

BRSU

---

# Neural Networks Assignment 7

---

Bastian Lang

November 21, 2015

## 1 OUTLINE

## 2 PCA & ICA

### 2.1 OUTPUT

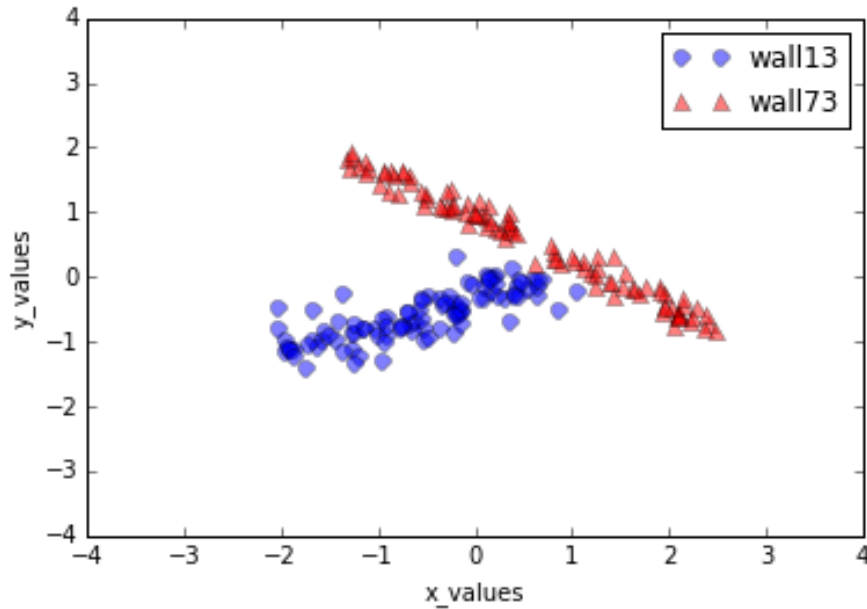


Figure 2.1: Both datasets in new coordinate system after performing PCA.

### 2.2 CODE

```
# -*- coding: utf-8 -*-
"""
Created on Sat Nov 21 12:41:57 2015

@author: bastian
"""

from matplotlib.mlab import PCA as mlabPCA
import matplotlib.pyplot as plt
import numpy as np

def do_pca(data, class_label):

    mlab_pca = mlabPCA(wall13_data)
```

```

print('PC axes in terms of the measurement axes scaled by the standard deviations:\n')

# pca
plt.plot(mlab_pca.Y[:,0],mlab_pca.Y[:,1],
         'o', markersize=7, color='blue', alpha=0.5, label=class_label)
# original
plt.plot(wall13_data[:,0], wall13_data[:,1], '^', markersize=7, color='red', alpha=0.5, label=class_label)

plt.xlabel('x_values')
plt.ylabel('y_values')
plt.xlim([-4,40])
plt.ylim([-4,10])
plt.legend()
plt.title('Transformed samples versus original data')

plt.show()

wall13_data = np.genfromtxt('wall13.csv', delimiter=',')
do_pca(wall13_data, 'wall13')

wall73_data = np.genfromtxt('wall73.csv', delimiter=',')
do_pca(wall73_data, 'wall73')

def split_pca(combined_data, label_1, label_2):

    mlab_pca = mlabPCA(combined_data)

    print('PC axes in terms of the measurement axes scaled by the standard deviations:\n')

    plt.plot(mlab_pca.Y[0:100,0],mlab_pca.Y[0:100,1],
             'o', markersize=7, color='blue', alpha=0.5, label=label_1)
    plt.plot(mlab_pca.Y[100:200,0], mlab_pca.Y[100:200,1],
             '^', markersize=7, color='red', alpha=0.5, label=label_2)

    plt.xlabel('x_values')
    plt.ylabel('y_values')
    plt.xlim([-4,4])
    plt.ylim([-4,4])

```

```
plt.legend()  
plt.title('Transformed samples with class labels from matplotlib.mlab.PCA()')  
  
plt.show()  
  
mixed_data = np.concatenate((wall13_data, wall73_data), axis=0)  
split_pca(mixed_data, 'wall13', 'wall73')
```