KNN35

February 1, 2019

In [3]:
```
### CREATION DES ECHANTILLONS DE REFERENCE

import time as cl
import random as rd
import numpy as np
import pickle

def GenPermutation(n):  # Création d'une permutation de [0,1,2, ..., n-1]
    L1 = list(range(n))
    L = []
    m = n
    for k in range(n):
        nouv = rd.randint(0,m-1)
        m -= 1
        L.append(L1.pop(nouv))
    return L


def PartitionHomogene(X,ident,p):
# Utiliser la fonction VectorisationAmb pour avoir X et ident
    deb = 0
    nX = []
    nY = []
    nXn = []
    nYn = []
    n = 0
    for couple in ident:
        nbTextes = couple[1]
        TailleSample = int(nbTextes * p)
        L = GenPermutation(nbTextes)

        for k in range(TailleSample):
            nX.append(X[ deb+L[k] ])
            nY.append(n)


        for k in range(TailleSample,nbTextes):
            nXn.append(X[ deb + L[k] ])
```

```python
                nYn.append(n)

            deb += nbTextes
            n+=1
    return nX, nY, nXn, nYn


def GenEchantillons(n,p,Xt,ident):
    Xtot = []
    c1=cl.clock()

    for k in range(n):
        nX,nY,nXn,nYn = PartitionHomogene(Xt,ident,p)
        Xtot.append((nX,nY,nXn,nYn))
    c2=cl.clock()
    print(c2-c1)

    return Xtot

def GenGamme(n,pas):
    Interv = np.linspace(0,1,pas)

    Banque=[]

    response = VectorisationAmb()
    Vec,ident = response
    X = []
    for vec in Vec:
        X.append(list(vec))
    Y = []

    for k in range(len(ident)):
        for i in range(ident[k][1]):
            Y.append(k)
    dim = 30
    Xt,pca = ReductionDim(X,dim)
    xt = []
    for a in Xt:
        xt.append(list(a))
    Xt = xt

    for p in Interv[1:(pas-1)]:
        Banque.append(GenEchantillons(n,p,Xt,ident))

    return Banque

##Banque = GenGamme(20,11)
```

```python
def moyenne(X):
    n = len(X)
    tot = 0
    for x in X:
        tot+=x
    moy = tot/n
    variance = 0
    for x in X:
        elem = (moy-x)**2
        variance += elem/n
    ecartType = variance*(1/2)
    incertitude = ecartType/(n**(1/2))
    return moy,incertitude


# Extraction d'un fichier binaire
def readbinary(adresse):

    with open(adresse, "rb") as file:
        s = file.read()
    return s

def register(Banque,direction):
    serialBanque = pickle.dumps(Banque)


    fichiertxt = open(direction,mode="xb")
    fichiertxt.write(serialBanque)
    fichiertxt.close()

def recuperation(direction):
    c1 = cl.clock()

    serial_Banque= readbinary(direction)

    Banque= pickle.loads(serial_Banque)
    c2 = cl.clock()
    print(c2-c1)
    return Banque


##Banque = recuperation("Banque")
```

```
In [4]: KNNRes = recuperation("/Users/NAIT/classification/pact35/modules/Classifica
```

```
0.0020329999999999515
```

In [5]:
```
from sklearn.neighbors import KNeighborsClassifier
import random as rd
import pylab as pl

def entraineKNN(nX,nY,n):
    model = KNeighborsClassifier(n_neighbors=n)
    model.fit(nX,nY)
    return model


def testKNN(nX, nY, nXn, nYn, k):
    #nX et nY les parties d'entraînement
    #nXn et nYn les parties de testKNN
    # k est le nombre de proches voisins
    model = entraineKNN(nX,nY,k)
    n = len(nXn)
    if n == 0:
        return -1
    goal = 0
    failure = 0

    for i in range(n):
        prediction = model.predict([nXn[i]])
        if prediction[0] == nYn[i]:
            goal+=1
        else:
            failure +=1
    return goal/n


def efficKNNpara(Banque):
    p0 = 0
    p1 = 1
    pas = 11
    P = np.linspace(0,1,11)
    P = list(P)
    P = P[1:10]
    K = []
    AbscisseP = []

    for k in range(22):
        n_components = 2*k+1
        K.append(n_components)

    for i in range(len(P)):             # Proportion prise dans la bibliohe
        p = P[i]
        EnsemblePartitionP = Banque[i]
        AbscisseNComponents = []
```

```
        for k in range(22): # n_components variation
            c1 = cl.clock()
            n_components = 2*k + 1
            Z = []
            for (nX, nY, nXn, nYn) in EnsemblePartitionP:
                zi = testKNN(nX, nY, nXn, nYn, n_components)
                Z.append(zi)
            z,incertitude = moyenne(Z)
            AbscisseNComponents.append((z,incertitude))
            c2 = cl.clock()
            print("Pour n_components = " + str(n_components) + " et p = " +
        AbscisseP.append(AbscisseNComponents)


    return AbscisseP,P,K


#########################################################################

def efficKNN(X,ident,p0,p1,pas,iteration):
    abs = np.linspace(p0,p1,pas)

    # On enlève les cas triviaux pathologiques 0 et 1
    if p0 == 0:
        abs = abs[1:]
    if p1 == 1:
        abs = abs[:(pas-2)]
    res = []

    for p in abs:
        c1 = cl.clock()
        T=[]
        for k in range(iteration):
            nX, nY, nXn, nYn = PartitionHomogene(X,ident,p)
            T.append(testKNN(nX, nY, nXn, nYn))
        res.append(moyenne(T))
        c2 = cl.clock()
        print("Pour la proportion p = ", p , ", on met un temps de ", (c2-c
    ResP = []
    ResM = []
    for couple in res:
        ResM.append(couple[0]-couple[1])
        ResP.append(couple[0]+couple[1])
    pl.plot(abs,ResP)
    pl.plot(abs,ResM)
    pl.show()
    return abs,res
```

```
#P=[0.10000000000000001, 0.20000000000000001, 0.30000000000000004, 0.40000(
#K=[1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37,
#Z=[[(0.19713386348575213, 8.133905069254739e-06), (0.18316766070245197, 1.
#format de Z: liste de 9 listes de 22 couples de floats
```

0.0.1 La fonction retourne une liste, notée KNNRes, qui est une liste de listes de couples comportant le taux de réussite et un calcul d'incertitude; ce pour chaque valeur de paramètre de voisins k; et ce pour chaque proportion p du DataTraining. À noter que ce classifieur est donc testé non seulement selon la proportion de DataTraining utilisé mais aussi du paramètre d'entrée du classifieur.

```
In [2]: KNNRes = [[(0.19713386348575213, 8.133905069254739e-06), (0.18316766070245
        KNNResu = []
        for i in range(len(KNNRes)):
            for j in range(len(KNNRes[0])):
                KNNResu.append(KNNRes[i][j][0])
        print(KNNResu)
```

```
[0.19713386348575213, 0.18316766070245197, 0.20226971504307492, 0.2119449966865473
```

```
In [3]: import matplotlib as mpl
        from pylab import *
        from mpl_toolkits.mplot3d import Axes3D
        import numpy as np
        import matplotlib.pyplot as plt


        x = np.array([ 0.1]*22 + [ 0.2]*22 + [ 0.3]*22+ [ 0.4]*22+ [ 0.5]*22+ [ 0.6
        print(x)
        print(len(x))
        y = np.array([1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33
        print(y)
        print(len(y))
        z = np.array(KNNResu)
        print(z)
        print(len(z))

        fig = plt.figure()
        ax = fig.gca(projection='3d')

        plt.title("Taux de réussite r du classifieur KNN en fonction de \n la propo
        ax.set_xlabel('proportion p')
        ax.set_ylabel('paramètre k')
        ax.set_zlabel('Taux de réussite r')
```

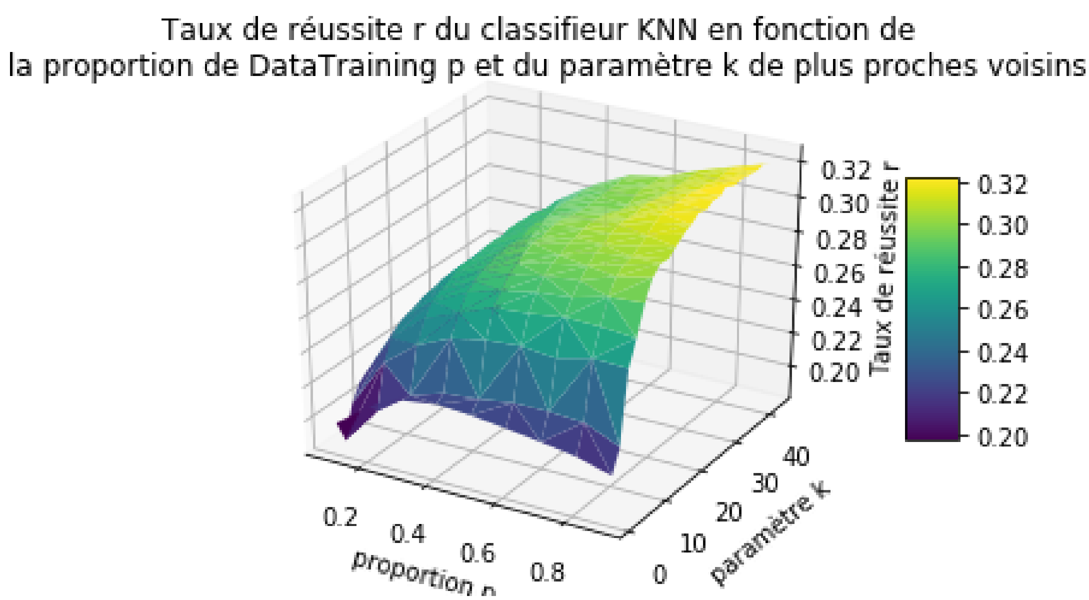
```
    # to Add a color bar which maps values to colors.
    surf=ax.plot_trisurf(x, y, z, cmap=plt.cm.viridis, linewidth=0.2)
    fig.colorbar( surf, shrink=0.5, aspect=5)
    plt.savefig('CourbeKNNthiz.png')
    plt.show()

    # Rotate it
    ax.view_init(30, 45)
    plt.show()

    # Other palette
    ax.plot_trisurf(y, x, z, cmap=plt.cm.jet, linewidth=0.01)
    plt.show()
```

```
[ 0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2
  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.2  0.3
  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3  0.3
  0.3  0.3  0.3  0.3  0.3  0.3  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4
  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.4  0.5  0.5
  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5  0.5
  0.5  0.5  0.5  0.5  0.5  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6
  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.6  0.7  0.7  0.7
  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7  0.7
  0.7  0.7  0.7  0.7  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8
  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.8  0.9  0.9  0.9  0.9
  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9  0.9
  0.9  0.9  0.9]
198
[ 1  3  5  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43  1  3  5
  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43  1  3  5  7  9 11
 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43  1  3  5  7  9 11 13 15 17
 19 21 23 25 27 29 31 33 35 37 39 41 43  1  3  5  7  9 11 13 15 17 19 21 23
 25 27 29 31 33 35 37 39 41 43  1  3  5  7  9 11 13 15 17 19 21 23 25 27 29
 31 33 35 37 39 41 43  1  3  5  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35
 37 39 41 43  1  3  5  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41
 43  1  3  5  7  9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43]
198
[ 0.19713386  0.18316766  0.20226972  0.211945    0.21494367  0.21491054
  0.2140159   0.2147283   0.21449636  0.21245858  0.21164679  0.21174619
  0.20997349  0.20758781  0.20611332  0.20463883  0.20311465  0.20213718
  0.19971836  0.19754805  0.19597416  0.19441683  0.21181073  0.20586811
  0.23137109  0.24267884  0.24793219  0.25014903  0.2514158   0.25385618
  0.25480626  0.25584948  0.25700447  0.25611028  0.25413562  0.25326006
  0.25298063  0.25230999  0.25255216  0.25240313  0.25137854  0.25
  0.24806259  0.24662817  0.22065079  0.22033177  0.24629945  0.25867716
  0.2653339   0.26875798  0.27071459  0.27320289  0.27518077  0.27447895
```

```
  0.27501063  0.27639302  0.27649936  0.27645683  0.27764781  0.27792429
  0.27728626  0.27749894  0.2758826   0.27513824  0.27558486  0.27522331
  0.22353671  0.22673611  0.25533234  0.26654266  0.27490079  0.27842262
  0.28157242  0.28323413  0.2843998   0.28546627  0.28576389  0.28504464
  0.28777282  0.28829365  0.28735119  0.2875744   0.28888889  0.28874008
  0.28819444  0.28851687  0.28831845  0.28764881  0.22221228  0.22829457
  0.25903399  0.27429934  0.28085868  0.28664281  0.2905486   0.29284436
  0.29555754  0.29534884  0.29680978  0.29800239  0.29749553  0.29603459
  0.29570662  0.29522958  0.29600477  0.29612403  0.2966607   0.29686941
  0.29758497  0.29698867  0.21973294  0.23126855  0.26042285  0.27585312
  0.28468101  0.29050445  0.29469585  0.29617953  0.29962908  0.30029674
  0.30196588  0.30263353  0.30192878  0.30170623  0.29966617  0.29821958
  0.29833086  0.3009273   0.30207715  0.30126113  0.30152077  0.3004822
  0.21691249  0.23121927  0.25835792  0.27841691  0.28618486  0.29262537
  0.29768928  0.30211406  0.30373648  0.30717797  0.30889872  0.30899705
  0.30860374  0.30968535  0.30968535  0.30875123  0.30806293  0.30791544
  0.30816126  0.30757129  0.30806293  0.30835792  0.21375     0.23014706
  0.26330882  0.27794118  0.29139706  0.29948529  0.30294118  0.30426471
  0.30727941  0.31029412  0.31448529  0.31661765  0.31683824  0.31705882
  0.31669118  0.31713235  0.31544118  0.31617647  0.31411765  0.31426471
  0.31507353  0.31463235  0.20785714  0.22114286  0.26257143  0.27614286
  0.29271429  0.30357143  0.30828571  0.30757143  0.31128571  0.31528571
  0.31771429  0.321       0.32        0.32228571  0.32228571  0.326
  0.32257143  0.32314286  0.32228571  0.32185714  0.32271429  0.32057143]
198
```



0.1 Détermination du maximum d'efficacité du KNN et des paramètres associés

In [8]:
```
zmax = 0
imax = 0
k = 0
for zi in z:
    k+=1
    if zi>zmax:
        zmax = zi
        imax = k
pmax = x[imax]
kmax = y[imax]
print ("Efficacité maximale du classifieur par KNN = " + str(zmax*100) + "%
print("obtenue pour un paramètre de plus proches voisins k = " + str(kmax))
print("obtenue pour une proportion de DataTraining p = " + str(pmax))
```

```
Efficacité maximale du classifieur par KNN = 32.6%
obtenue pour un paramètre de plus proches voisins k = 33
obtenue pour une proportion de DataTraining p = 0.9
```

0.2 CONCLUSION : Éfficacité du classifieur KNN maximale, de maximum 32.6% de réussite avec un paramètre de plus proches voisins k = 33 et une proportion de DataTraining p = 0.9

0.2.1 NB : À noter qu'on considère être une réussite le fait de renvoyer exactement l'ambiance du texte. Les rapprochements d'ambiance ne sont pas pris en compte. Notamment, on ne pondère pas selon si la deuxième ambiance trouvée se rapproche de celle souhaitée.