In [3]:
```
import numpy as np
import pandas as pd
data = pd.read_csv('MyFoodRatings.csv')
```

In [4]:
```
data.head()
```

Out[4]:

	Name	Chicken	Mutton	Paneer	ChowMein	SpringRolls	Momo	Sushi	Ramen	Temp
0	A	5	5	5	0	0	0	0	0	0
1	B	4	4	4	0	0	0	0	0	0
2	C	3	3	3	0	0	0	0	0	0
3	D	2	2	2	0	0	0	0	0	0
4	E	0	0	0	2	2	2	0	0	0

In [5]:
```
from scipy import linalg
```

In [16]:
```
A = data.drop(['Name'], axis=1)
```

In [20]:
```
u, s, vh = np.linalg.svd(A, full_matrices=True)
```

In [17]:
```
U,s,Vh = linalg.svd(A)
```

In [19]:
```
print ("Shape of U :",U.shape)
print ("Shape of Vh :",Vh.shape)
```

```
Shape of U : (12, 12)
Shape of Vh : (9, 9)
```

In [21]:
```
print(U)
```

```
[[-6.80413817e-01  0.00000000e+00  0.00000000e+00  2.58908743e-33
   0.00000000e+00  0.00000000e+00  0.00000000e+00  6.83951720e-01
  -2.63148402e-01  1.45752665e-18  0.00000000e+00  0.00000000e+00]
 [-5.44331054e-01  4.96506831e-17  3.85856584e-18 -1.78352620e-17
   2.48253415e-16  8.15015983e-17 -4.42281885e-01 -2.92767967e-01
   6.46521942e-01 -1.62440512e-02  5.53840102e-02 -3.24881025e-02]
 [-4.08248290e-01  4.38559108e-33  3.19773868e-34 -7.06645285e-34
   1.21871670e-32  3.18417792e-33 -4.79822791e-17 -6.51972922e-01
  -6.38955900e-01 -1.00346663e-18  4.00753524e-18 -1.59750734e-18]
 [-2.72165527e-01 -9.93013661e-17 -7.71713167e-18  3.56705241e-17
  -4.96506831e-16 -1.63003197e-16  8.84563769e-01 -1.46383983e-01
   3.23260971e-01  3.24881025e-02 -1.10768020e-01  6.49762050e-02]
 [ 0.00000000e+00 -3.26217015e-01 -5.18387119e-17  2.39611568e-16
  -2.89928697e-01 -1.09495032e-15 -1.33251006e-01  0.00000000e+00
   0.00000000e+00  2.18234113e-01 -7.44068101e-01  4.36468226e-01]
 [ 0.00000000e+00 -1.63108508e-01  9.77859273e-17 -2.46732844e-16
  -1.44964349e-01  1.86020064e-15  1.56765889e-02  0.00000000e+00
   0.00000000e+00  3.37122867e-01  6.19577325e-01  6.74245733e-01]
 [ 0.00000000e+00 -6.64310100e-01  2.62409237e-33  2.33236138e-33
   7.47457083e-01 -9.48369971e-32  4.87654368e-16  0.00000000e+00
   0.00000000e+00  2.24762928e-17 -1.39878140e-17  3.17847976e-17]
 [ 0.00000000e+00 -6.52434031e-01  1.47287415e-18 -5.81225731e-17
  -5.79857394e-01  8.24249965e-17  6.27063556e-02  0.00000000e+00
   0.00000000e+00 -1.93397773e-01  2.17139719e-01 -3.86795546e-01]
 [ 0.00000000e+00  0.00000000e+00 -5.41047938e-01 -8.36812635e-01
   0.00000000e+00  8.37361465e-02  0.00000000e+00  0.00000000e+00
   0.00000000e+00 -6.78298183e-17 -4.20942476e-16 -1.66589948e-16]
 [ 0.00000000e+00  0.00000000e+00 -1.93680321e-01  1.62154236e-01
   0.00000000e+00  3.69044628e-01  0.00000000e+00  0.00000000e+00
   0.00000000e+00  8.00000000e-01 -7.10071599e-16 -4.00000000e-01]
 [ 0.00000000e+00  0.00000000e+00 -7.20906926e-01  4.10212912e-01
   0.00000000e+00 -5.58586225e-01  0.00000000e+00  0.00000000e+00
   0.00000000e+00  1.88013586e-16  1.28110188e-15  4.54531794e-16]
 [ 0.00000000e+00  0.00000000e+00 -3.87360641e-01  3.24308471e-01
   0.00000000e+00  7.38089256e-01  0.00000000e+00  0.00000000e+00
   0.00000000e+00 -4.00000000e-01 -1.42014320e-15  2.00000000e-01]]
```

In [22]:
```
print(Vh)
```

```
[[-0.57735027 -0.57735027 -0.57735027  0.          0.          0.
   0.          0.          0.        ]
 [ 0.          0.          0.         -0.63787511 -0.51226147 -0.57506829
   0.          0.          0.        ]
 [ 0.          0.          0.          0.          0.          0.
  -0.47616345 -0.55763787 -0.67993263]
 [ 0.          0.          0.          0.          0.          0.
   0.29611035  0.62638051 -0.72108676]
 [-0.         -0.         -0.          0.65303038 -0.75559349 -0.05128155
   0.          0.          0.        ]
 [-0.         -0.         -0.          0.          0.          0.
   0.82800183 -0.54469025 -0.13313715]
 [ 0.          0.          0.         -0.40824829 -0.40824829  0.81649658
   0.          0.          0.        ]
 [ 0.81649658 -0.40824829 -0.40824829  0.          0.          0.
   0.          0.          0.        ]
 [ 0.         -0.70710678  0.70710678  0.          0.          0.
   0.          0.          0.        ]]
```

In [23]:
```
M,N = A.shape
Sig = linalg.diagsvd(s,M,N)
```

In [24]:
```
A.shape
```

Out[24]: (12, 9)

In [25]:
```
Sig
```

Out[25]:
```
array([[1.27279221e+01, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 1.05770379e+01, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 8.84826058e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 1.24205263e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        1.06125858e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 4.06927550e-01, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 5.43862610e-16, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 3.23597471e-16,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        2.65957113e-32],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00],
       [0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00, 0.00000000e+00, 0.00000000e+00, 0.00000000e+00,
        0.00000000e+00]])
```

In [28]:
```
np.diag(s[:3])
```

Out[28]:
```
array([[12.72792206,  0.        ,  0.        ],
       [ 0.        , 10.57703788,  0.        ],
       [ 0.        ,  0.        ,  8.84826058]])
```

In [29]:
```
s
```

Out[29]:
```
array([1.27279221e+01, 1.05770379e+01, 8.84826058e+00, 1.24205263e+00,
       1.06125858e+00, 4.06927550e-01, 5.43862610e-16, 3.23597471e-16,
       2.65957113e-32])
```

In [33]:
```
Vh_df = pd.DataFrame(data=Vh)
```

In [36]:
```
Vh_df[:]
```

Out[36]:

	0	1	2	3	4	5	6	7
0	-0.577350	-0.577350	-0.577350	0.000000	0.000000	0.000000	0.000000	0.000000
1	0.000000	0.000000	0.000000	-0.637875	-0.512261	-0.575068	0.000000	0.000000
2	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	-0.476163	-0.557638
3	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.296110	0.626381
4	-0.000000	-0.000000	-0.000000	0.653030	-0.755593	-0.051282	0.000000	0.000000
5	-0.000000	-0.000000	-0.000000	0.000000	0.000000	0.000000	0.828002	-0.544690
6	0.000000	0.000000	0.000000	-0.408248	-0.408248	0.816497	0.000000	0.000000
7	0.816497	-0.408248	-0.408248	0.000000	0.000000	0.000000	0.000000	0.000000
8	0.000000	-0.707107	0.707107	0.000000	0.000000	0.000000	0.000000	0.000000