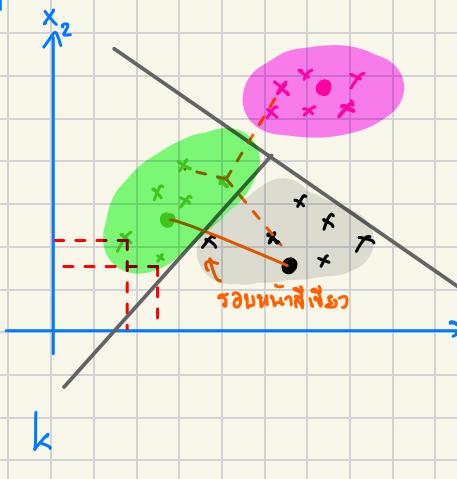


Clustering

K-means



$k = ?$

centroid = จุดกลาง cluster

$k = 3$

$$c_1 = \begin{bmatrix} 1.5 \\ 3 \end{bmatrix}$$

$$c_2 = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$$

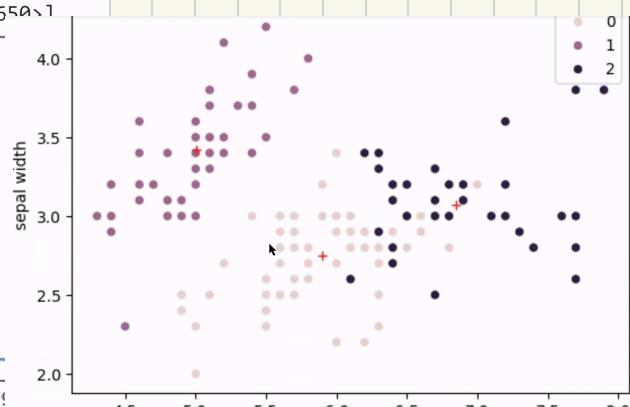
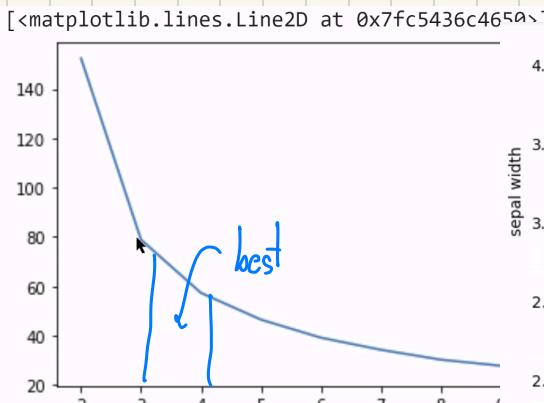
$$c_3 = \begin{bmatrix} 3.1 \\ 4.5 \end{bmatrix}$$

find best k

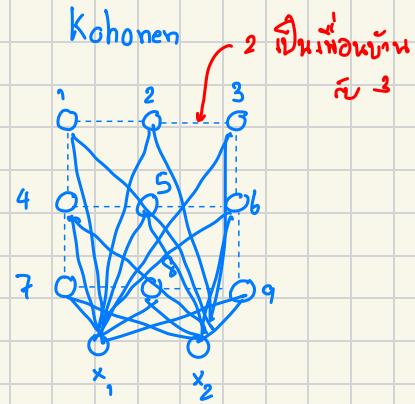
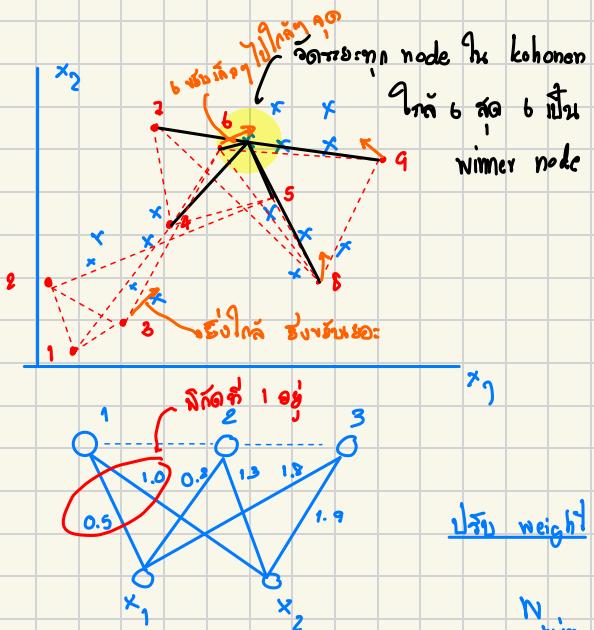
```

1 q=[]
2 for k in range(2,11):
3     km=KMeans(n_clusters=k).fit(X)
4     q.append(km.inertia_)
5 plt.plot([i for i in range(2,11)],q) 1 import seaborn as sb
2 chart=sb.scatterplot(df,x='sepal length',y='sepal width',hue='label')
3 chart.plot(km.cluster_centers_.T[:,0:1],km.cluster_centers_.T[:,1:2],'r+')

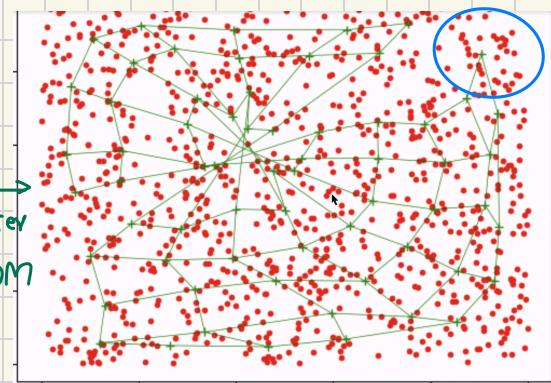
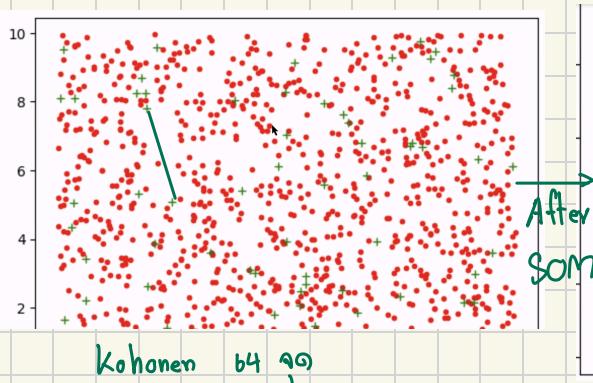
```

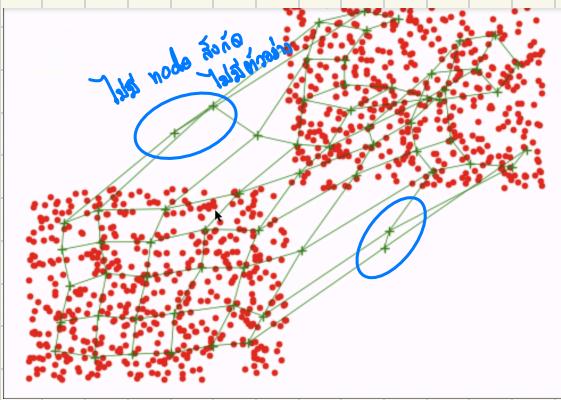


Self-Organizing Map - SOM



Collaborative



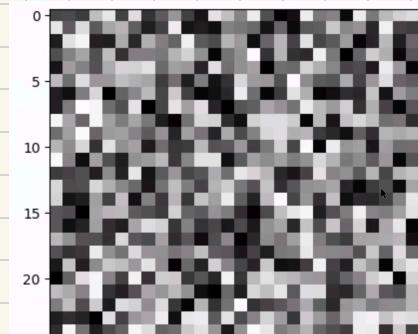


วิธีการเป็นห้องเรียนฟังก์ชัน ก็จะ
สอนๆไป

MNIST with SOM

```

l1 width,height=8,8
l2 k = np.random.random(size=28*28*width*height)*256
l3 k = k.reshape(width,height,28,28)
l4 eta = 0.1
    
```



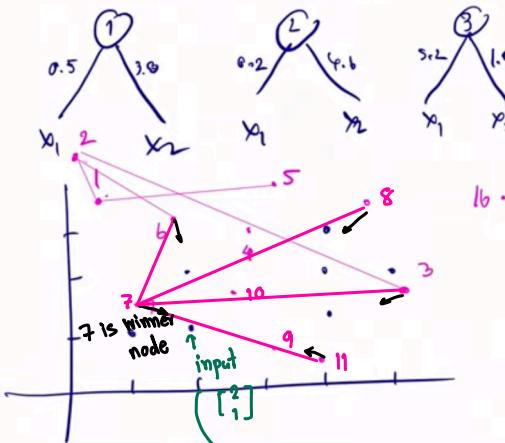
สร้าง kohonen $8 \times 8 = 64$ node

แต่ node ที่มีจาก input ต้องเท่ากัน

→

	id	i	j	class	หมายเหตุ
0	0	3	4	5	kohonen node
1	1	0	5	0	$3 \text{ in } 4$
2	2	7	4	4	
3	3	0	2	1	
4	4	6	1	9	

Example SOM



$$\vec{w}_{\text{winner}} = \vec{w}_{\text{winner}} + \eta(\vec{x} - \vec{w}_{\text{winner}})$$

$$\vec{w}_{\text{neighbor}} = \vec{w}_{\text{neighbor}} + 0.7\eta(\vec{x} - \vec{w}_{\text{neighbor}})$$