PCA_MNIST_Digits

November 7, 2018

1 PCA on MNIST Handwritten Digits

Why To have hands-on on PCA

Reference None. Just for my own practice/ understanding

In [1]:
```
# import required modules

import numpy as np
import pandas as pd # for dataframe
import seaborn as sns
from sklearn.preprocessing import StandardScaler
from sklearn.decomposition import PCA
import matplotlib.pyplot as plt
```

In [2]:
```
# Load Dataset
df = pd.read_csv('../../../datasets/mnist-digits-dataset/train.csv')
df.head()
```

Out[2]:

	label	pixel0	pixel1	pixel2	pixel3	pixel4	pixel5	pixel6	pixel7	\
0	1	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	
2	1	0	0	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	

	pixel8	...	pixel774	pixel775	pixel776	pixel777	pixel778	\
0	0	...	0	0	0	0	0	
1	0	...	0	0	0	0	0	
2	0	...	0	0	0	0	0	
3	0	...	0	0	0	0	0	
4	0	...	0	0	0	0	0	

	pixel779	pixel780	pixel781	pixel782	pixel783
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0

```
        4         0         0         0         0         0

        [5 rows x 785 columns]
```

```
In [3]: # remove labels from the data set
        df_labels = df['label']
        df_data = df.drop(['label'],axis=1)
        print(df_labels.shape,df_data.shape)
```

```
(42000,) (42000, 784)
```

```
In [4]: # Column Standardize the data
        standardized_data = StandardScaler().fit_transform(df_data.astype(np.float64))
        print(type(standardized_data))
        print(standardized_data.shape)
        standardized_data[:4]
```

```
<class 'numpy.ndarray'>
(42000, 784)
```

```
Out[4]: array([[0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.]])
```

```
In [5]: # PCA
        pca = PCA()
        pca.n_components = 2
        pca_data = pca.fit_transform(standardized_data)
        pca_data.shape
```

```
Out[5]: (42000, 2)
```

```
In [6]: # Add Labels
        new_data = np.vstack((pca_data.T,df_labels)).T
        new_data.shape
```

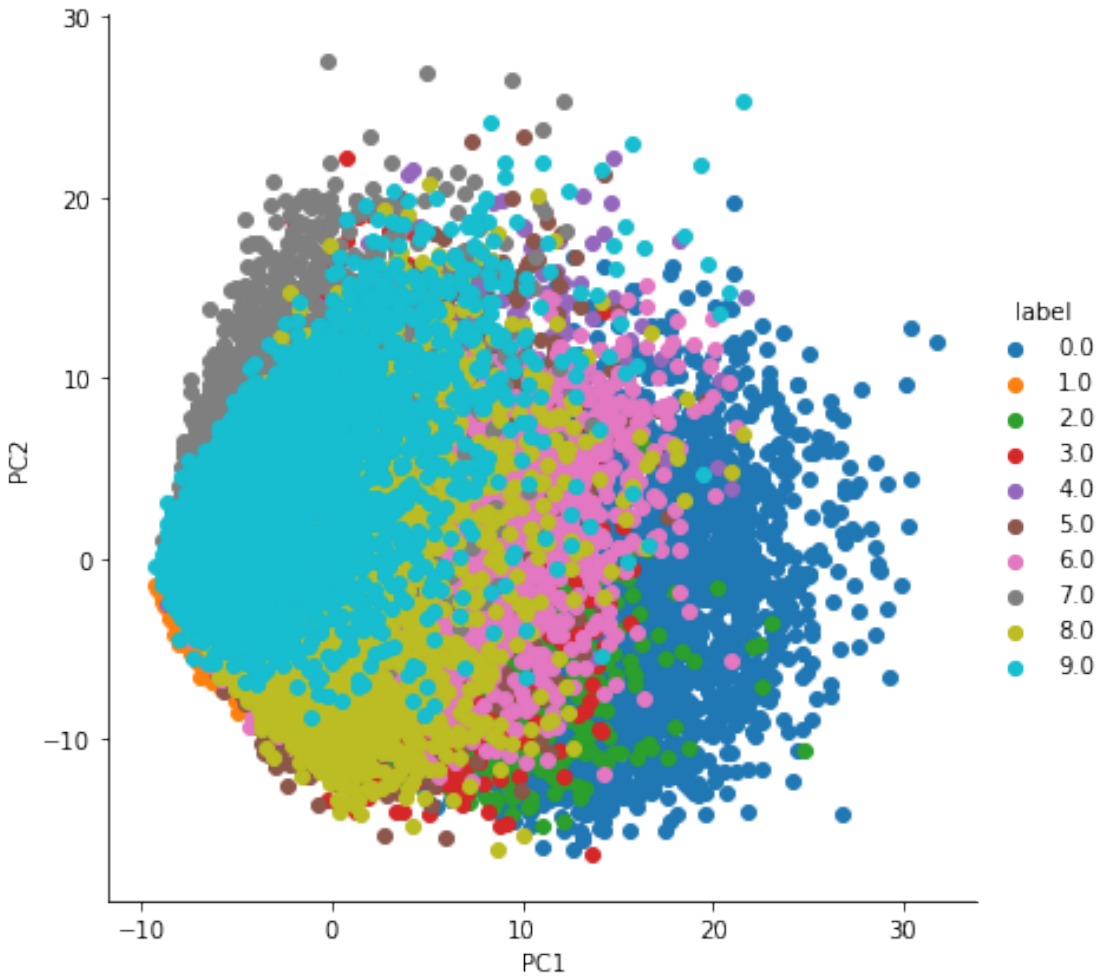
```
Out[6]: (42000, 3)
```

```
In [7]: new_df = pd.DataFrame(new_data,columns=['PC1','PC2','label'])
        new_df.head()
```

```
Out[7]:          PC1       PC2  label
        0  -5.140494 -5.226546    1.0
        1  19.292342  6.033227    0.0
        2  -7.644477 -1.705717    1.0
        3  -0.474203  5.836530    4.0
        4  26.559560  6.024783    0.0
```

```
In [8]: sns.FacetGrid(new_df,hue='label',height=6).map(plt.scatter, 'PC1', 'PC2').add_legend()

Out[8]: <seaborn.axisgrid.FacetGrid at 0x7f62cff01978>
```



2 Observation

Nothing able to deduce from PCA over MNIST Handwritten dataset
All the digits are overlapped in 2-D visualization.
So 2-D visualizion using PCA is not right for this dataset