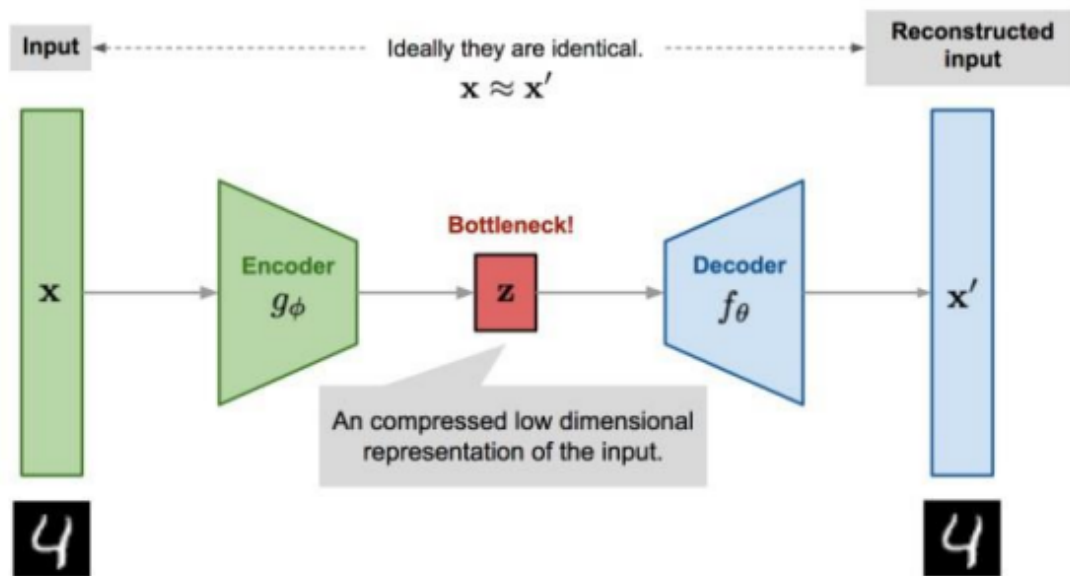


Methodology to be used:

AutoEncoder is a generative unsupervised deep-learning algorithm used for reconstructing high dimensional input data using a neural network with a narrow bottleneck layer in the middle which contains the latent representation of the input data



Steps:-

Read the dataset

Exploratory Data Analysis

Visualize the dataset:-plotting the number of normal and fraud transactions in the dataset

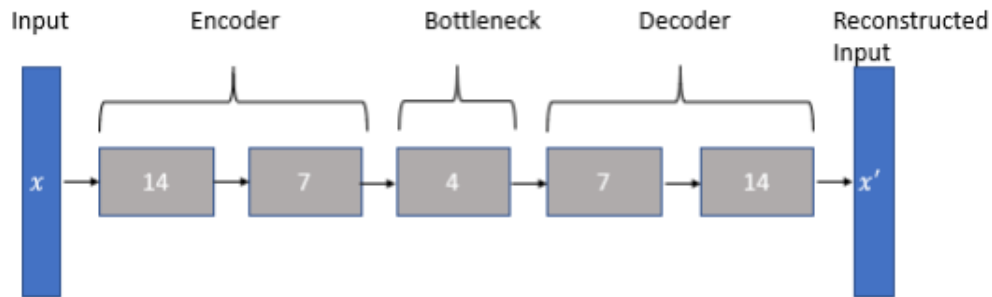
Create train and test dataset

Use only normal transactions to train the Autoencoder. Normal data has a value of 0 in the target variable. Using the target variable to create a normal and fraud dataset.

Set the training parameter value

Create the Autoencoder

The architecture of the autoencoder is shown below.



Compile the autoencoder

Train the autoencoder

Plot training and test loss

Plotting the test data points and their respective reconstruction error sets a threshold value to visualize if the threshold value needs to be adjusted

Detect anomalies as points where the reconstruction loss is greater than a fixed threshold. Here we see that a value of 52 for the threshold will be good.

As our dataset is highly imbalanced, we see a high accuracy but a low recall and precision.

Things to further improve precision and recall would add more relevant features, different architecture for autoencoder, different hyperparameters, or a different algorithm.

Conclusion: Autoencoders can be used as an anomaly detection algorithm when we have an unbalanced dataset where we have a lot of good examples and only a few anomalies.

Autoencoders are trained to minimize reconstruction error. When we train the autoencoders on normal data or good data, we can hypothesize that the anomalies will have higher reconstruction errors than the good or normal data