In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.spatial.distance import cdist
from sklearn.decomposition import PCA
import matplotlib.pyplot as plt
from sklearn.preprocessing import scale
```

In [2]:
```
var=pd.read_csv('C://Users/Gopi/Desktop/machine learning/csv files/Cars.csv')
print(var.head(1))
```

```
   HP        MPG  VOL          SP         WT
0  49  53.700681   89  104.185353  28.762059
```

In [3]:
```
var1 = scale(var)
print(var1.shape)
```

```
(81, 5)
```

In [4]:
```
model = PCA (n_components = 3)
print(model)
```

```
PCA(copy=True, iterated_power='auto', n_components=3, random_state=None,
    svd_solver='auto', tol=0.0, whiten=False)
```

In [5]:
```
temp = model.fit_transform(var1)
print(temp)
```

```
[[-2.6123435  -0.64477881  0.80705114]
 [-2.16482189 -0.74286674  0.60638348]
 [-2.17886412 -0.72254398  0.59843893]
 [-1.52045534 -0.37235871  0.50966693]
 [-2.27211186 -0.74850319  0.59738183]
 [-1.63473818 -0.22846673  0.442958  ]
 [-2.17296003 -0.73108874  0.60177924]
 [-3.48353714  1.37690391 -0.57665129]
 [-3.45723844  1.33884283 -0.5617725 ]
 [-1.11853471 -0.28224631  0.3261837 ]
 [-1.62537117 -0.24398604  0.29049378]
 [-2.32435717  2.1129633  -0.69631507]
 [-0.45425584 -0.24231121  0.39523401]
 [-1.62459541 -0.24510877  0.29093267]
 [-1.84394062 -0.39462765  0.27424893]
 [-1.61297613 -0.2619249   0.29750641]
 [-1.32809924 -0.16136988  0.25726692]
 [-2.30171443  2.08019336 -0.68350468]
 [-1.30787075 -0.19064578  0.26871142]
 [-0.45605404 -0.5190537   0.29490354]
 [-0.52081831 -0.29308336  0.20382739]
 [-0.92427762 -1.10004267  0.44632784]
 [-0.39968472 -0.30891593  0.26971261]
 [-0.97963754 -0.43935199  0.15300412]
 [-0.84307983  0.24677206  0.0106483 ]
 [-2.35090654  2.00428176 -0.86508382]
 [ 0.13898218 -1.1189562   0.58942975]
 [-0.49458671 -0.33104732  0.21866821]
 [-1.57882026 -1.51404087  0.0477038 ]
 [ 0.13859814 -0.5483948   0.21781288]
 [-0.32611995 -1.25809464  0.37728814]
 [-0.78536201 -0.68664035  0.1085742 ]
 [-0.37105829 -0.05915608  0.02201072]
 [ 0.27158475 -0.87453434  0.39653797]
 [-0.87528053 -0.70164739  0.06171734]
 [-0.68137371 -0.3759046   0.01025803]
 [-1.04635432  0.08063389 -0.20307431]
 [-0.70764594  0.39447045 -0.47675563]
 [-0.66907161  0.33864334 -0.45493176]
 [ 0.29213008  0.66596462 -0.18960451]
 [ 0.1108387  -1.06351306  0.11219377]
 [-0.15262856 -0.73238578 -0.04165411]
 [-0.44995011  0.06452757 -0.32685704]
 [-0.86099603  0.16377615 -0.4547338 ]
 [-0.4114596  -0.54737622 -0.13912801]
 [-0.27800444 -0.29505713 -0.17308967]
 [ 0.16449654 -0.84945107  0.08546878]
 [-0.20831598 -0.52815404 -0.0792276 ]
 [ 0.065407   0.95108186 -0.32197991]
 [ 0.25081348 -0.22964799 -0.49424191]
 [ 0.23824718 -0.21146128 -0.50135144]
 [ 0.24969516 -0.2280295  -0.49487461]
 [ 1.07372462 -1.25574266 -0.01293764]
 [ 2.3143954   0.46364636  0.25130471]
 [ 1.73500035  0.07795969  0.14636314]
 [ 1.5039631  -0.96024313  0.06333135]
 [-0.56970194 -0.15420247 -0.84113861]
 [ 0.21360791 -0.17580183 -0.51529138]
 [-0.34991598 -0.13612732 -0.81882186]
 [ 0.54571798 -1.08935378 -0.44480737]
 [ 1.36292876 -0.1236054  -0.04543082]
 [ 1.05384298 -0.88756317 -0.68699989]
 [ 2.09500491 -1.25510199 -0.16348238]
 [ 1.79570327 -0.87928136 -0.33828801]
 [ 1.89876922 -0.62312401 -0.24570877]
 [-1.4876562   2.96226819 -0.11129725]
 [ 1.9575568  -0.03267054 -0.23731517]
 [ 2.40580247 -0.58821019  0.02517744]
 [ 2.26808216 -0.41756644 -0.05547556]
 [ 3.46987881  1.50643507  0.60789185]
 [ 1.88292918  5.11620807 -0.42822362]
 [ 2.63079463 -1.00162822  0.16195721]
 [ 2.53605779 -0.88602439  0.10630664]
 [ 3.30919283 -2.71376916 -0.05833179]
 [ 2.14734614 -1.25449325 -0.73686503]
 [ 2.81337421 -0.65338183 -0.30885677]
 [ 1.37969232  5.49502645  1.45241711]
 [ 3.37796208  1.09224205  0.2107926 ]
 [ 0.47370804  4.52162531  0.42923747]
 [ 4.50897322  1.85684909  1.07124624]
 [ 3.14274433  1.20334346 -0.93224695]]
```

In [6]:
```
ratio = model.explained_variance_ratio_
print(ratio)
```

```
[0.59078919 0.36332536 0.04155747]
```

In [10]:
```
final = pd.DataFrame(data = temp,columns = ['principal component 1', 'principal component 2','princi
pal component 3'])
print('Initial Data set',var.shape)
print('After applying PCA',final.shape)
final.head(3)
```

```
Initial Data set (81, 5)
After applying PCA (81, 3)
```

Out[10]:

	principal component 1	principal component 2	principal component 3
0	-2.612343	-0.644779	0.807051
1	-2.164822	-0.742867	0.606383
2	-2.178864	-0.722544	0.598439