SepFuentes

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1 Introducción

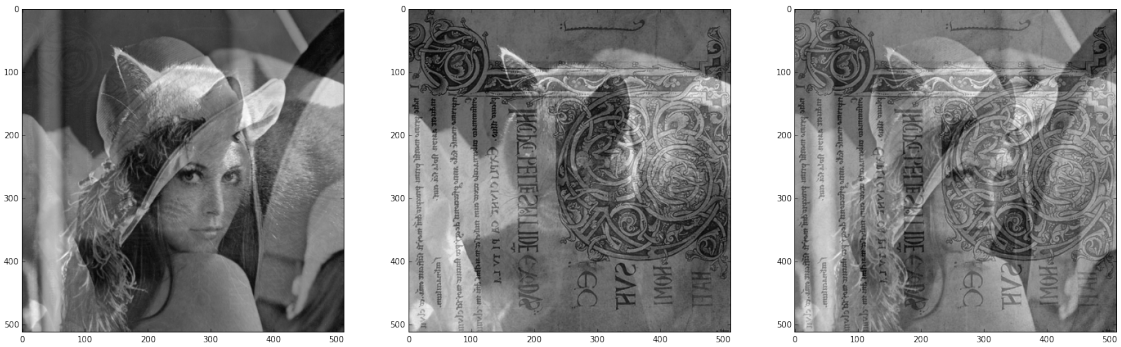
El objetivo de este trabajo es la aplicación de las técnicas de Análisis por Componentes Principales (*PCA, del inglés*) y de Análisis por Componentes Independientes (*ICA, del inglés*) para separas tres imágenes mezcladas en sus componentes.

```
In [27]: %matplotlib inline
         import numpy as np
         import matplotlib.pyplot as plt
         from sklearn import decomposition
```

```
In [4]: img_1 = np.genfromtxt('imagen_mezclada_uno.dat', dtype='float64')
        img_2 = np.genfromtxt('imagen_mexclada_dos.dat', dtype='float64')
        img_3 = np.genfromtxt('imagen_mexclada_tres.dat', dtype='float64')

        f, (ax1,ax2,ax3) = plt.subplots(1,3)
        f.set_size_inches((24,40))
        ax1.imshow(img_1, cmap=plt.cm.gray)
        ax2.imshow(img_2, cmap=plt.cm.gray)
        ax3.imshow(img_3, cmap=plt.cm.gray)
```

```
Out[4]: <matplotlib.image.AxesImage at 0x1081a5e90>
```



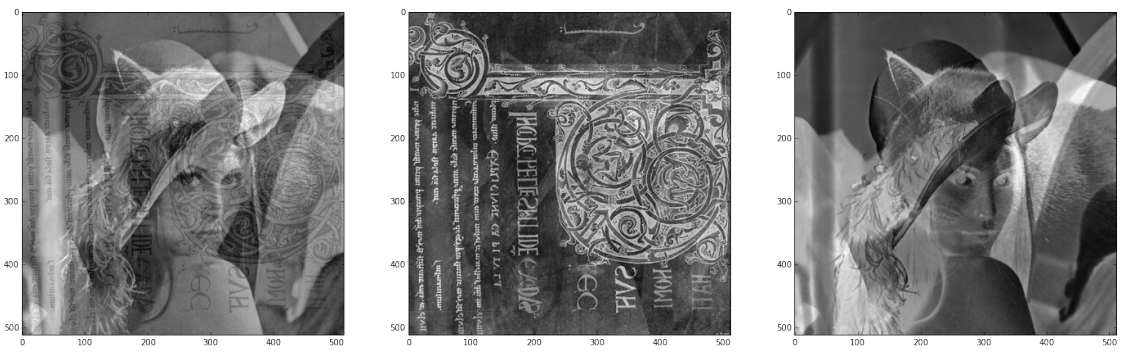
```
In [26]: # each image is flattened and all three are stacked together
         X = np.vstack((img_1.flatten(),img_2.flatten(),img_3.flatten()))
```

```
In [24]: pca = decomposition.PCA(n_components=3)
         img_pca= pca.fit_transform(X.T)
         f, (ax1,ax2,ax3) = plt.subplots(1,3)
```

```
        print "Explained variance:\n", pca.explained_variance_
        print "Explained variance ratio:\n", pca.explained_variance_ratio_
        print "Inverse of Mixing Matrix:\n", pca.components_
        print "Mixing Matrix:\n", np.linalg.inv(pca.components_)
        f.set_size_inches((24,40))
        ax1.imshow(img_pca[:,0].reshape((512,512)), cmap=plt.cm.gray)
        ax2.imshow(img_pca[:,1].reshape((512,512)), cmap=plt.cm.gray)
        ax3.imshow(img_pca[:,2].reshape((512,512)), cmap=plt.cm.gray)
```

```
Explained variance:
[ 5.72141859  0.90953297  0.189357  ]
Explained variance ratio:
[ 0.83887973  0.13335657  0.0277637 ]
Inverse of Mixing Matrix:
[[ 0.65909172  0.14263253  0.73841321]
 [ 0.74315636 -0.27417719 -0.61036505]
 [ 0.11539815  0.95104302 -0.28670619]]
Mixing Matrix:
[[ 0.65909172  0.74315636  0.11539815]
 [ 0.14263253 -0.27417719  0.95104302]
 [ 0.73841321 -0.61036505 -0.28670619]]
```

Out[24]: <matplotlib.image.AxesImage at 0x114d65d50>



In [25]:
```
np.random.seed(20)

        ica = decomposition.FastICA(n_components=3)
        img_ica= ica.fit_transform(X.T)

        print "Mixing Matrix:\n",ica.mixing_
        print "Unmixing Matrix:\n",ica.components_

        f, (ax1,ax2,ax3) = plt.subplots(1,3)
        f.set_size_inches((24,40))
        ax1.imshow(img_ica[:,0].reshape((512,512)), cmap=plt.cm.gray)
        ax2.imshow(img_ica[:,1].reshape((512,512)), cmap=plt.cm.gray)
        ax3.imshow(img_ica[:,2].reshape((512,512)), cmap=plt.cm.gray)
```

```
Mixing Matrix:
[[-567.29852888  675.60652116  -74.83530837]
```

```
 [-241.26704961  -37.39529646  183.64472666]
 [-419.33633585  630.17696537  581.14653985]]
Unmixing Matrix:
[[-0.00103173 -0.00330088  0.00091023]
 [ 0.00047438 -0.00271003  0.00091747]
 [-0.00125886  0.00055686  0.00138266]]
```

Out[25]: <matplotlib.image.AxesImage at 0x10e350910>

In [105]:

In []: