**TUGAS MINGGU KE-12**

**STATISTIKA DESKRIPTIF**



**NAMA : MUKHAMAD IKHSANUDIN**

**NIM : 082011633086**

**PROGRAM STUDI S1 SISTEM INFORMASI**

**FAKULTAS SAINS DAN TEKNOLOGI**

**UNIVERSITAS AIRLANGGA**

**2021**

Tugas pertemuan 24 🡪 dikumpulkan hari ini, tgl. 04-06-2021 jam 23.59 🡪 di upload ke Aula dan kirim ke email eto-w@fst.unair .ac.id dengan subject : PCA

Code dan outputnya jadikan satu di notebook R-nya

Gunakan prcomp() and princomp() functions untuk masing-masing soal berikut :

1. Carilah data yang sesuai untuk PCA dengan covarians
2. Tampilkan eigenvalue-nya (variansnya) 🡪 table dan grafik
3. Tampilkan matriks PC-nya
4. Plot di 2-dimensi untuk individunya
5. Plot di 2-dimensi untuk variabelnya
6. Bi-Plot di 2-dimensi untuk individu dan variabelnya
7. Plot PC di 3-dimensi
8. Interpretasikan point c s.d f
9. Carilah data yang sesuai untuk PCA dengan correlation
10. Tampilkan eigenvalue-nya (variansnya) 🡪 table dan grafik
11. Tampilkan matriks PC-nya
12. Plot di 2-dimensi untuk individunya
13. Plot di 2-dimensi untuk variabelnya
14. Bi-Plot di 2-dimensi untuk individu dan variabelnya
15. Plot PC di 3-dimensi
16. Interpretasikan point c s.d f

==============================================================================

Code ditaruh diantara tanda berikut :

```{R}

Syntax di sini

```

1. Carilah data yang sesuai untuk PCA dengan covarians

```{r}

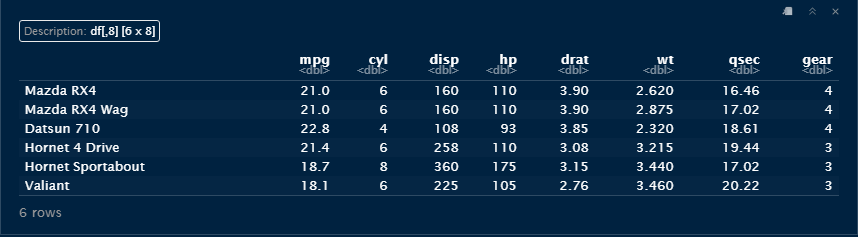
#No 1

library(dplyr)

PCA\_Data <- select(mtcars, c(1:7, 10:11))

head(PCA\_Data[,-9])

```



1. Tampilkan eigenvalue-nya (variansnya) 🡪 table dan grafik

```{r}

#a. Tampilkan eigen valuenya (variansnya)

PCA\_Standardized <- scale(x = PCA\_Data)

Covarian\_Matrix <- cov(PCA\_Standardized)

Nilai\_Eigen <- eigen(Covarian\_Matrix)

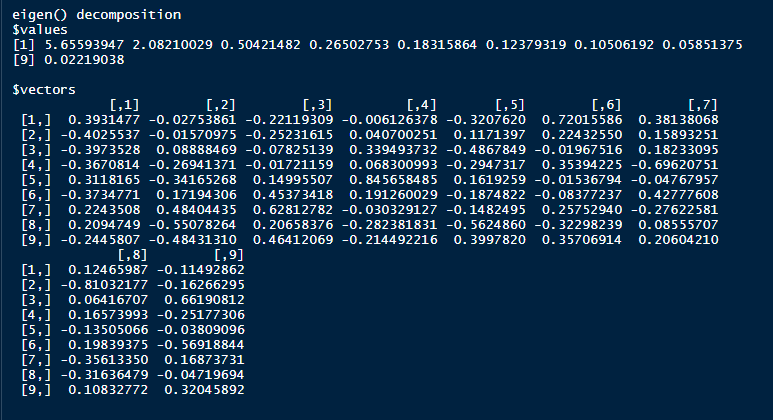
Nilai\_Eigen

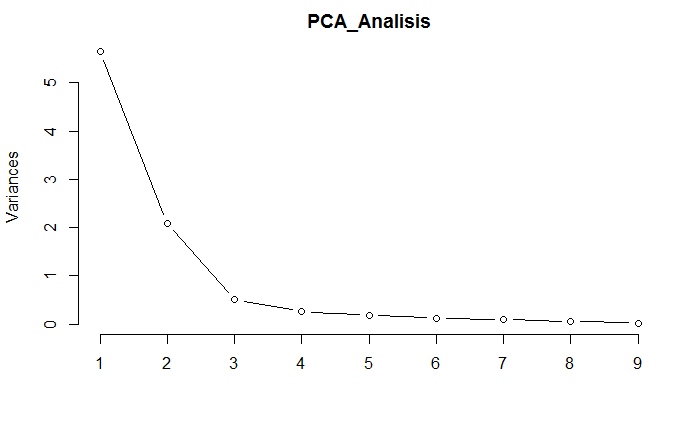
PCA\_Analisis <- prcomp(x = PCA\_Data, scale. = TRUE, center = TRUE)

PCA\_Analisis

plot(PCA\_Analisis, type = "l")

```





1. Tampilkan matriks PC-nya

```{r}

#b. tampilkan matriks PC nya

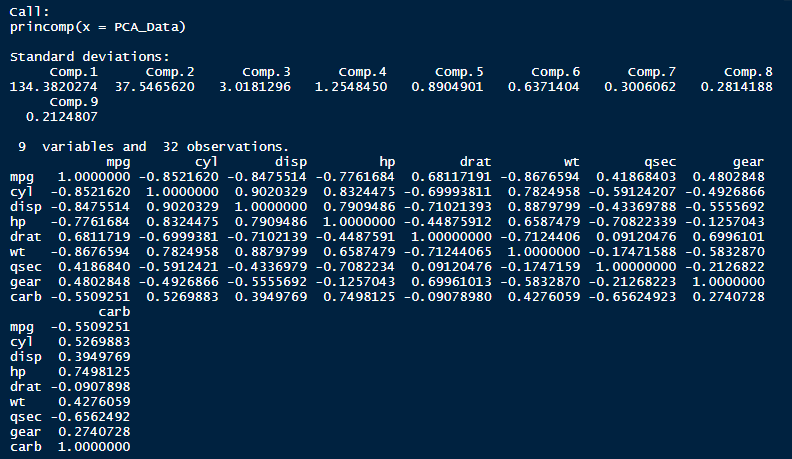
PCA\_Analisis\_New <- princomp(x = PCA\_Data)

PCA\_Analisis\_New

Covarian\_Matrix <- cov(PCA\_Standardized)

Covarian\_Matrix

```



1. Plot di 2-dimensi untuk individunya

```{r}

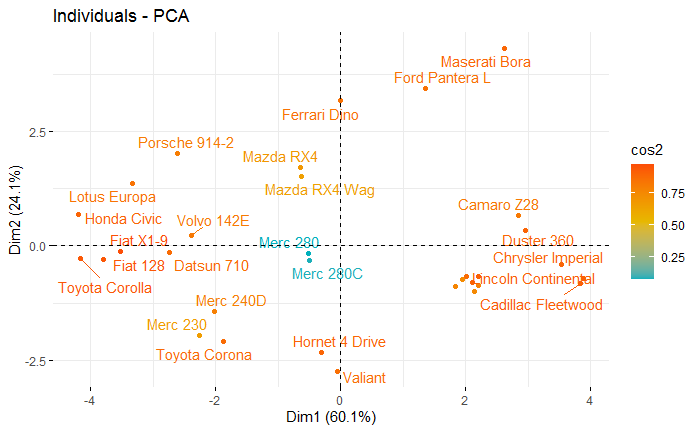
#c. Plot di 2-dimensi untuk individunya

library(factoextra)

Visual\_PCA\_Cor <- prcomp(mtcars, scale = TRUE)

fviz\_pca\_ind(Visual\_PCA\_Cor, col.ind = "cos2",gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

```



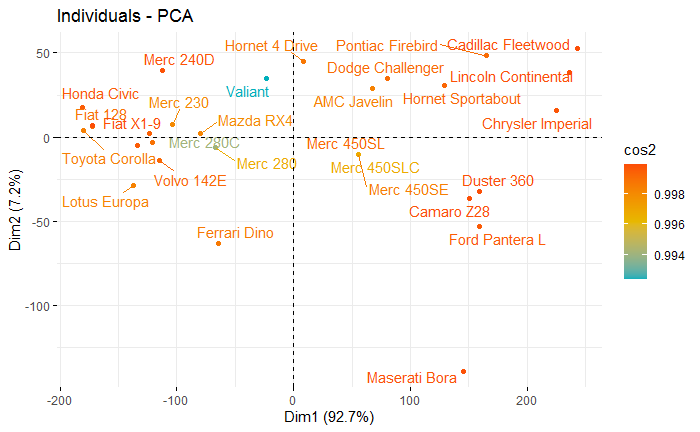
```{r}

library(factoextra)

Visual\_PCA\_Cov <- prcomp(mtcars, scale = FALSE)

fviz\_pca\_ind(Visual\_PCA\_Cov, col.ind = "cos2", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

```



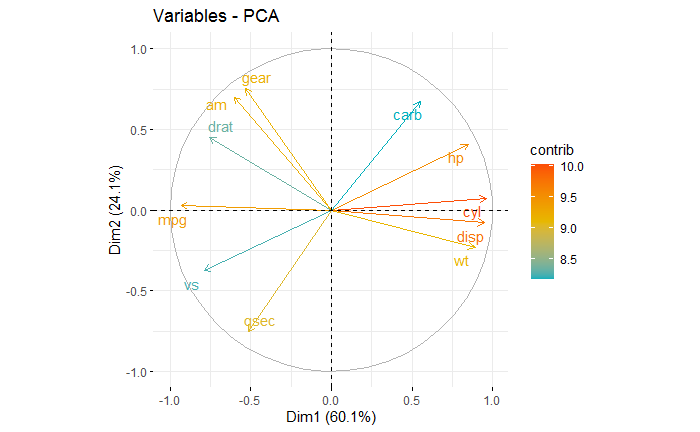
1. Plot di 2-dimensi untuk variabelnya

```{R}

#d Plot di 2-dimensi untuk variabelnya

fviz\_pca\_var(Visual\_PCA\_Cor, col.var = "contrib", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

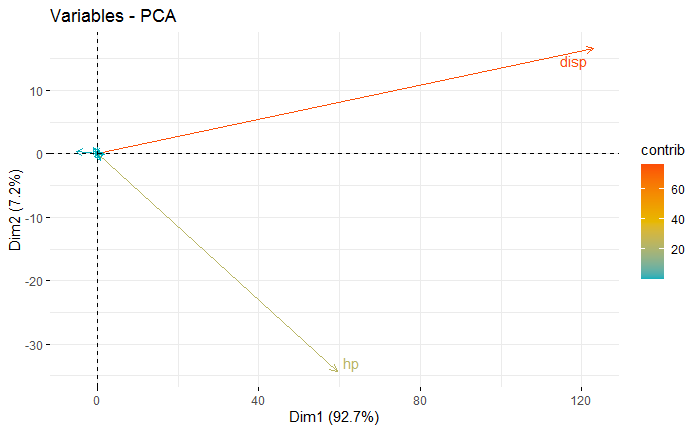
```



```{R}

fviz\_pca\_var(Visual\_PCA\_Cov, col.var = "contrib", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

```



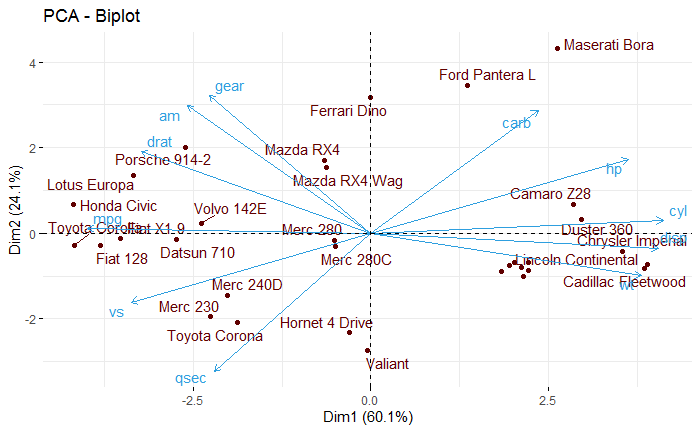
1. Bi-Plot di 2-dimensi untuk individu dan variabelnya

```{R}

#e. Bi-Plot di 2-dimensi untuk individu dan variabelnya

fviz\_pca\_biplot(Visual\_PCA\_Cor, repel = TRUE, col.var = "#2E9FDF", col.ind = "#600000")

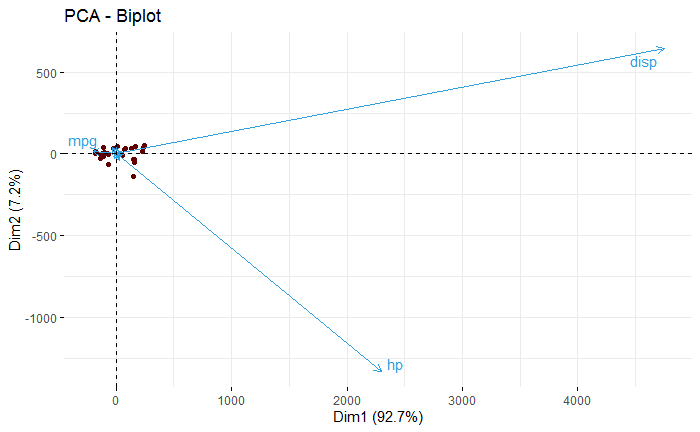
```



```{R}

fviz\_pca\_biplot(Visual\_PCA\_Cov, repel = TRUE, col.var = "#2E9FDF", col.ind = "#600000")

```



1. Plot PC di 3-dimensi

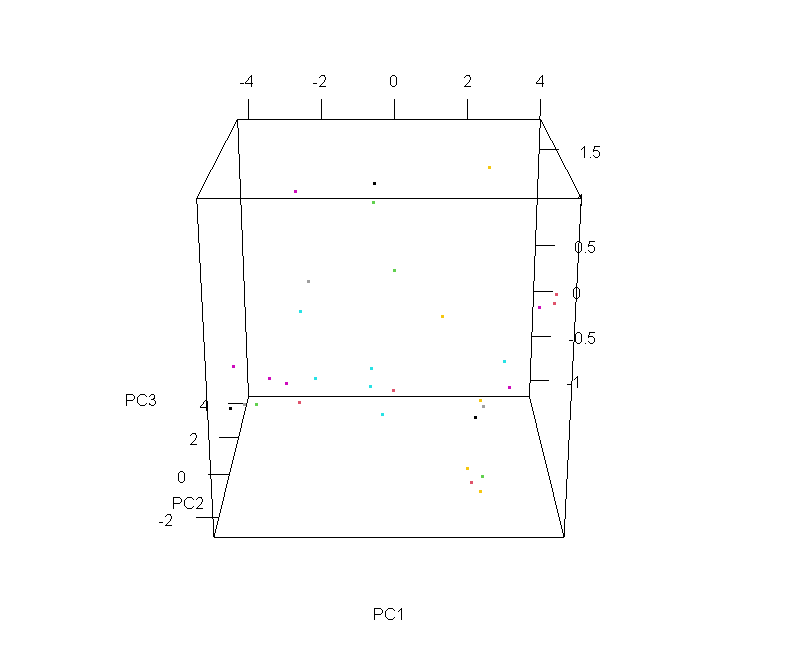
```{R}

#f. Plot PC di 3-dimensi

library(rgl)

plot3d(Visual\_PCA\_Cor$x, col = PCA\_Data$mpg)

```

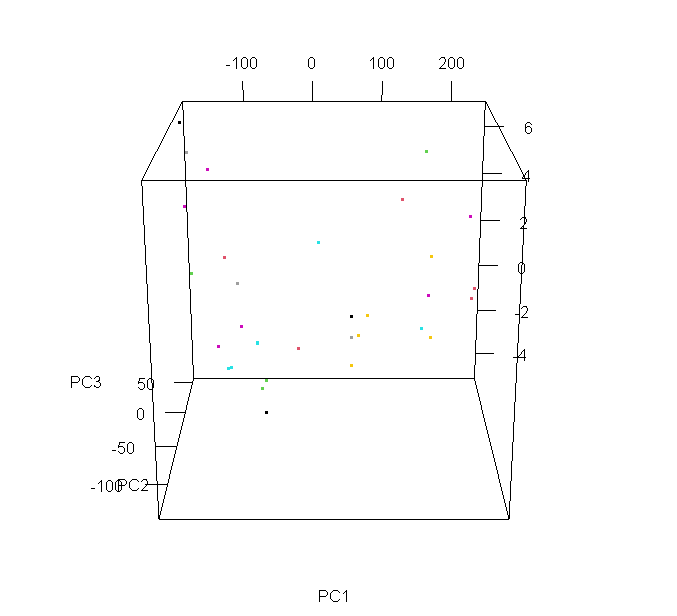


```{R}

library(rgl)

plot3d(Visual\_PCA\_Cov$x, col = PCA\_Data$mpg)

```



1. Carilah data yang sesuai untuk PCA dengan correlation

```{R}

#No 2

PCA\_Standardized <- scale(x = PCA\_Data)

Correlation\_Matrix <- cor(PCA\_Standardized)

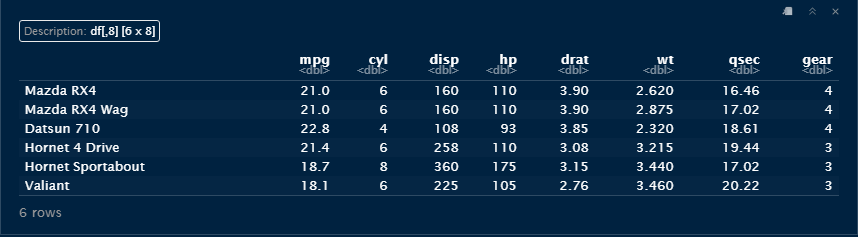
Nilai\_Eigen\_Cor <- eigen(Correlation\_Matrix)

Nilai\_Eigen\_Cor

PCA\_Analisis\_Cor <- prcomp(x = PCA\_Data, scale. = TRUE, center = TRUE)

PCA\_Analisis\_Cor

```



1. Tampilkan eigenvalue-nya (variansnya) 🡪 table dan grafik

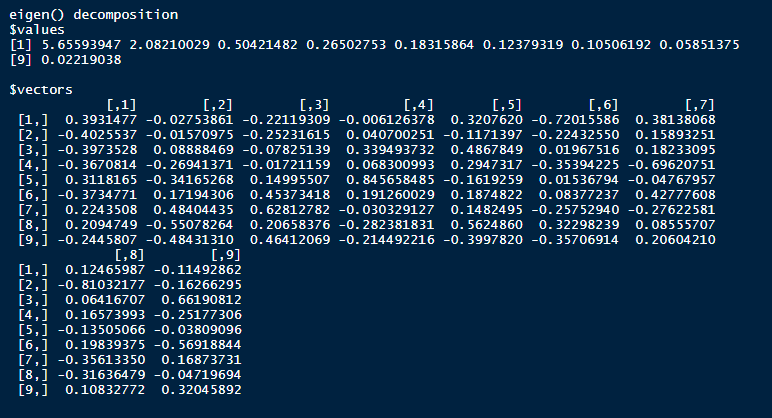
```{R}

#a. Tampilkan eigenvalue-nya (variansnya)

Nilai\_Eigen\_Cor <- eigen(Correlation\_Matrix)

Nilai\_Eigen\_Cor

```



1. Tampilkan matriks PC-nya

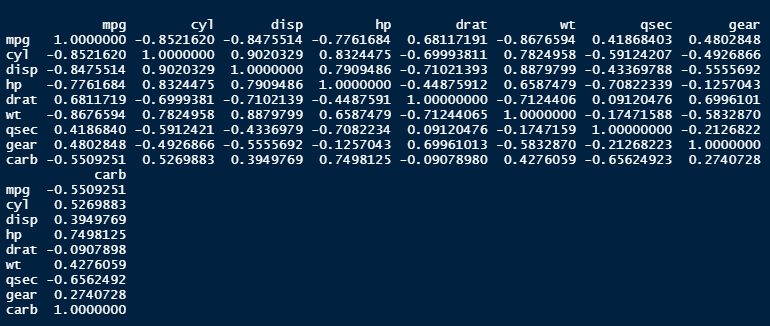
```{R}

#b. Tampilkan matriks PC-nya

Correlation\_Matrix <- cor(PCA\_Standardized)

Correlation\_Matrix

```



1. Plot di 2-dimensi untuk individunya

```{R}

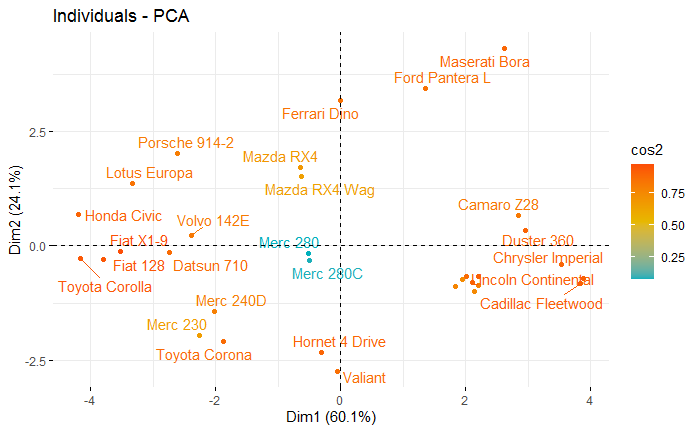
#c. Plot di 2-dimensi untuk individunya

library(factoextra)

Visual\_PCA\_Cor <- prcomp(Correlation\_Matrix, scale = TRUE)

fviz\_pca\_ind(visual.pca.cor, col.ind = "cos2", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

```



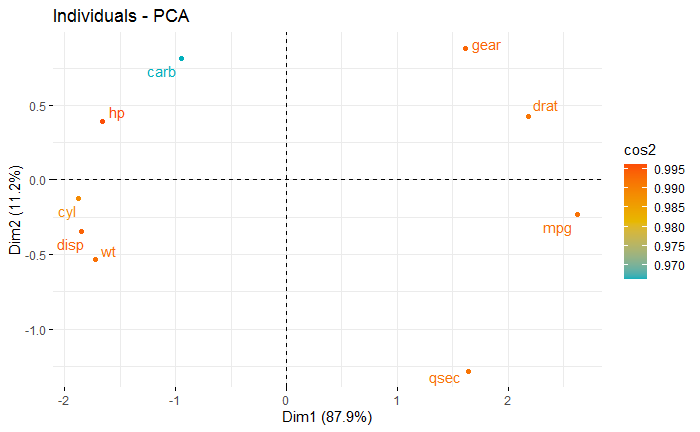
```{R}

library(factoextra)

Visual\_PCA\_Cor <- princomp(Correlation\_Matrix, scale = TRUE)

fviz\_pca\_ind(Visual\_PCA\_Cor, col.ind = "cos2", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

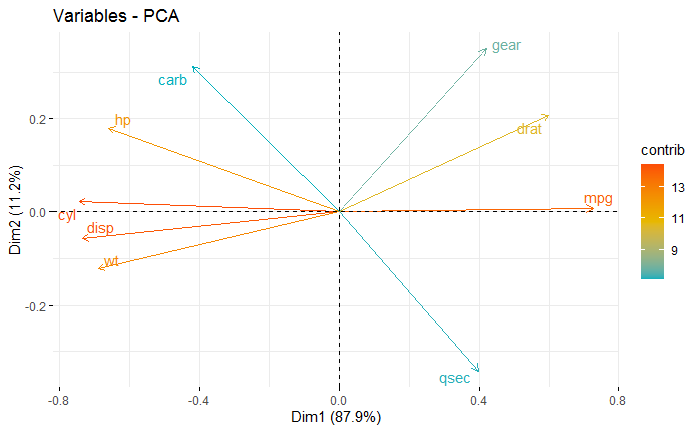
```



```{R}

fviz\_pca\_var(Visual\_PCA\_Cor, col.var = "contrib", gradient.cols = c("#00AFBB", "#E7B800", "#FC4E07"), repel = TRUE)

```



1. Plot di 2-dimensi untuk variabelnya

```{R}

#d. Plot di 2-dimensi untuk variabelnya

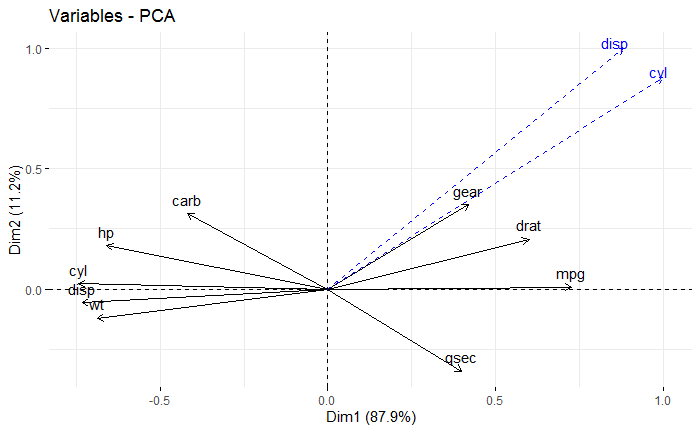
PCA\_Cor <- PCA\_Data[1:23, 2:3, drop = FALSE]

PCA\_Cor\_New <- cor(PCA\_Cor)

Correlation <- fviz\_pca\_var(Visual\_PCA\_Cor)

fviz\_add(Correlation, PCA\_Cor\_New, color = "blue", geom = "arrow")

```



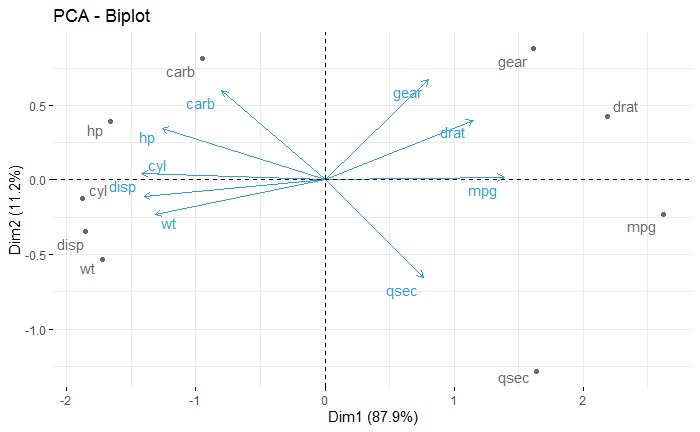
1. Bi-Plot di 2-dimensi untuk individu dan variabelnya

```{R}

#e. Bi-Plot di 2-dimensi untuk individu dan variabelnya

fviz\_pca\_biplot(Visual\_PCA\_Cor, repel = TRUE, col.var = "#2E9FDF", col.ind = "#696969")

```



1. Plot PC di 3-dimensi

```{R}

#f. Plot PC di 3-dimensi

library(rgl)

plot3d(Visual\_PCA\_Cor$x, col = PCA\_Data$gear)

```

