Untitled

October 30, 2019

In [12]:
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### K-Means Algorithm

from numpy import *
from matplotlib import pyplot
import time
import scipy.io

mat_contents=scipy.io.loadmat('hw7_1_data1.mat')
Y=mat(mat_contents['Yn'])
X=Y.T

(N,I)=shape(X)

pyplot.ion()    # allow to show figures without holding command lines

pyplot.figure(1)
pyplot.plot(X[:,0], X[:,1], 'b.')

K = 5    # number of clusters
C = X[0:K,:].copy()  # assign the first K points as the means

E = 1  # update error
m = 0
itr_max = 20

min_dis = zeros((itr_max,N))
ind = zeros((itr_max, N))
ss = zeros((itr_max))

CC = zeros((K, I, itr_max))
CC[:,:,0] = C

while (E > 1e-3):
    for n in range(0,N):
        dis = sqrt(sum(array(ones((K,1))*X[n] - C)**2, axis=1))
        min_dis[m,n] = amin(dis)
        ind[m,n] = argmin(dis)
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    for k in range(0,K):
        C[k,:] = mean(X[ind[m,:] == k,:], axis=0)

    CC[:,:,m+1] = C

    E = linalg.norm(CC[:,:,m+1] - CC[:,:,m])
    ss[m] = sum(min_dis[m,:]**2)

    pyplot.figure(m+2)
    #pyplot.clf()
    cr = 'brgyk'
    for k in range(0,K):
        pyplot.plot(X[ind[m,:]==k,0], X[ind[m,:]==k,1], '.', \
                    color = cr[k], markersize = 5)
        pyplot.plot(C[k,0], C[k,1], '*', color = cr[k], markersize = 10)

#         pyplot.show()

    m = m+1

pyplot.figure(m+2)
pyplot.plot(range(0,m), ss[0:m])

pyplot.show()
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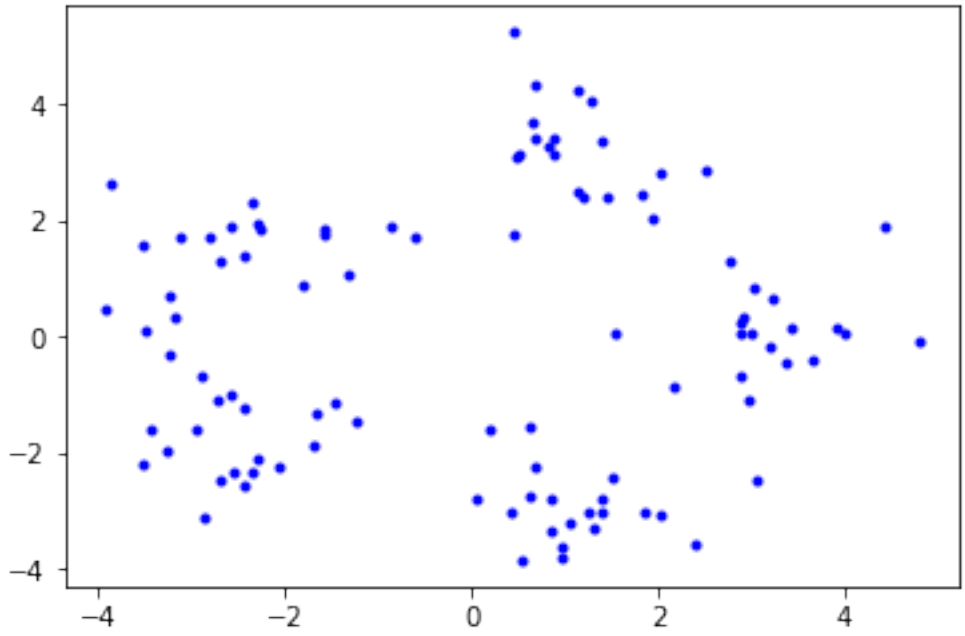

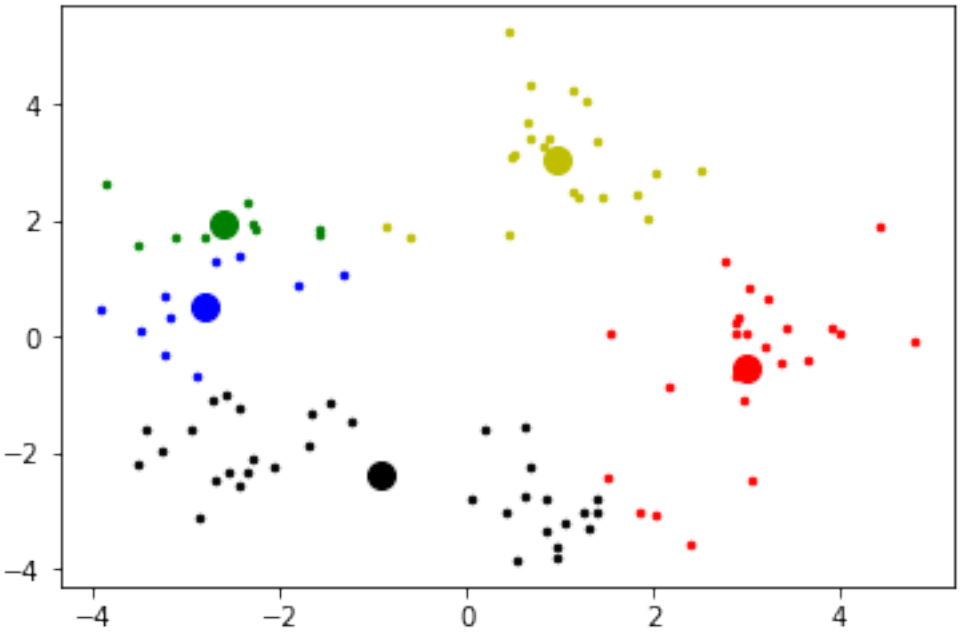
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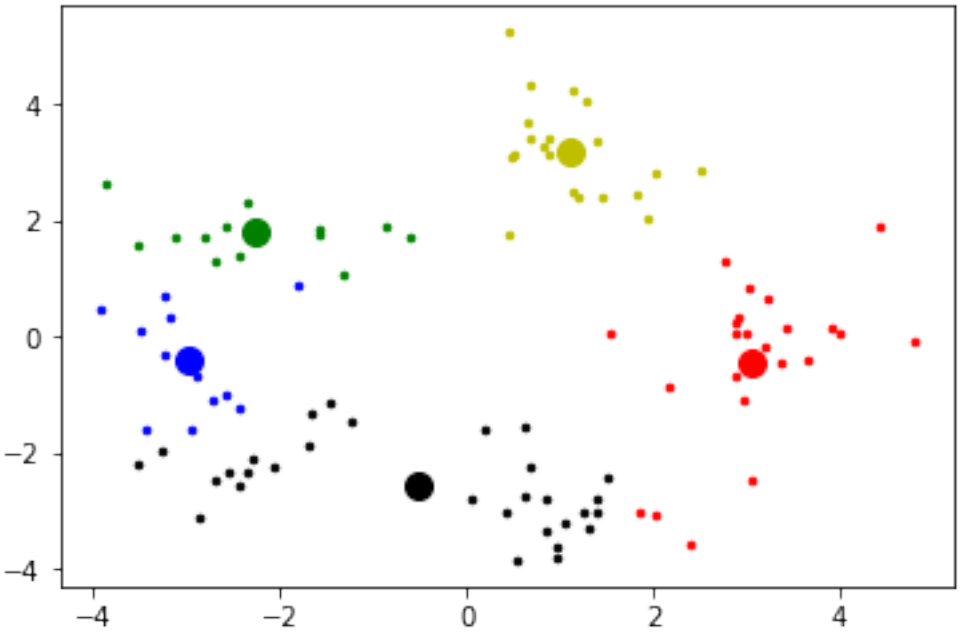
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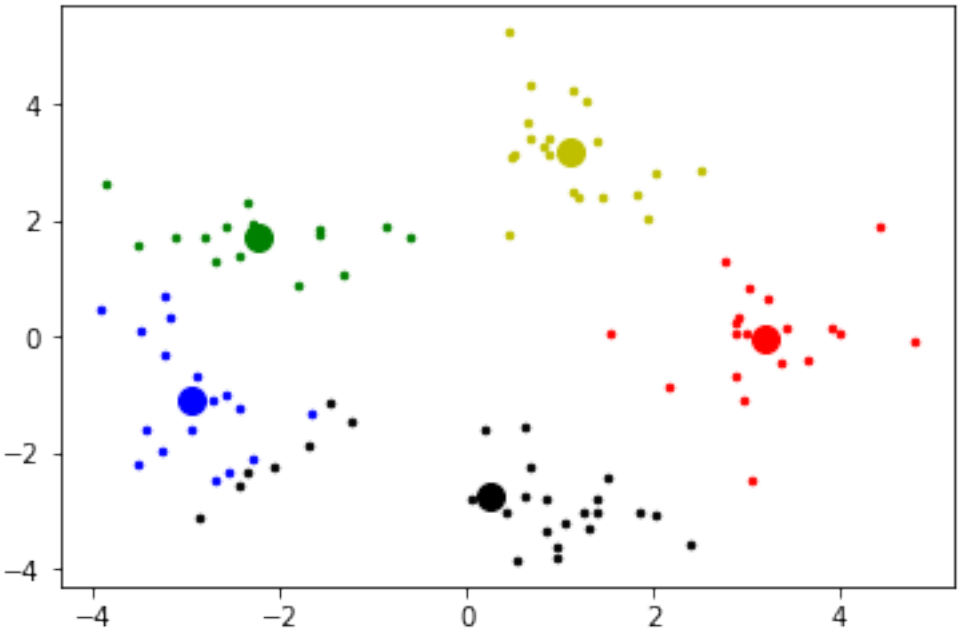
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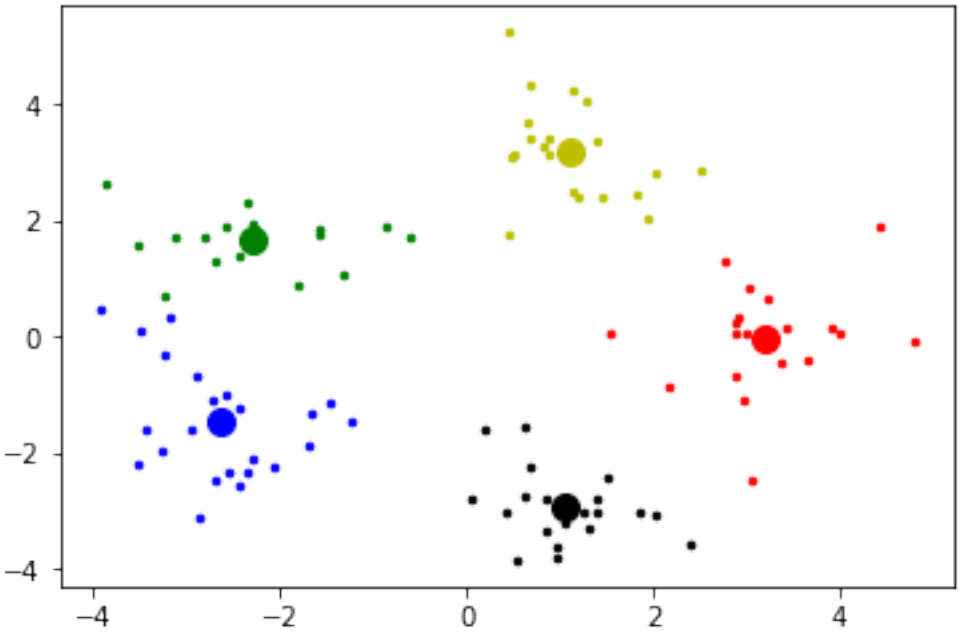
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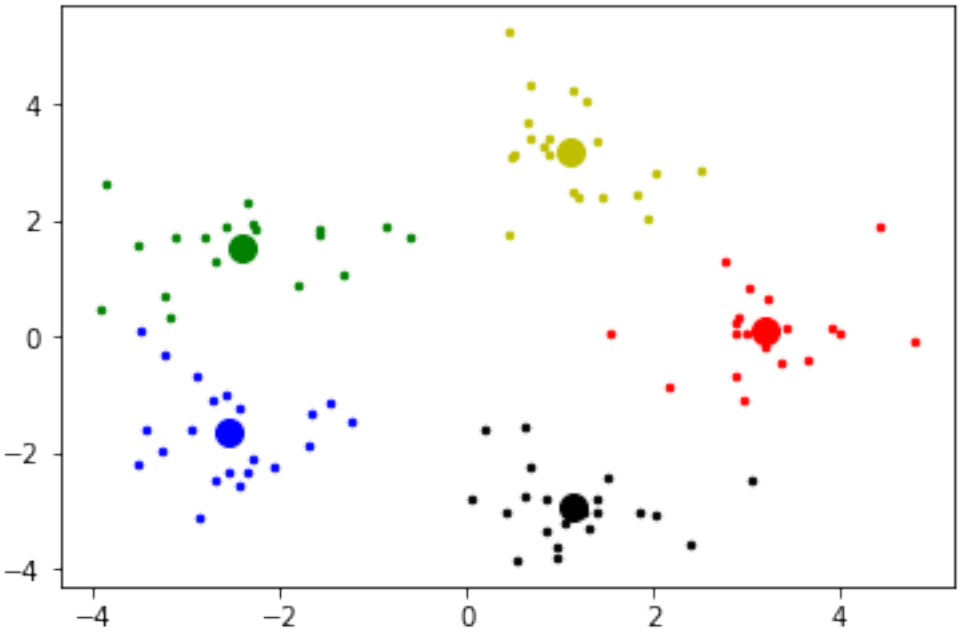
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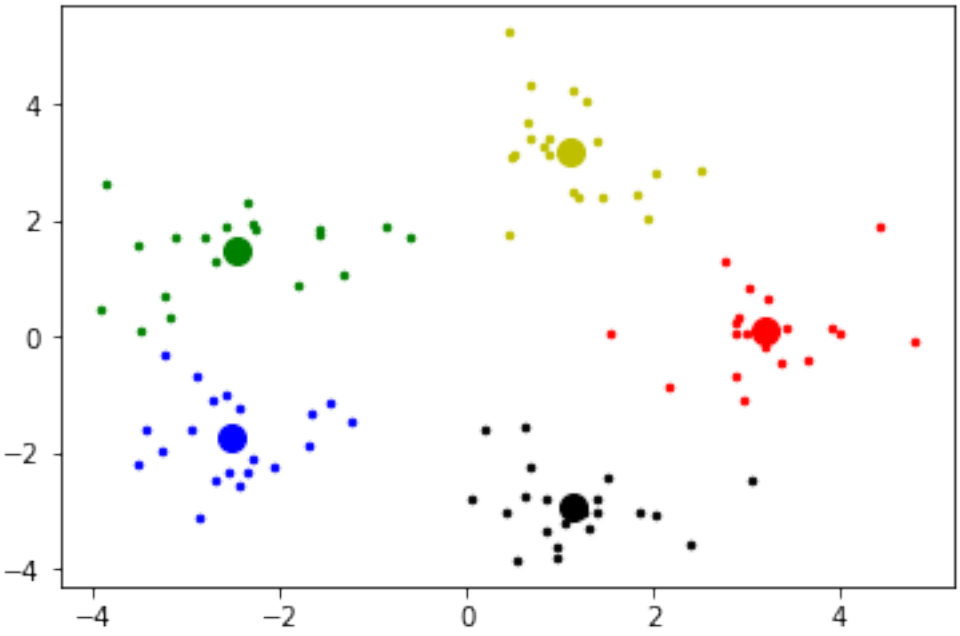
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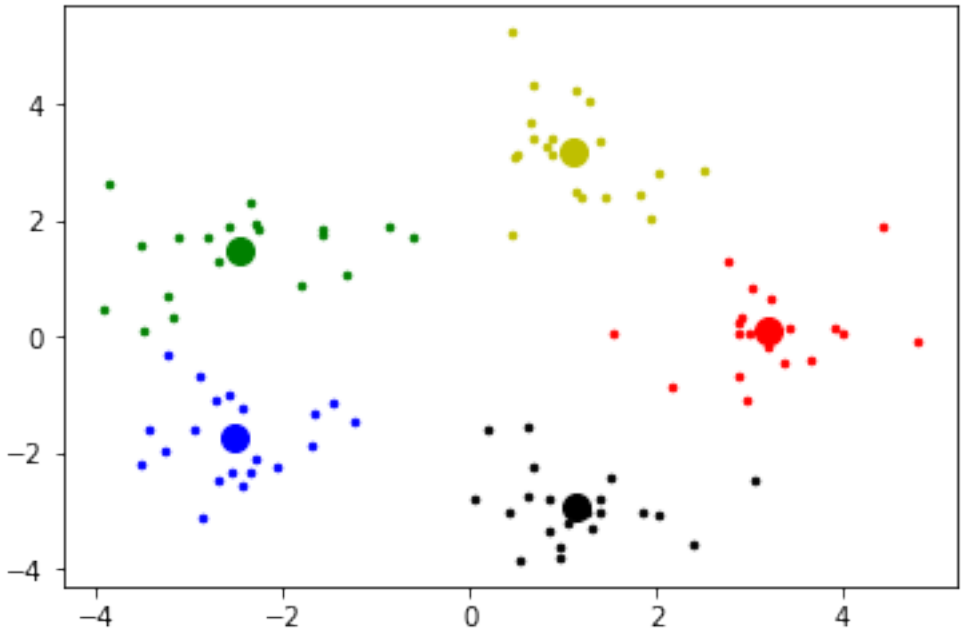

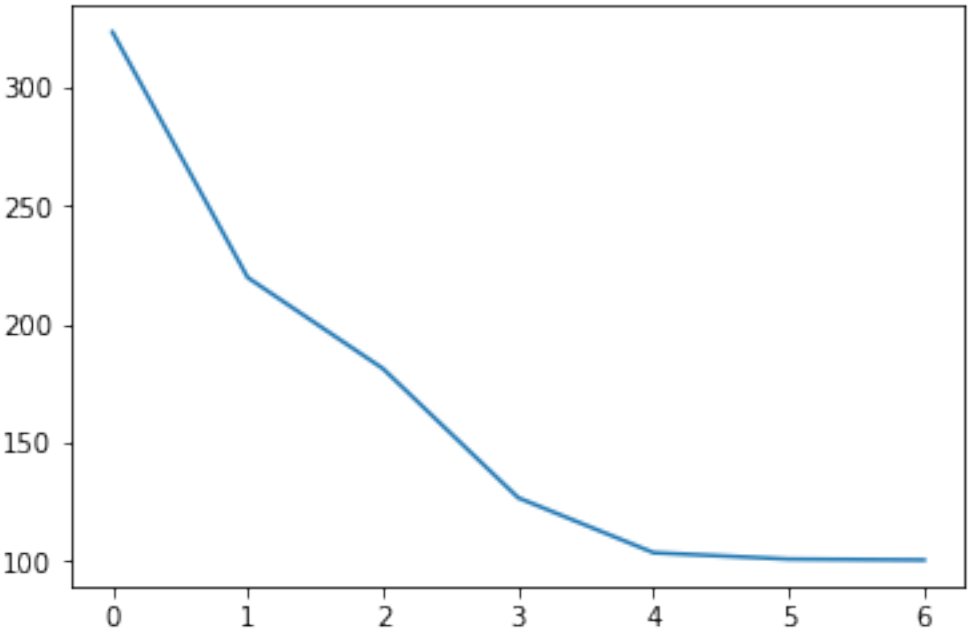

In [13]:
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### K-Means Algorithm

from numpy import *
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```
from matplotlib import pyplot
import time
import scipy.io

mat_contents=scipy.io.loadmat('hw7_1_data2.mat')
Y=mat(mat_contents['Yn'])
X=Y.T

(N,I)=shape(X)

pyplot.ion()    # allow to show figures without holding command lines

pyplot.figure(1)
pyplot.plot(X[:,0], X[:,1], 'b.')

K = 5    # number of clusters
C = X[0:K,:].copy()  # assign the first K points as the means

E = 1  # update error
m = 0
itr_max = 20

min_dis = zeros((itr_max,N))
ind = zeros((itr_max, N))
ss = zeros((itr_max))

CC = zeros((K, I, itr_max))
CC[:,:,0] = C

while (E > 1e-3):
    for n in range(0,N):
        dis = sqrt(sum(array(ones((K,1))*X[n] - C)**2, axis=1))
        min_dis[m,n] = amin(dis)
        ind[m,n] = argmin(dis)

    for k in range(0,K):
        C[k,:] = mean(X[ind[m,:] == k,:], axis=0)

    CC[:,:,m+1] = C

    E = linalg.norm(CC[:,:,m+1] - CC[:,:,m])
    ss[m] = sum(min_dis[m,:]**2)

    pyplot.figure(m+2)
    #pyplot.clf()
    cr = 'brgyk'
    for k in range(0,K):
        pyplot.plot(X[ind[m,:]==k,0], X[ind[m,:]==k,1], '.', \
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                    color = cr[k], markersize = 5)
        pyplot.plot(C[k,0], C[k,1], '*', color = cr[k], markersize = 10)

#         pyplot.show()

    m = m+1

pyplot.figure(m+2)
pyplot.plot(range(0,m), ss[0:m])

pyplot.show()
```

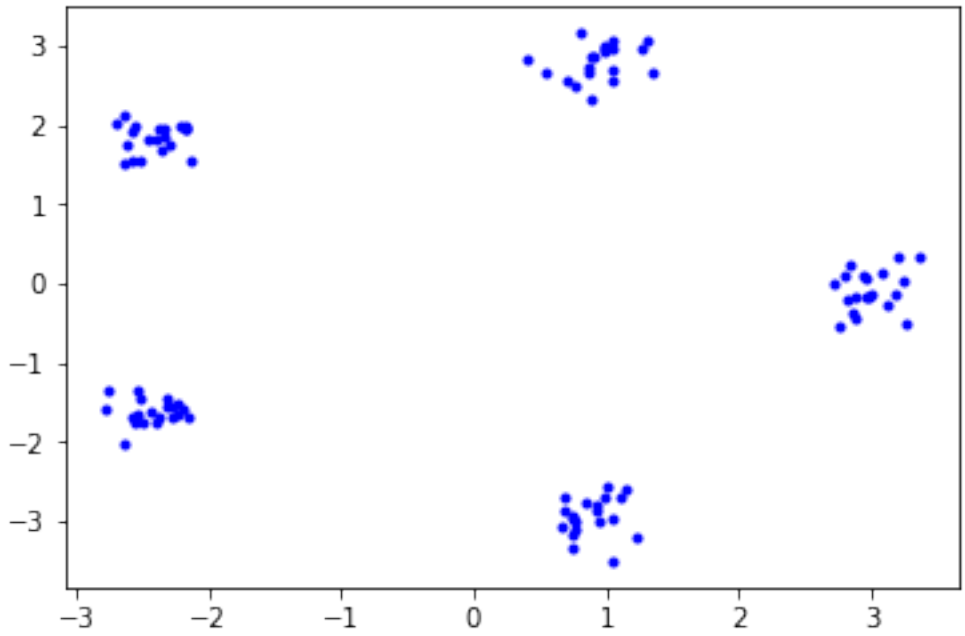

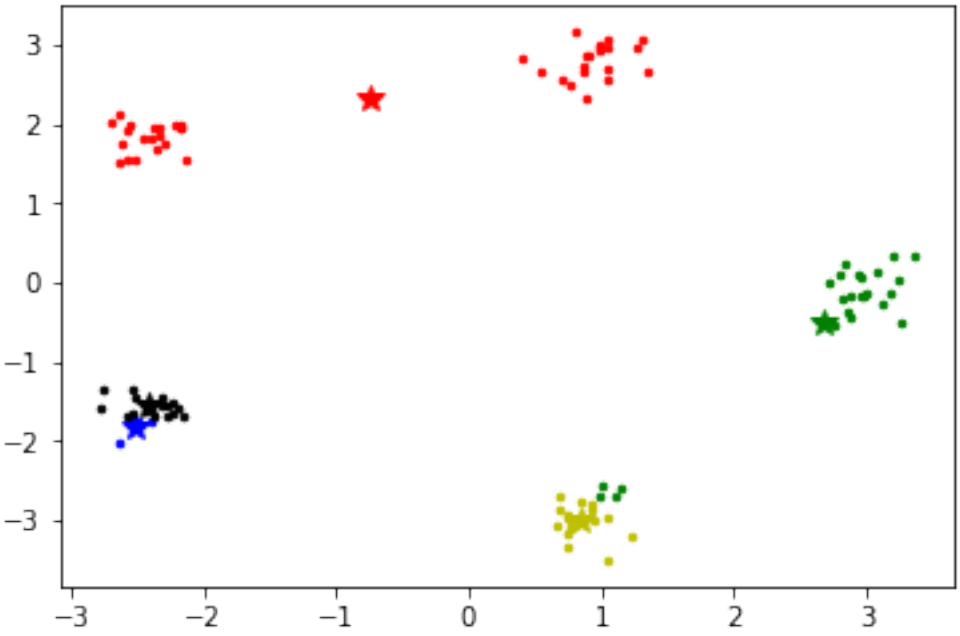
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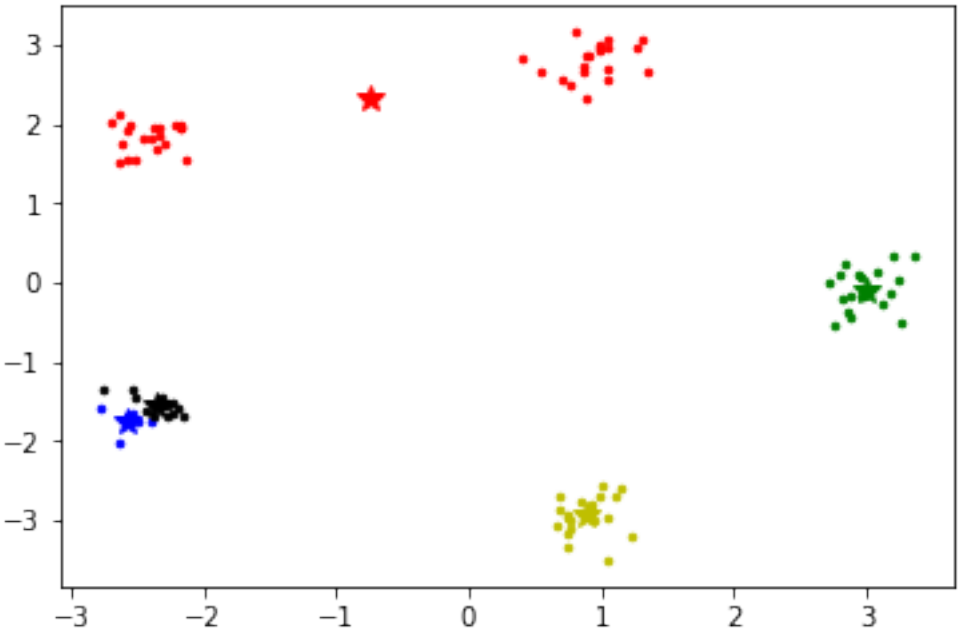
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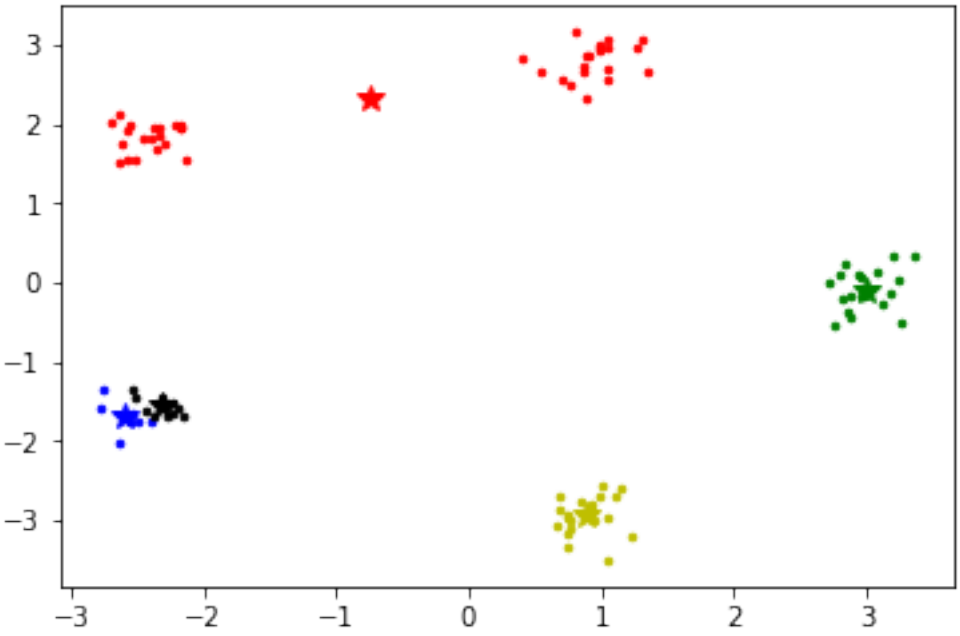
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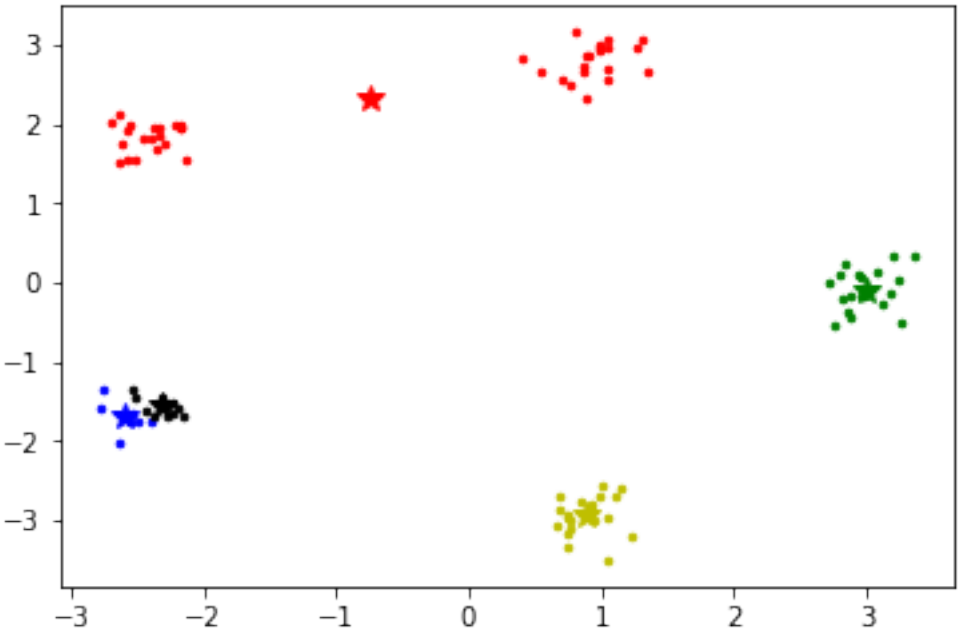
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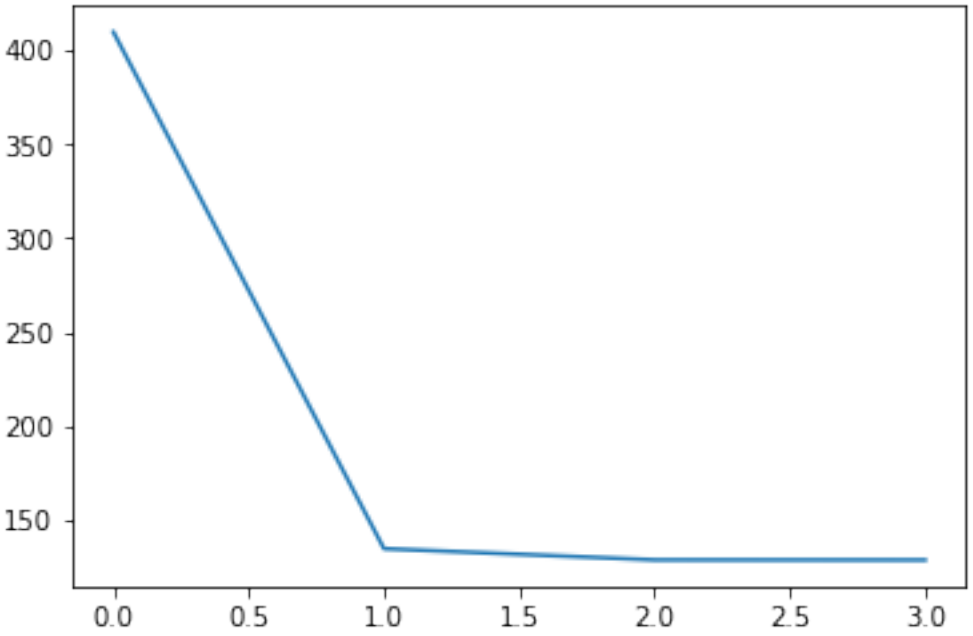

In [ ]: