 0.999674260 1.0000000000  
##   
## Loadings:  
## Comp.1 Comp.2 Comp.3 Comp.4 Comp.5 Comp.6 Comp.7  
## X1 0.413 0.188 0.288 0.454 0.638 0.305   
## X2 0.457 -0.201 0.246 -0.821 -0.122  
## X3 0.438 0.240 -0.180 -0.409 0.738  
## X4 0.422 0.278 -0.229 0.270 -0.420 0.121 -0.654  
## X5 -0.132 0.734 0.543 -0.368 -0.105   
## X6 0.400 -0.123 -0.200 -0.734 0.178 0.459   
## X7 0.272 -0.524 0.705 -0.382

scores=PCA$scores  
scores1=as.data.frame(scores[,1])  
company=as.data.frame(data$企业)  
data2=cbind.data.frame(scores1,company)  
data2

## scores[, 1] data$企业  
## 1 -0.6211539 A  
## 2 0.7211170 B  
## 3 -1.4842837 C  
## 4 -4.2067779 D  
## 5 3.9293521 E  
## 6 4.0222720 F  
## 7 1.8308536 G  
## 8 -1.7695543 H  
## 9 -0.1614966 I  
## 10 0.6325302 J  
## 11 -0.7503734 K  
## 12 -0.9041138 L  
## 13 -1.0690705 M  
## 14 1.8775799 N  
## 15 -2.0468807 O

order2=order(data2[,1])  
data2[order2,2]

## [1] "D" "O" "H" "C" "M" "L" "K" "A" "I" "J" "B" "G" "N" "E" "F"

library(psych)  
b = data[,2:8]  
cor(b) #计算样本数据的相关系数矩阵

## X1 X2 X3 X4 X5 X6  
## X1 1.00000000 0.8499349 0.8561731 0.8602587 -0.05381476 0.5845059  
## X2 0.84993492 1.0000000 0.9016942 0.8493357 -0.26500440 0.9041616  
## X3 0.85617309 0.9016942 1.0000000 0.9882288 -0.10573408 0.7668645  
## X4 0.86025872 0.8493357 0.9882288 1.0000000 -0.10334267 0.6829263  
## X5 -0.05381476 -0.2650044 -0.1057341 -0.1033427 1.00000000 -0.3210661  
## X6 0.58450587 0.9041616 0.7668645 0.6829263 -0.32106613 1.0000000  
## X7 0.49271170 0.5983097 0.3294932 0.2650965 -0.43424981 0.4969267  
## X7  
## X1 0.4927117  
## X2 0.5983097  
## X3 0.3294932  
## X4 0.2650965  
## X5 -0.4342498  
## X6 0.4969267  
## X7 1.0000000

fa <- fa(b, nfactors=2, rotate="none", fm="pa")

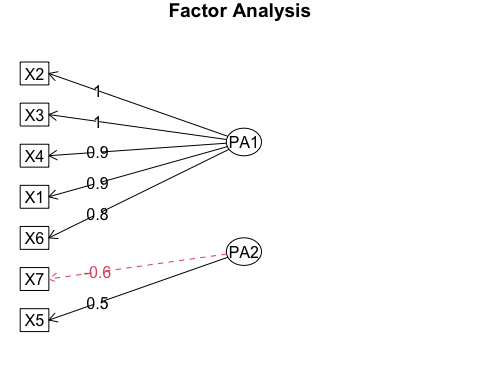
## Warning in fa.stats(r = r, f = f, phi = phi, n.obs = n.obs, np.obs = np.obs, :  
## The estimated weights for the factor scores are probably incorrect. Try a  
## different factor score estimation method.

## Warning in fac(r = r, nfactors = nfactors, n.obs = n.obs, rotate = rotate, : An  
## ultra-Heywood case was detected. Examine the results carefully

fa

## Factor Analysis using method = pa  
## Call: fa(r = b, nfactors = 2, rotate = "none", fm = "pa")  
## Standardized loadings (pattern matrix) based upon correlation matrix  
## PA1 PA2 h2 u2 com  
## X1 0.86 0.14 0.75 0.2467 1.1  
## X2 1.00 -0.13 1.02 -0.0172 1.0  
## X3 0.96 0.29 1.01 -0.0052 1.2  
## X4 0.92 0.34 0.95 0.0450 1.3  
## X5 -0.24 0.52 0.32 0.6769 1.4  
## X6 0.82 -0.19 0.70 0.2954 1.1  
## X7 0.53 -0.56 0.60 0.4032 2.0  
##   
## PA1 PA2  
## SS loadings 4.51 0.85  
## Proportion Var 0.64 0.12  
## Cumulative Var 0.64 0.77  
## Proportion Explained 0.84 0.16  
## Cumulative Proportion 0.84 1.00  
##   
## Mean item complexity = 1.3  
## Test of the hypothesis that 2 factors are sufficient.  
##   
## The degrees of freedom for the null model are 21 and the objective function was 12.59 with Chi Square of 136.43  
## The degrees of freedom for the model are 8 and the objective function was 3.22   
##   
## The root mean square of the residuals (RMSR) is 0.05   
## The df corrected root mean square of the residuals is 0.08   
##   
## The harmonic number of observations is 15 with the empirical chi square 1.35 with prob < 0.99   
## The total number of observations was 15 with Likelihood Chi Square = 30.55 with prob < 0.00017   
##   
## Tucker Lewis Index of factoring reliability = 0.4  
## RMSEA index = 0.428 and the 90 % confidence intervals are 0.287 0.623  
## BIC = 8.89  
## Fit based upon off diagonal values = 0.99

fa.diagram(fa)



fa\_model2 <- fa(b, nfactors = 2, rotate = "varimax", fm = "ml")  
fa\_model2

## Factor Analysis using method = ml  
## Call: fa(r = b, nfactors = 2, rotate = "varimax", fm = "ml")  
## Standardized loadings (pattern matrix) based upon correlation matrix  
## ML1 ML2 h2 u2 com  
## X1 0.83 0.31 0.78 0.2211 1.3  
## X2 0.80 0.60 1.00 0.0048 1.9  
## X3 0.97 0.21 0.99 0.0062 1.1  
## X4 0.99 0.10 1.00 0.0049 1.0  
## X5 -0.05 -0.37 0.14 0.8582 1.0  
## X6 0.63 0.67 0.84 0.1564 2.0  
## X7 0.19 0.74 0.58 0.4209 1.1  
##   
## ML1 ML2  
## SS loadings 3.69 1.64  
## Proportion Var 0.53 0.23  
## Cumulative Var 0.53 0.76  
## Proportion Explained 0.69 0.31  
## Cumulative Proportion 0.69 1.00  
##   
## Mean item complexity = 1.3  
## Test of the hypothesis that 2 factors are sufficient.  
##   
## The degrees of freedom for the null model are 21 and the objective function was 12.59 with Chi Square of 136.43  
## The degrees of freedom for the model are 8 and the objective function was 2.32   
##   
## The root mean square of the residuals (RMSR) is 0.06   
## The df corrected root mean square of the residuals is 0.1   
##   
## The harmonic number of observations is 15 with the empirical chi square 2.44 with prob < 0.96   
## The total number of observations was 15 with Likelihood Chi Square = 22.01 with prob < 0.0049   
##   
## Tucker Lewis Index of factoring reliability = 0.627  
## RMSEA index = 0.335 and the 90 % confidence intervals are 0.181 0.534  
## BIC = 0.34  
## Fit based upon off diagonal values = 0.99  
## Measures of factor score adequacy   
## ML1 ML2  
## Correlation of (regression) scores with factors 1.00 0.99  
## Multiple R square of scores with factors 1.00 0.97  
## Minimum correlation of possible factor scores 0.99 0.95

fa.diagram(fa\_model2)

