SHRI VILEPARLE KELAVANI MANDAL'S
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC ACCREDITED with "A" GRADE (CGPA : 3.18)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

COURSE CODE: DJ19DSC501 **DATE:**

COURSE NAME: Machine Learning - II **CLASS: AY 2023-24**

Jhanvi Parekh

60009210033

D11

LAB EXPERIMENT NO. 8

AIM :

Compare the performance of PCA and Autoencoders on a given dataset

THEORY:

What is Dimensionality Reduction?

In machine learning classification problems, there are often too many factors on the basis of which the final classification is done. These factors are basically variables called features. The higher the number of features, the harder it gets to visualize the training set and then work on it. Sometimes, most of these features are correlated, and hence redundant. This is where dimensionality reduction algorithms come into play. Dimensionality reduction is the process of reducing the number of random variables under consideration, by obtaining a set of principal variables. It can be divided into feature selection and feature extraction.

Principle Component Analysis

Principle Component Analysis is an unsupervised technique where the original data is projected to the direction of high variance. These directions of high variance are orthogonal to each other resulting in very low or almost close to 0 correlation in the projected data. These features transformation is linear and the methodology to do it is:

Step 1: Calculate the Correlation matrix data consisting of n dimensions. The Correlation matrix will be of shape n*n.

Step 2: Calculate the Eigenvectors and Eigenvalues of this matrix.

Step 3: Take the first k-eigenvectors with the highest eigenvalues.

Step 4: Project the original dataset into these k eigenvectors resulting in k dimensions where k ≤ n.

Autoencoders

Academic Year 2021-22 SAP ID:

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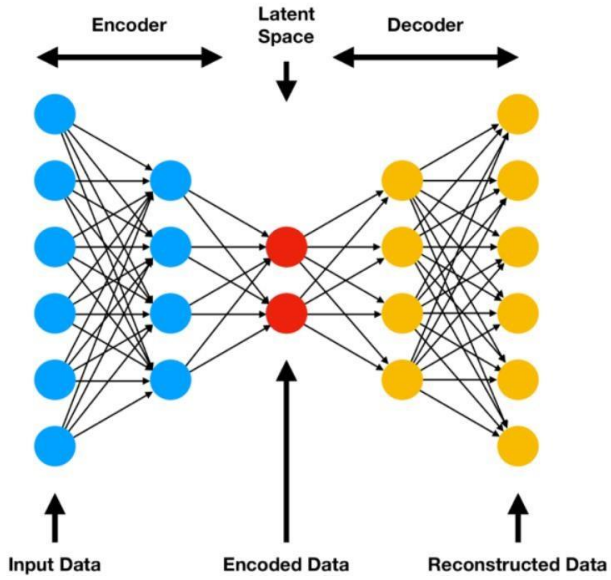
Autoencoder is an unsupervised artificial neural network that compresses the data to lower dimension and then reconstructs the input back. Autoencoder finds the representation of the data in a lower dimension by focusing more on the important features getting rid of noise and redundancy. It's based on Encoder-Decoder architecture, where encoder encodes the high-dimensional data to lower-dimension and decoder takes the lower-dimensional data and tries to reconstruct the original high-dimensional data.



Tasks to be performed:

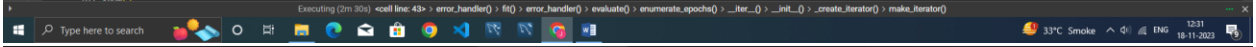
1. **Use the Iris Dataset present in the scikit-learn library**
2. **Create an Auto Encoder and fit it with our data using 3 neurons in the dense layer**
3. **Use encoded layer to encode the training input**
4. **Plot loss for different encoders [PCA, Linear Autoencoder, Sigmoid based NonLinear Autoencoder, ReLU based Non-Linear Auto encoder]**

Link: https://colab.research.google.com/drive/1n7aUhoBCC3ZOZW_r-SnrSYgxTpigD-G5?usp=sharing

```
import keras
import pickle
import pandas as pd
import numpy as np
from keras.models import Model,load_model
from keras.layers import Input,Dense
from keras.callbacks import ModelCheckpoint
from keras import regularizers
from keras.optimizers import Adam
from sklearn import datasets
from sklearn import decomposition
from sklearn.cluster import KMeans
from sklearn.preprocessing import MinMaxScaler
from sklearn import metrics
import matplotlib.pyplot as plt

RANDOM_SEED=37117
np.random.seed(RANDOM_SEED)
```

```
[2] iris=datasets.load_iris()

    X=iris.data
    y=iris.target
    print("X:",X[0])
    target_names=iris.target_names

    scaler=MinMaxScaler()
    scaler.fit(X)
    X_scaled=scaler.transform(X)


    def plot3clusters(X,title,vtitle):
     plt.figure()
     colors=['navy','turquoise','darkorange']
     lw=2
     for color,i,target_name in zip(colors,[0,1,2],target_names):
      plt.scatter(X[y==i,0],X[y==i,1],color=color,alpha=1.,lw=lw,label=target_name)
      plt.legend(loc='best',shadow=False,scatterpoints=1)
      plt.title(title)
      plt.xlabel(vtitle+"1")
      plt.ylabel(vtitle+"2")
      plt.show()
```

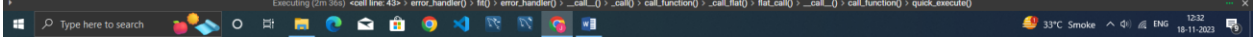
Executing (2m 30s) <cell line: 43> › error_handler() › fit() › error_handler() › evaluate() › enumerate_epochs() › __iter__() › __init__() › _create_iterator() › make_iterator()




```
import matplotlib.pyplot as plt
[1]
    RANDOM_SEED=37117
    np.random.seed(RANDOM_SEED)
```

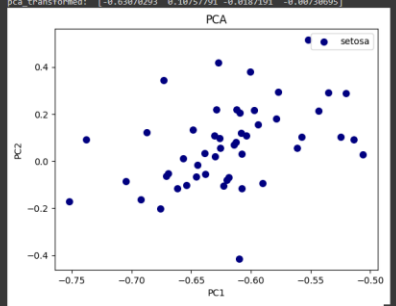
```
    iris=datasets.load_iris()

    X=iris.data
    y=iris.target
    print("X:",X[0])
    target_names=iris.target_names

    scaler=MinMaxScaler()
    scaler.fit(X)
    X_scaled=scaler.transform(X)


    def plot3clusters(X,title,vtitle):
     plt.figure()
     colors=['navy','turquoise','darkorange']
     lw=2
     for color,i,target_name in zip(colors,[0,1,2],target_names):
      plt.scatter(X[y==i,0],X[y==i,1],color=color,alpha=1.,lw=lw,label=target_name)
      plt.legend(loc='best',shadow=False,scatterpoints=1)
      plt.title(title)
      plt.xlabel(vtitle+"1")
      plt.ylabel(vtitle+"2")
      plt.show()

    pca=decomposition.PCA()
    pca_transformed=pca.fit_transform(X_scaled)
    print("pca_transformed: ",pca_transformed[0])
    plot3clusters(pca_transformed[:,:2],'PCA','PC')
```

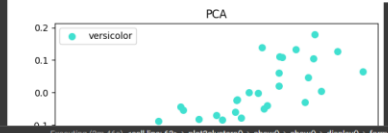

Executing (2m 36s) <cell line: 43> › error_handler() › fit() › error_handler() › __call__() › _call() › call_function() › _call_flat() › flat_call() › __call__() › call_function() › quick_execute()



```
    plt.ylabel(vtitle+"2")
    plt.show()

pca=decomposition.PCA()
pca_transformed=pca.fit_transform(X_scaled)
print("pca_transformed: ",pca_transformed[0])
plot3clusters(pca_transformed[:,:2],'PCA','PC')
```

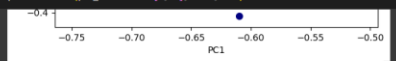
```
X: [5.1 3.5 1.4 0.2]
pca_transformed:  [-0.63070293  0.10757791 -0.0187191  -0.00730695]
```

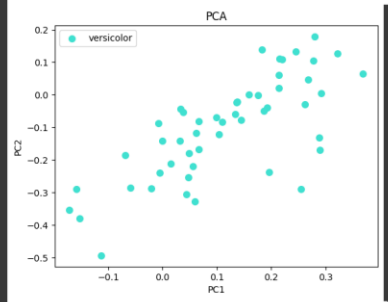


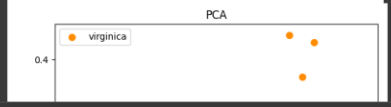


Executing (2m 46s) <cell line: 63> › plot3clusters() › show() › show() › display() › format() › __call__() › catch_format_error() › __call__() › print_figure() › print_figure() › get_tightbbox() › get_tightbbox() › get_tightbbox() › get_window_extent() › frozen() › frozen()


```
    plt.ylabel(vtitle+"2")
    plt.show()

pca=decomposition.PCA()
pca_transformed=pca.fit_transform(X_scaled)
print("pca_transformed: ",pca_transformed[0])
plot3clusters(pca_transformed[:,:2],'PCA','PC')
```





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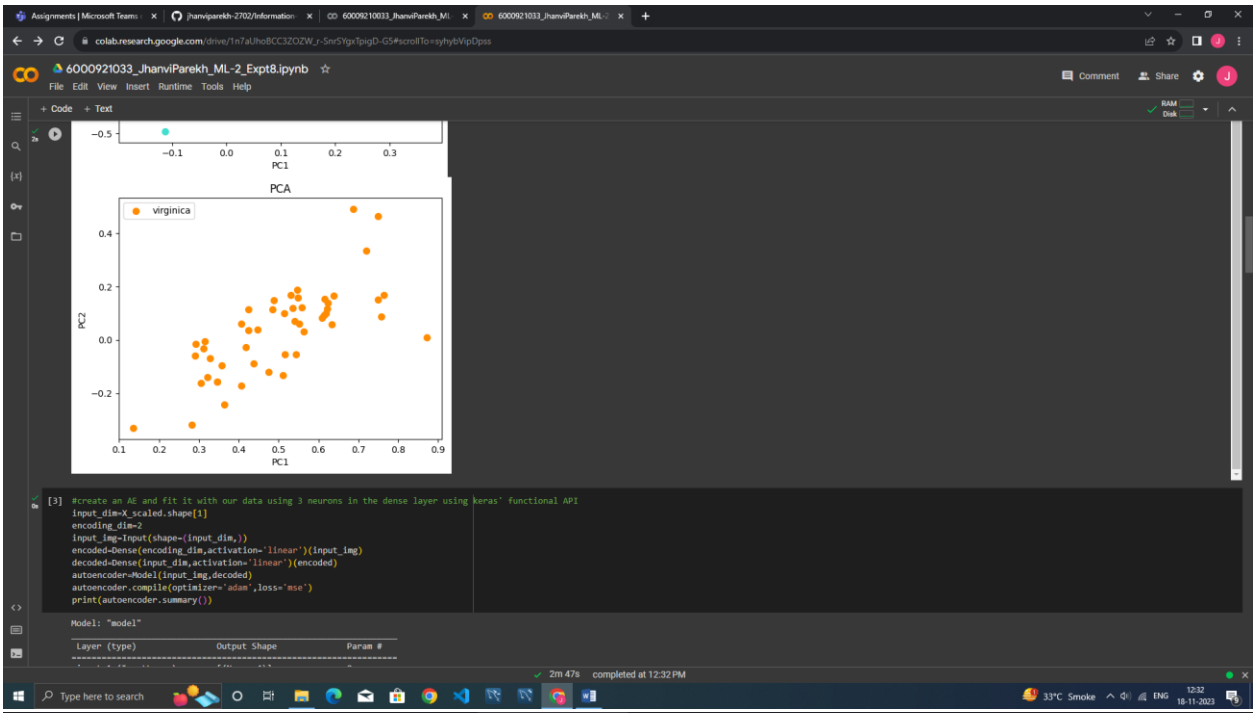
6000921033_JhanviParekh_ML-2_Expt8.ipynb
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+ Code + Text
PCA
virginica
PC1
PC2
[3] #create an AE and fit it with our data using 3 neurons in the dense layer using keras' functional API
input_dim=X_scaled.shape[1]
encoding_dim=2
input_img=Input(shape=(input_dim,))
encoded=Dense(encoding_dim,activation='linear')(input_img)
decoded=Dense(input_dim,activation='linear')(encoded)
autoencoder=Model(input_img,decoded)
autoencoder.compile(optimizer='adam',loss='mse')
print(autoencoder.summary())
Model: "model"
Layer (type) Output Shape Param #
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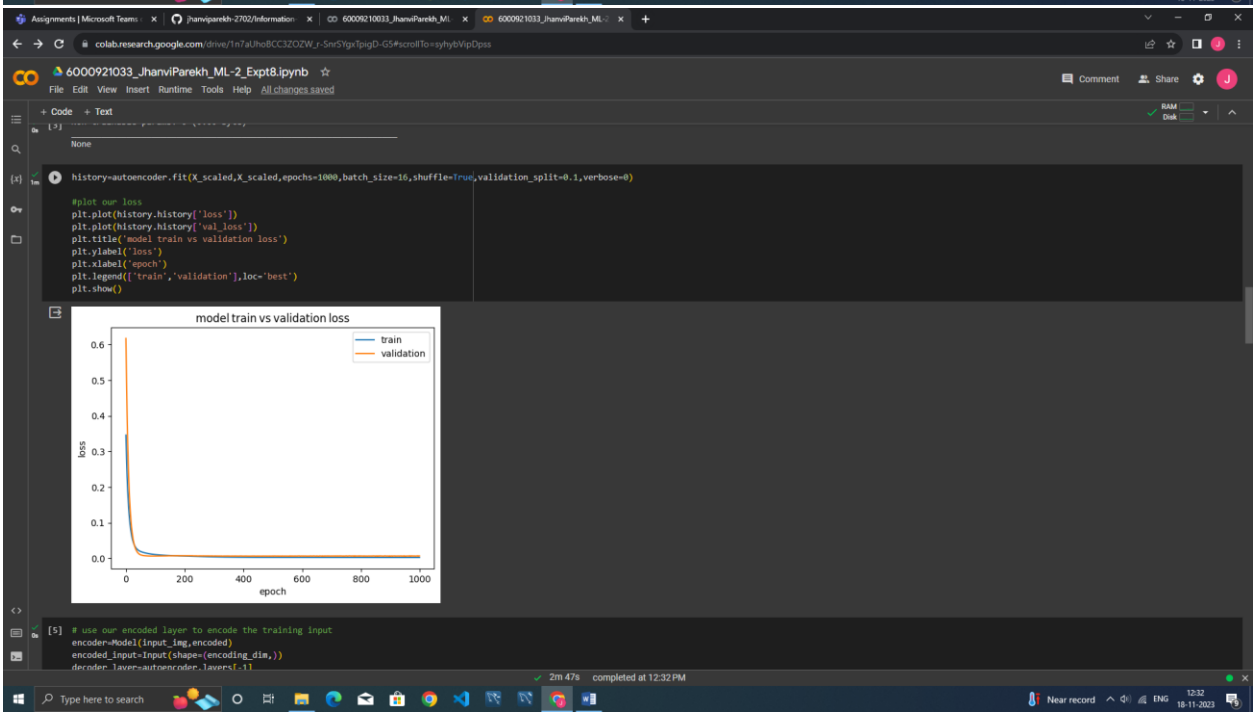
6000921033_JhanviParekh_ML-2_Expt8.ipynb
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+ Code + Text
None
history=autoencoder.fit(X_scaled,X_scaled,epochs=1000,batch_size=16,shuffle=True,validation_split=0.1,verbose=0)
#plot our loss
plt.plot(history.history['loss'])
plt.plot(history.history['val_loss'])
plt.title('model train vs validation loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.legend(['train','validation'],loc='best')
plt.show()
model train vs validation loss
train
validation
loss
epoch
[5] # use our encoded layer to encode the training input
encoder=Model(input_img,encoded)
encoded_input=Input(shape=(encoding_dim,))
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18-11-2023

Assignments | Microsoft Teams | jhanviparekh-2702/Information | 6000921033_JhanviParekh_ML | 6000921033_JhanviParekh_ML-2

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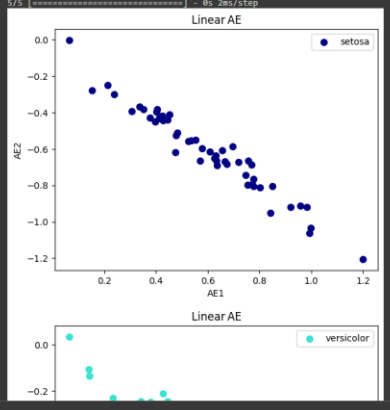
RAM Disk

epoch

```
# use our encoded layer to encode the training input
encoder=Model(input_img,encoded)
encoded_input=Input(shape=(encoding_dim,))
decoder_layer=autoencoder.layers[-1]
decoder=Model(encoded_input,decoder_layer(encoded_input))
encoded_data=encoder.predict(X_scaled)
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
```

```
5/5 [==============================] - 0s 2ms/step
```



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Assignments | Microsoft Teams | jhanviparekh-2702/Information | 6000921033_JhanviParekh_ML | 6000921033_JhanviParekh_ML-2

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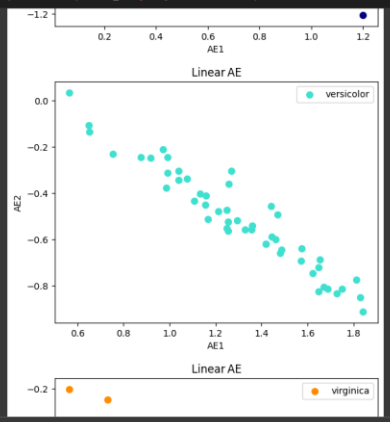
RAM Disk

epoch

```
# use our encoded layer to encode the training input
encoder=Model(input_img,encoded)
encoded_input=Input(shape=(encoding_dim,))
decoder_layer=autoencoder.layers[-1]
decoder=Model(encoded_input,decoder_layer(encoded_input))
encoded_data=encoder.predict(X_scaled)
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
```



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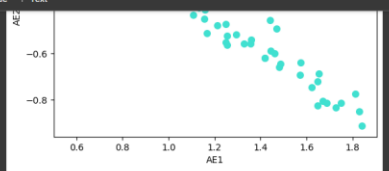
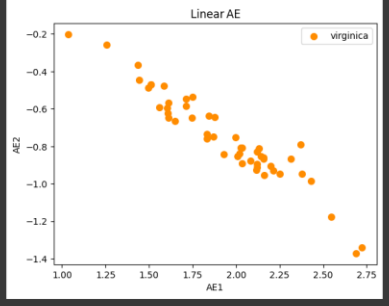
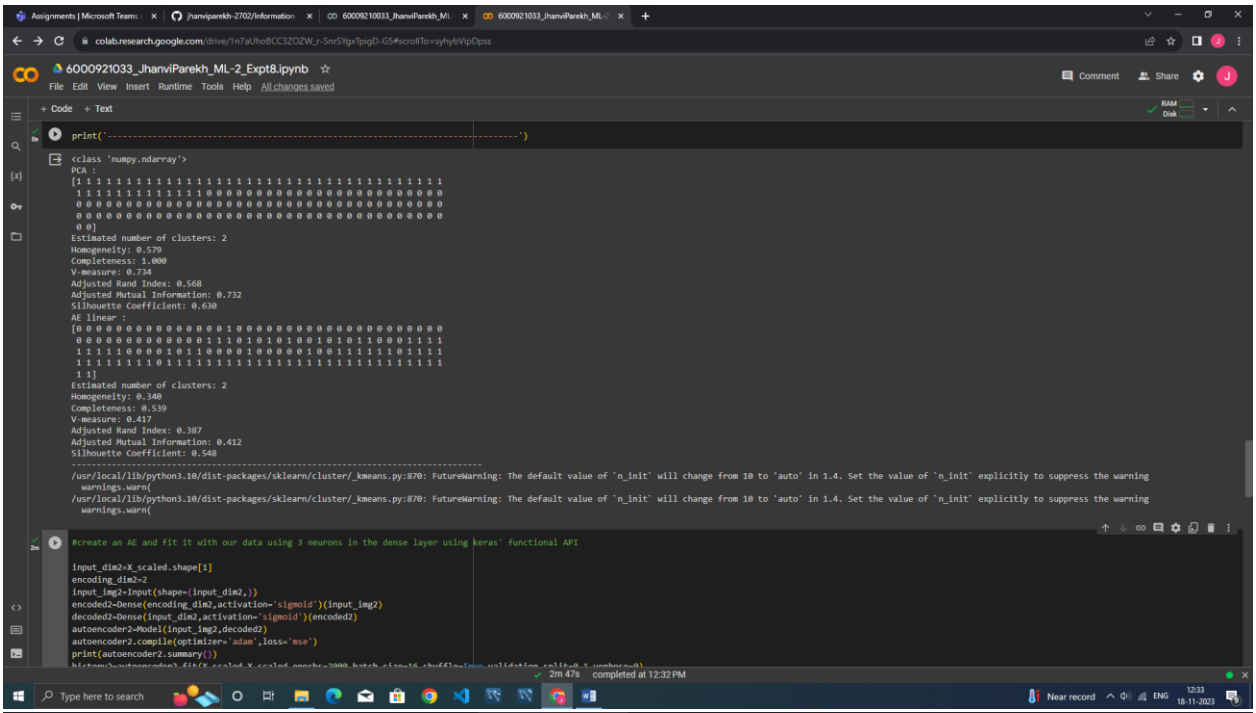





```
[6] labels_true=y
    titles=['PCA','Linear AE']

    for n_clusters_ in [2]:
     estimators=[('PCA',KMeans(n_clusters=n_clusters_),pca_transformed),('AE linear',KMeans(n_clusters=n_clusters_),encoded_data)]
```

```
labels_true=y
titles=['PCA','Linear AE']

for n_clusters_ in [2]:
 estimators=[('PCA',KMeans(n_clusters=n_clusters_),pca_transformed),('AE linear',KMeans(n_clusters=n_clusters_),encoded_data)]
 print(type(y))
for name,est,data in estimators:
 X=data
 est.fit(X)
 labels=est.labels_
 print(name,':')
 print(labels[:])
 print('Estimated number of clusters: %d'%n_clusters_)
 print("Homogeneity: %0.3f"%metrics.homogeneity_score(labels_true,labels))
 print("Completeness: %0.3f"%metrics.completeness_score(labels_true,labels))
 print("V-measure: %0.3f"%metrics.v_measure_score(labels_true,labels))
 print("Adjusted Rand Index: %0.3f"%metrics.adjusted_rand_score(labels_true,labels))
 print("Adjusted Mutual Information: %0.3f"%metrics.adjusted_mutual_info_score(labels_true,labels))
 print("Silhouette Coefficient: %0.3f"%metrics.silhouette_score(X,labels))

print('-----------------------------------------------------------------------------')
```

```
<class 'numpy.ndarray'>
PCA :
[1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0]
Estimated number of clusters: 2
Homogeneity: 0.579
Completeness: 1.000
V-measure: 0.734
Adjusted Rand Index: 0.568
Adjusted Mutual Information: 0.732
Silhouette Coefficient: 0.630
AE linear :
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 1 0 1 0 1 0 0 1 0 1 0 1 1 0 0 0 1 1 1 1
 1 1 1 1 0 0 0 0 1 0 1 1 0 0 0 0 1 0 0 0 0 0 1 0 0 1 0 0 1 1 1 1 1 1 0 1 1 1 1
 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1]
Estimated number of clusters: 2
Homogeneity: 0.340
```


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
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print('--')
<class 'numpy.ndarray'>
PCA :
Estimated number of clusters: 2
Homogeneity: 0.579
Completeness: 1.000
V-measure: 0.734
Adjusted Rand Index: 0.568
Adjusted Mutual Information: 0.732
Silhouette Coefficient: 0.630
AE linear :
Estimated number of clusters: 2
Homogeneity: 0.340
Completeness: 0.539
V-measure: 0.417
Adjusted Rand Index: 0.387
Adjusted Mutual Information: 0.412
Silhouette Coefficient: 0.548

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
warnings.warn(
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
warnings.warn(
#create an AE and fit it with our data using 3 neurons in the dense layer using keras' functional API
input_dim2=X_scaled.shape[1]
encoding_dim2=2
input_img2=Input(shape=(input_dim2,))
encoded2=Dense(encoding_dim2,activation='sigmoid')(input_img2)
decoded2=Dense(input_dim2,activation='sigmoid')(encoded2)
autoencoder2=Model(input_img2,decoded2)
autoencoder2.compile(optimizer='adam',loss='mse')
print(autoencoder2.summary())
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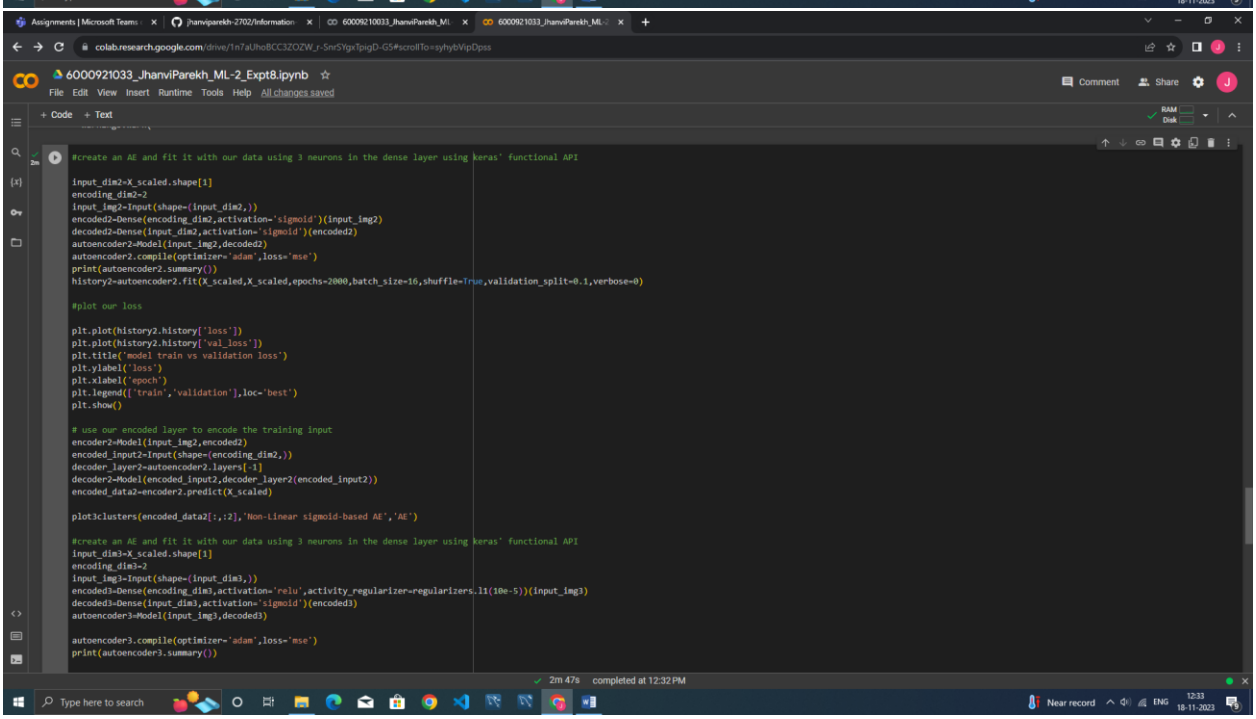
6000921033_JhanviParekh_ML-2_Expt8.ipynb
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#create an AE and fit it with our data using 3 neurons in the dense layer using keras' functional API
input_dim2=X_scaled.shape[1]
encoding_dim2=2
input_img2=Input(shape=(input_dim2,))
encoded2=Dense(encoding_dim2,activation='sigmoid')(input_img2)
decoded2=Dense(input_dim2,activation='sigmoid')(encoded2)
autoencoder2=Model(input_img2,decoded2)
autoencoder2.compile(optimizer='adam',loss='mse')
print(autoencoder2.summary())
history2=autoencoder2.fit(X_scaled,X_scaled,epochs=2000,batch_size=16,shuffle=True,validation_split=0.1,verbose=0)
#plot our loss
plt.plot(history2.history['loss'])
plt.plot(history2.history['val_loss'])
plt.title('model train vs validation loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.legend(['train','validation'],loc='best')
plt.show()
# use our encoded layer to encode the training input
encoder2=Model(input_img2,encoded2)
encoded_input2=Input(shape=(encoding_dim2,))
decoder_layer2=autoencoder2.layers[-1]
decoder2=Model(encoded_input2,decoder_layer2(encoded_input2))
encoded_data2=encoder2.predict(X_scaled)
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
#create an AE and fit it with our data using 3 neurons in the dense layer using keras' functional API
input_dim3=X_scaled.shape[1]
encoding_dim3=2
input_img3=Input(shape=(input_dim3,))
encoded3=Dense(encoding_dim3,activation='relu',activity_regularizer=regularizers.l1(10e-5))(input_img3)
decoded3=Dense(input_dim3,activation='sigmoid')(encoded3)
autoencoder3=Model(input_img3,decoded3)
autoencoder3.compile(optimizer='adam',loss='mse')
print(autoencoder3.summary())
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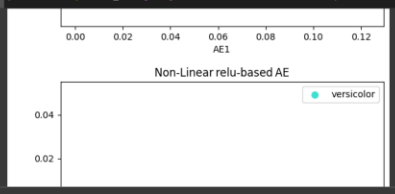
```
encoded3=Dense(encoding_dim3,activation='relu',activity_regularizer=regularizers.l1(10e-5))(input_img3)
decoded3=Dense(input_dim3,activation='sigmoid')(encoded3)
autoencoder3=Model(input_img3,decoded3)

autoencoder3.compile(optimizer='adam',loss='mse')
print(autoencoder3.summary())

history3=autoencoder3.fit(X_scaled,X_scaled,epochs=400,batch_size=16,shuffle=True,validation_split=0.1,verbose=0)
#plot our loss
plt.plot(history3.history['loss'])
plt.plot(history3.history['val_loss'])
plt.title('model train vs validation loss')
plt.ylabel('loss')

plt.xlabel('epoch')
plt.legend(['train','validation'],loc='best')

plt.show()
# use our encoded layer to encode the training input
encoder3=Model(input_img3,encoded3)
encoded_input3=Input(shape=(encoding_dim3,))
decoder_layer3=autoencoder3.layers[-1]
decoder3=Model(encoded_input3,decoder_layer3(encoded_input3))
encoded_data3=encoder3.predict(X_scaled)
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
plot3clusters(pca_transformed[:,:2],'PCA','PC')
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```



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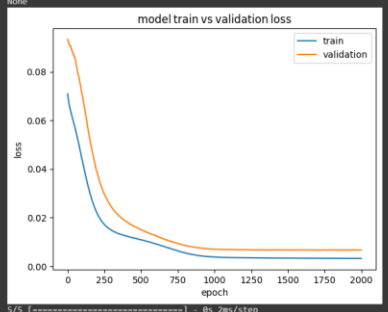
```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```

```
Model: "model_3"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_3 (InputLayer)        [(None, 4)]               0

 dense_2 (Dense)             (None, 2)                 10

 dense_3 (Dense)             (None, 4)                 12

=================================================================
Total params: 22 (88.00 Byte)
Trainable params: 22 (88.00 Byte)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
None
```




```
5/5 [==============================] - 0s 2ms/step
```

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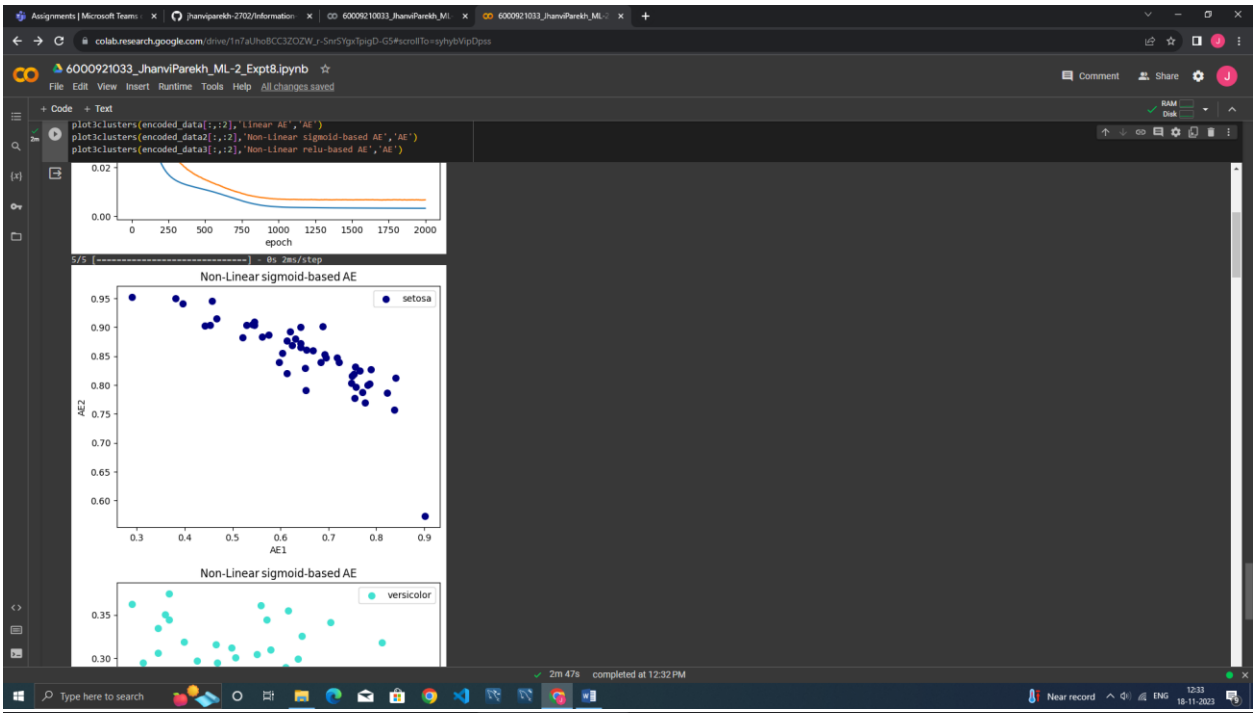
6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
epoch
5/5 [==========] - 0s 2ms/step
Non-Linear sigmoid-based AE
setosa
AE1
AE2
Non-Linear sigmoid-based AE
versicolor
2m 47s completed at 12:32 PM
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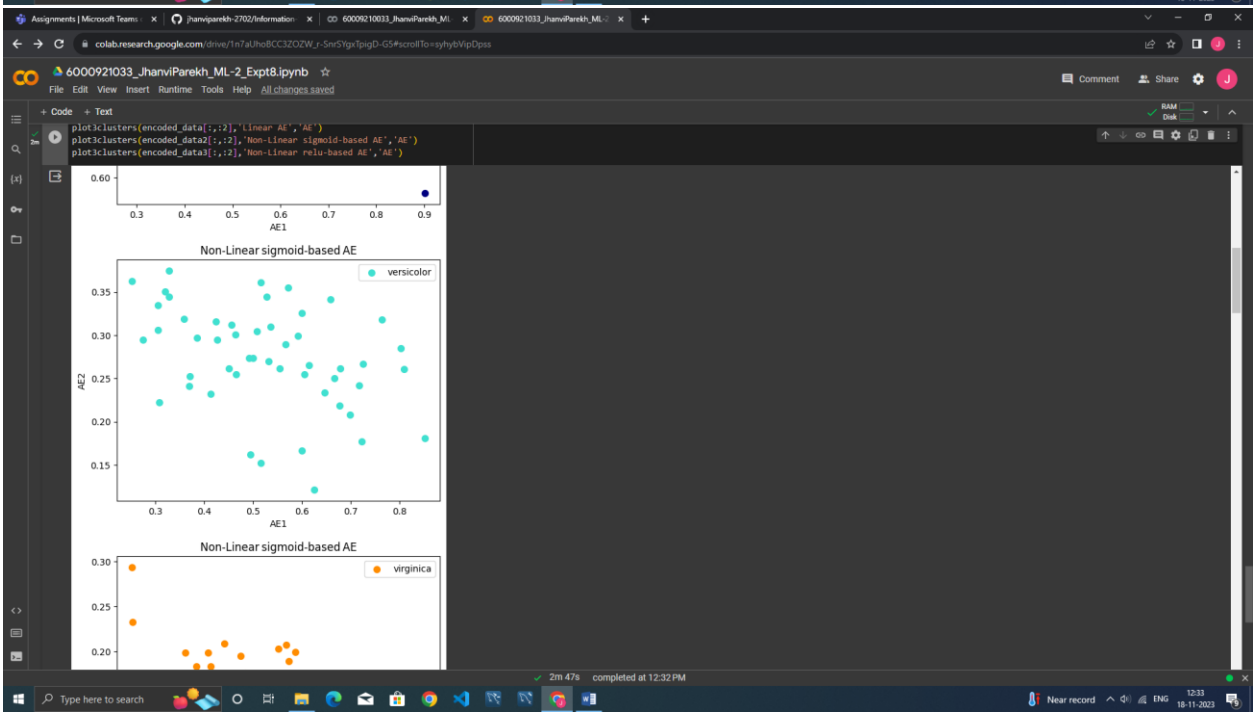
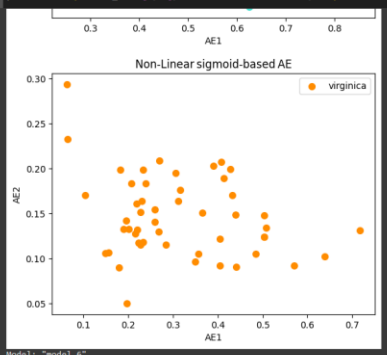
Near record
ENG
12:33
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear sigmoid-based AE
versicolor
AE2
Non-Linear sigmoid-based AE
virginica
2m 47s completed at 12:32 PM
Type here to search
Near record
ENG
12:33
18-11-2023

```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```

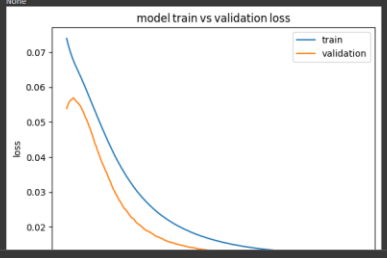


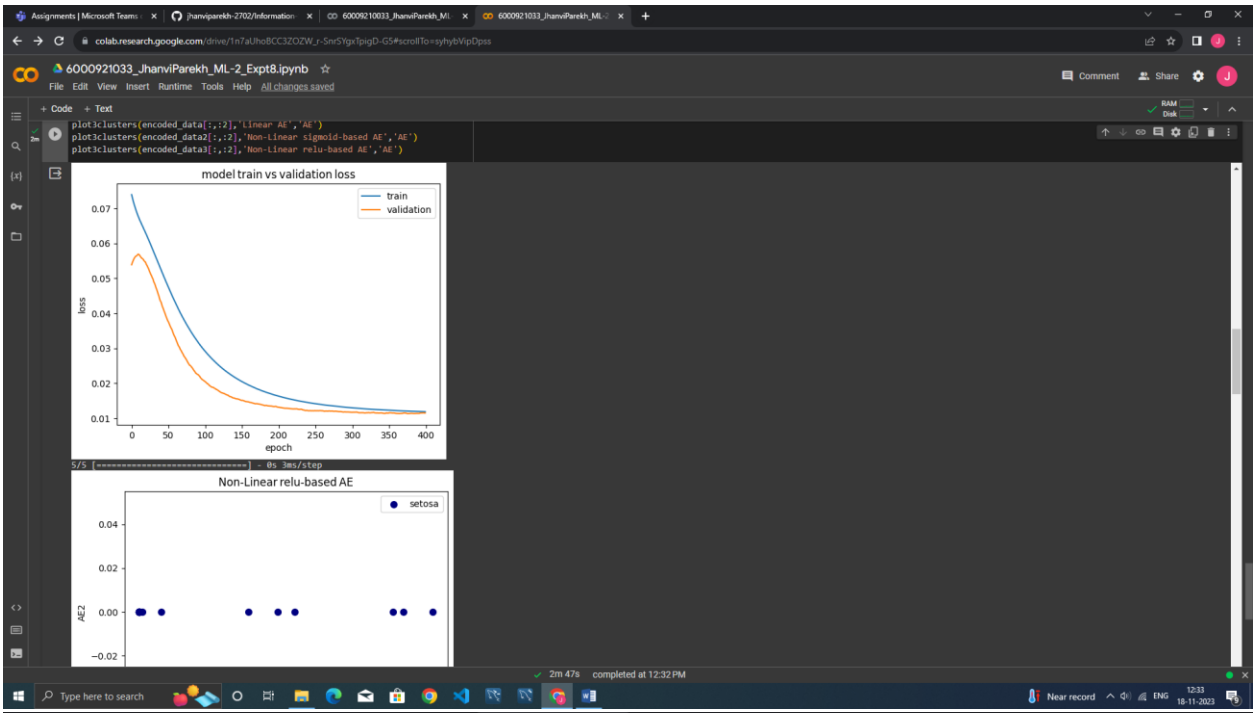

```
Model: "model_6"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_5 (InputLayer)        [(None, 4)]               0

 dense_4 (Dense)             (None, 2)                 10

 dense_5 (Dense)             (None, 4)                 12

=================================================================
Total params: 22 (88.00 Byte)
Trainable params: 22 (88.00 Byte)
Non-trainable params: 0 (0.00 Byte)
_________________________________________________________________
None
```




6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
model train vs validation loss
train
validation
loss
epoch
5/5 [==========] - 0s 3ms/step
Non-Linear relu-based AE
setosa
AE2
2m 47s completed at 12:32 PM
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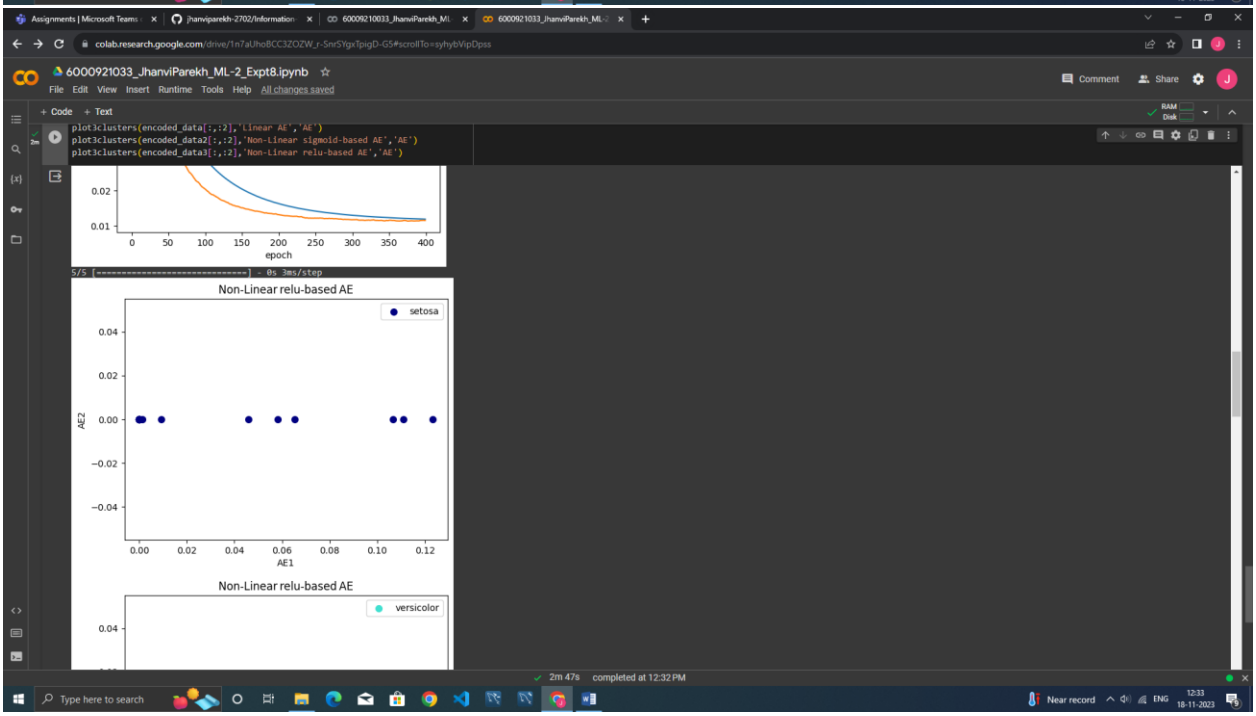
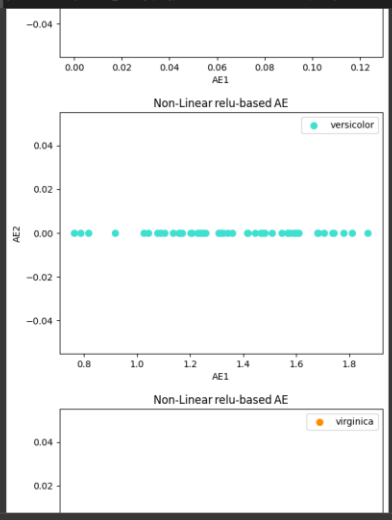
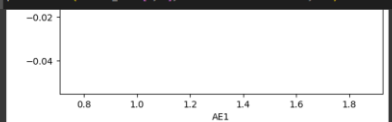
Near record
ENG
12:33
18-11-2023

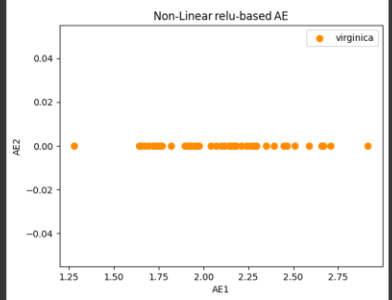

6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
epoch
5/5 [==========] - 0s 3ms/step
Non-Linear relu-based AE
setosa
AE2
AE1
Non-Linear relu-based AE
versicolor
2m 47s completed at 12:32 PM
Type here to search
Near record
ENG
12:33
18-11-2023

```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```



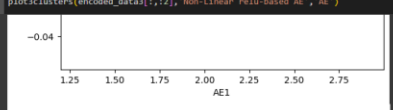
2m 47s completed at 12:32 PM

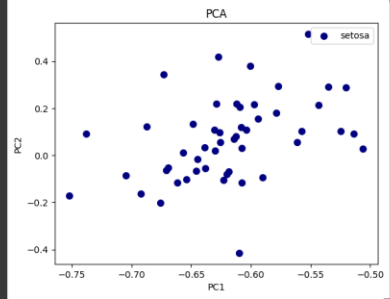




2m 47s completed at 12:32 PM

```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```





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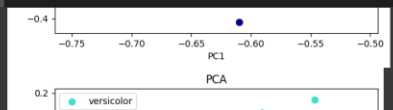

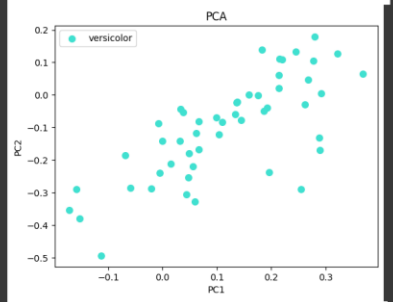

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Assignments | Microsoft Teams | jhanviparekh-2702/Information | 6000921033_JhanviParekh_ML | 6000921033_JhanviParekh_ML-2

colab.research.google.com/drive/1n7aUhoBCC3ZOZW_r-SnrSYgxTpigD-G5#scrollTo=syhybVipDpss

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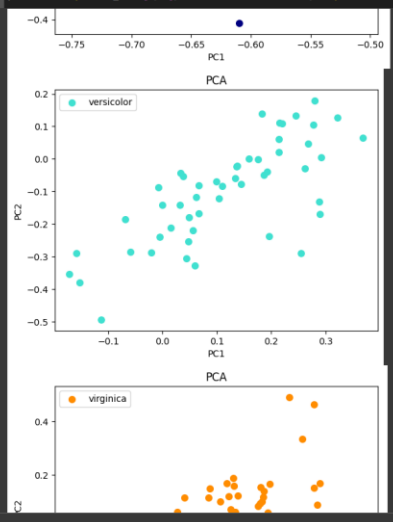
```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```



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Near record ENG 12:34 18-11-2023

Assignments | Microsoft Teams | jhanviparekh-2702/Information | 6000921033_JhanviParekh_ML | 6000921033_JhanviParekh_ML-2

colab.research.google.com/drive/1n7aUhoBCC3ZOZW_r-SnrSYgxTpigD-G5#scrollTo=syhybVipDpss

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```
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
```

PC1

PCA
versicolor
PC2
PC1

PCA
virginica

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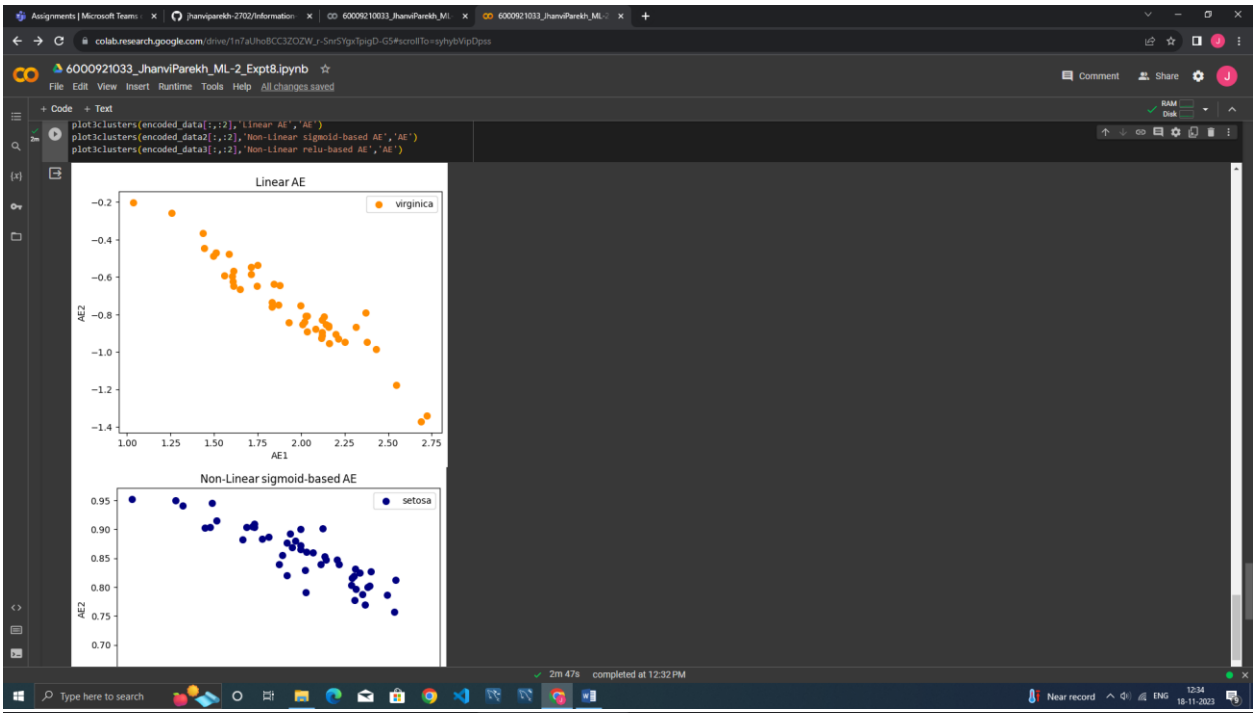
Near record ENG 12:34 18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
Linear AE
virginica
AE2
AE1
Non-Linear sigmoid-based AE
setosa
AE2
2m 47s completed at 12:32 PM
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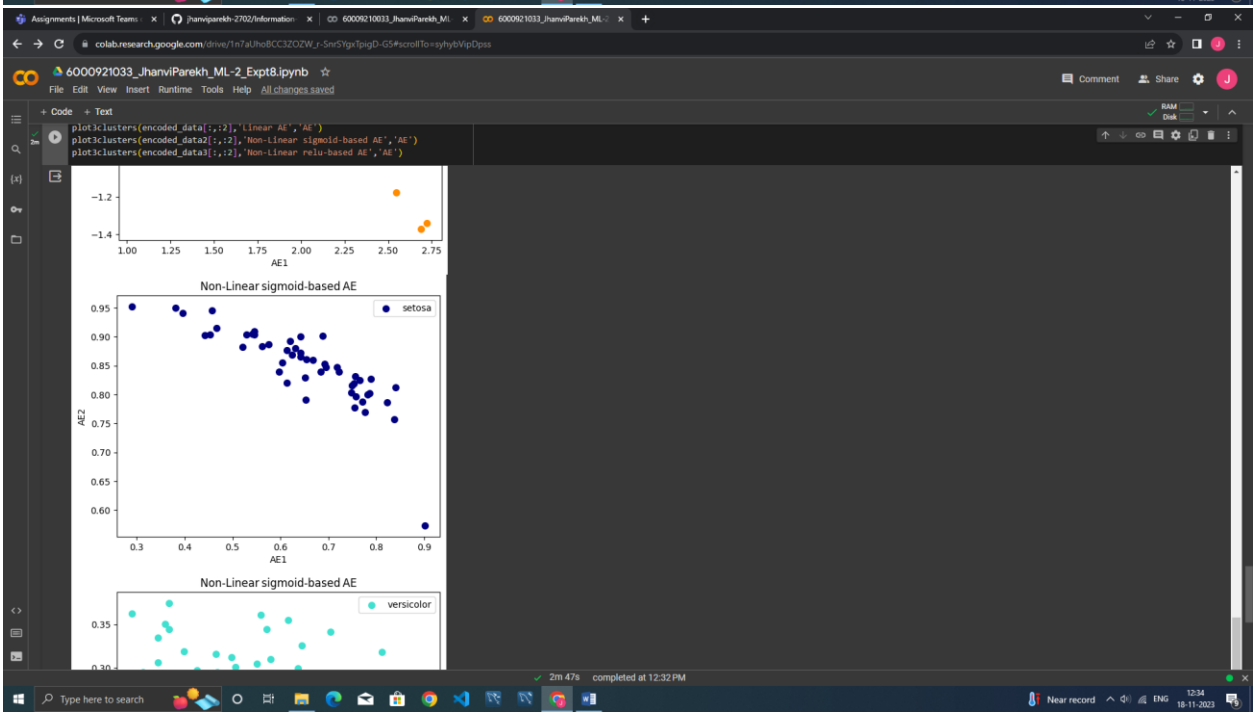
Near record
ENG
12:34
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
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plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear sigmoid-based AE
setosa
AE2
AE1
Non-Linear sigmoid-based AE
versicolor
2m 47s completed at 12:32 PM
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Near record
ENG
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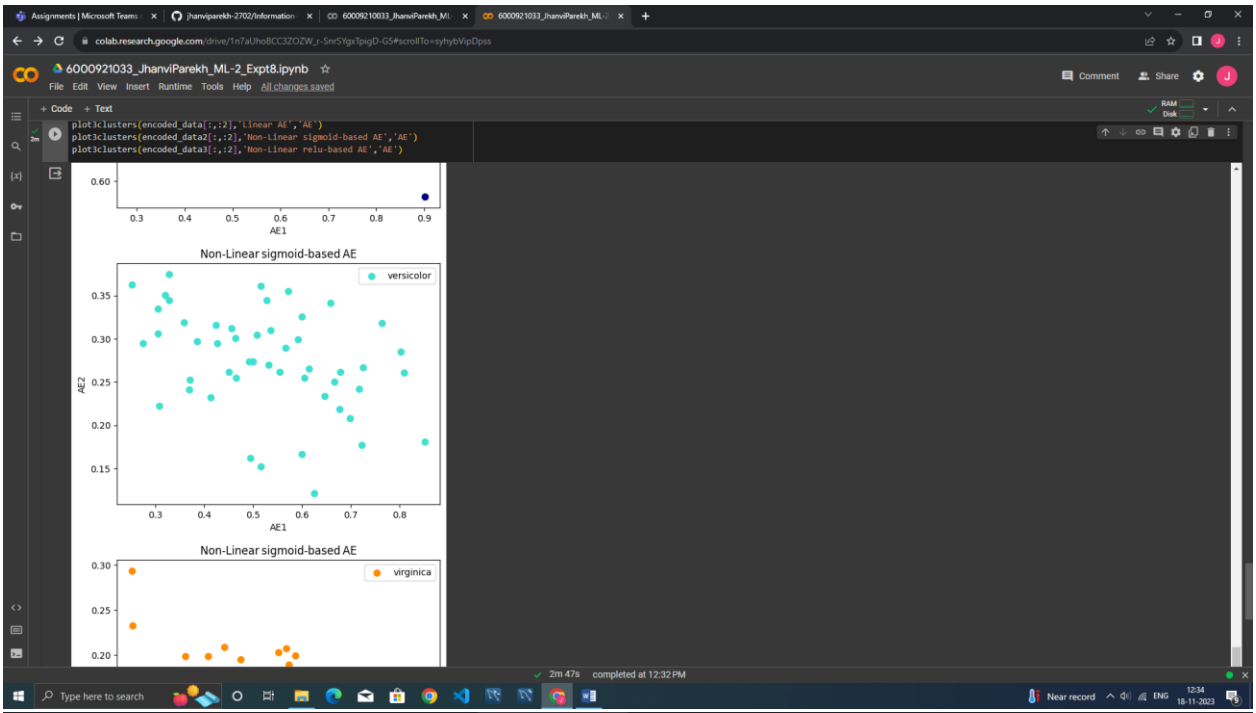
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear sigmoid-based AE
versicolor
AE2
AE1
Non-Linear sigmoid-based AE
virginica
2m 47s completed at 12:32 PM
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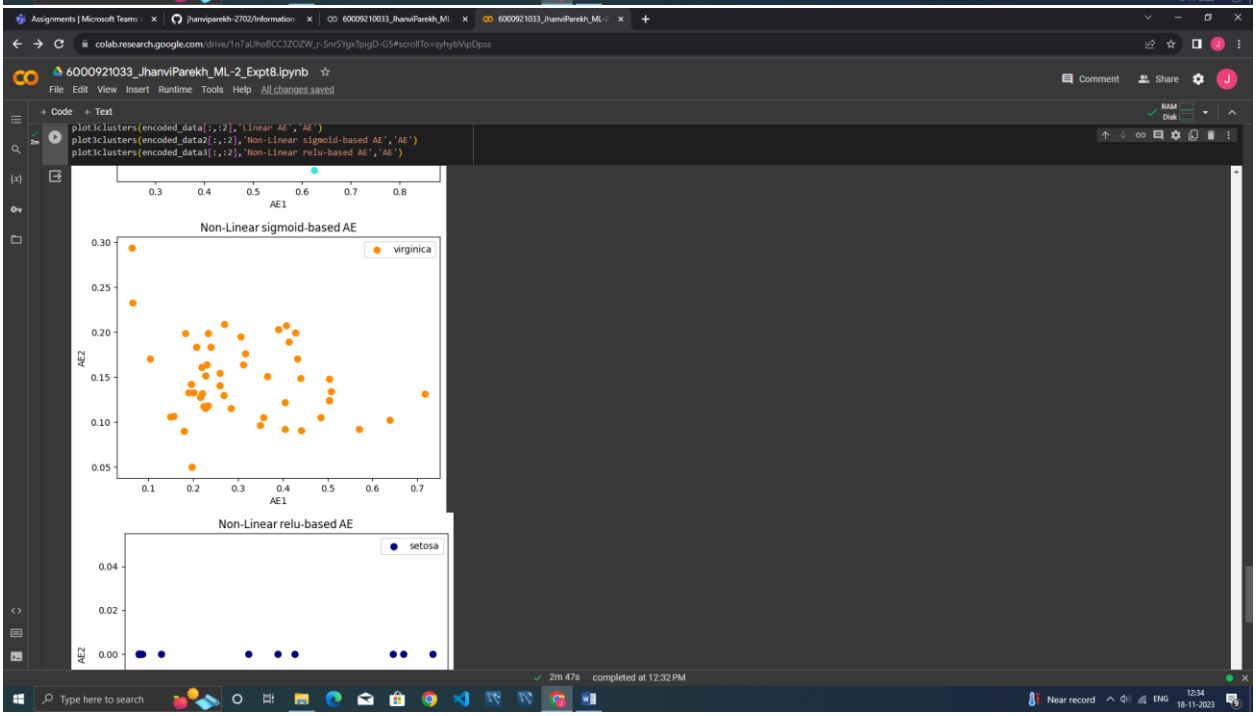
Near record
ENG
12:34
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
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plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear sigmoid-based AE
virginica
AE2
AE1
Non-Linear relu-based AE
setosa
AE2
2m 47s completed at 12:32 PM
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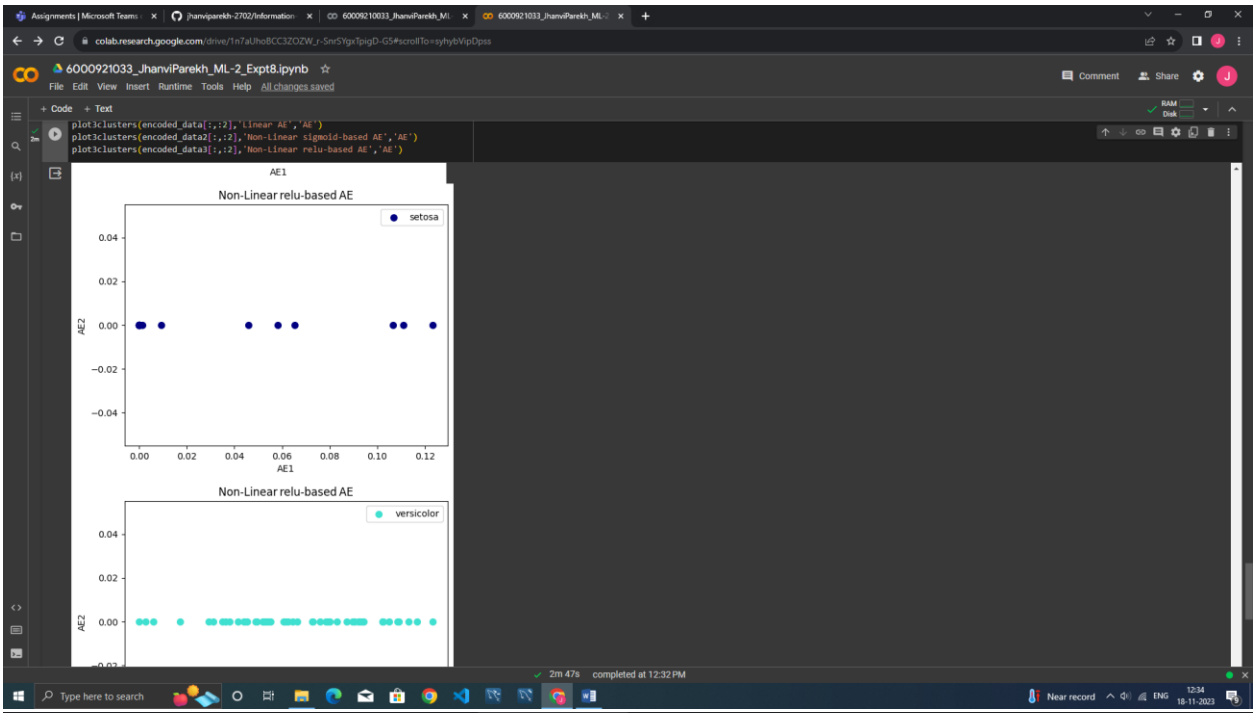
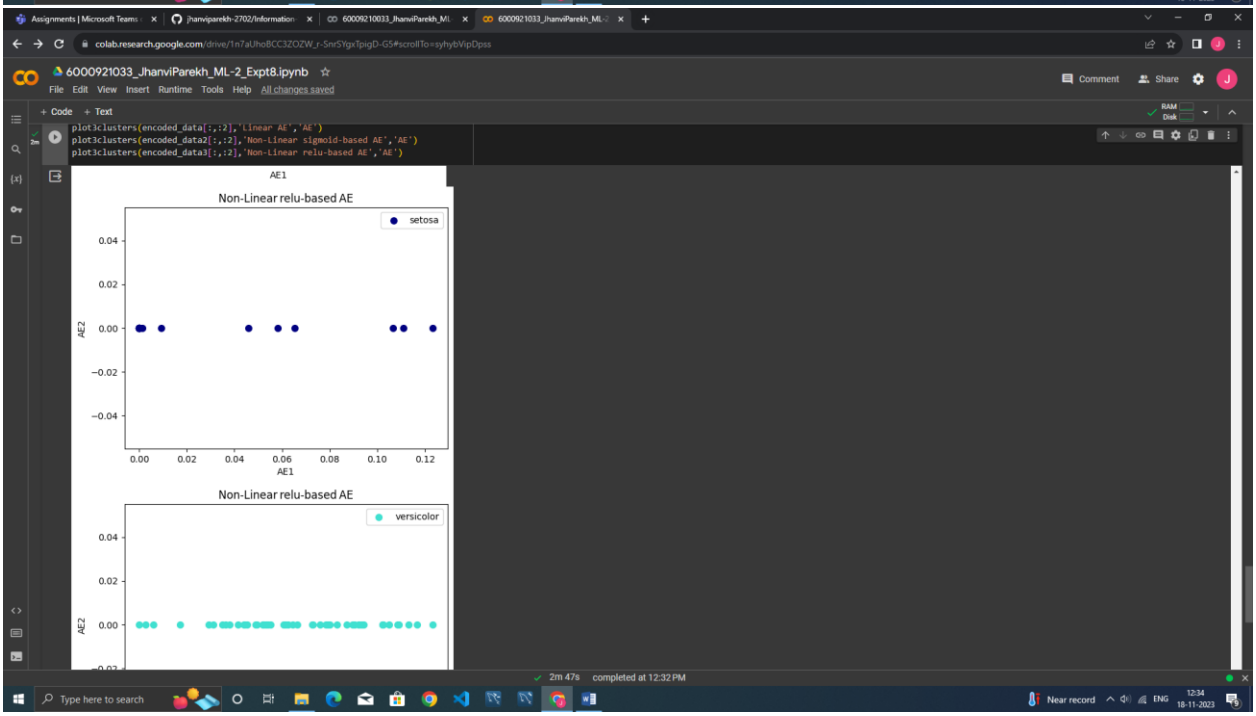
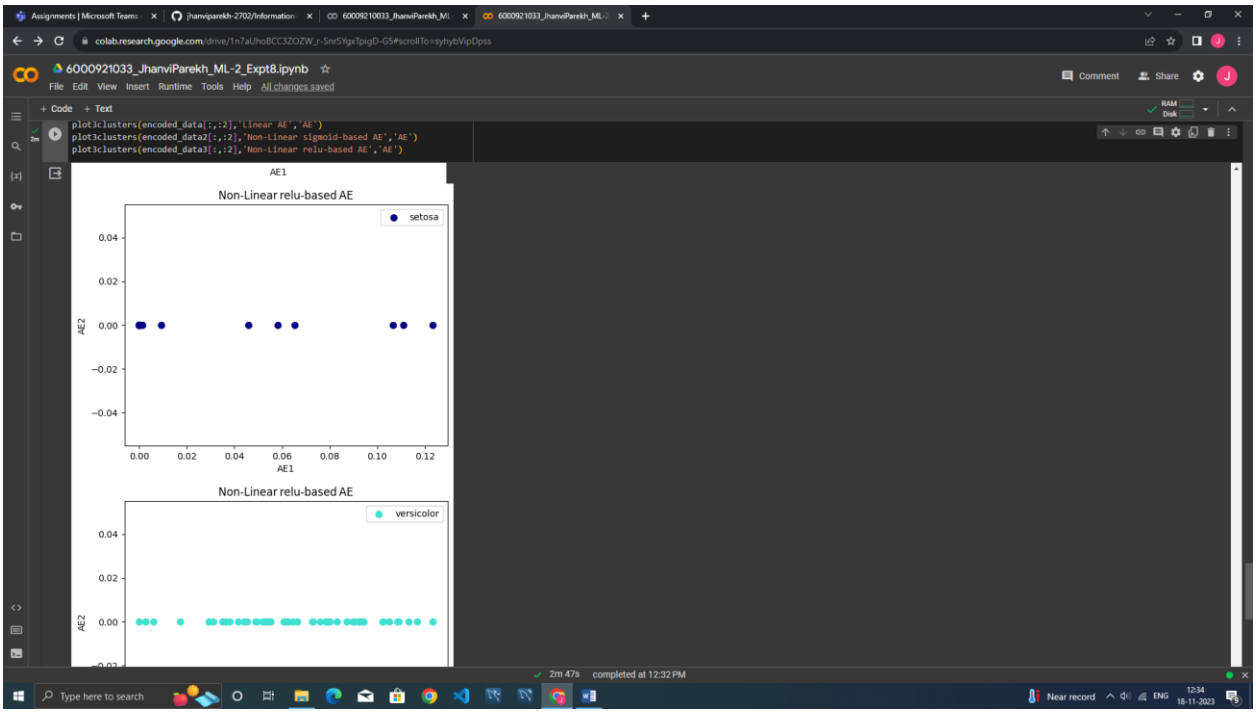
Near record
ENG
12:34
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear relu-based AE
setosa
AE2
AE1
Non-Linear relu-based AE
versicolor
AE2
2m 47s completed at 12:32 PM
Type here to search
Near record
ENG
12:34
18-11-2023


6000921033_JhanviParekh_ML-2_Expt8.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear relu-based AE
setosa
AE2
AE1
Non-Linear relu-based AE
versicolor
AE2
2m 47s completed at 12:32 PM
Type here to search
Near record
ENG
12:34
18-11-2023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File Edit View Insert Runtime Tools Help All changes saved
Comment
Share
+ Code + Text
plot3clusters(encoded_data[:,:2],'Linear AE','AE')
plot3clusters(encoded_data2[:,:2],'Non-Linear sigmoid-based AE','AE')
plot3clusters(encoded_data3[:,:2],'Non-Linear relu-based AE','AE')
AE1
Non-Linear relu-based AE
setosa
AE2
AE1
Non-Linear relu-based AE
versicolor
AE2
2m 47s completed at 12:32 PM
Type here to search
Near record
ENG
12:34
18-11-2023