Bank Customer Churn Prediction

The problem is related to the application of AI algorithms in banking-related tasks. The goal of this project is to predict whether a customer is going to churn or not. The target class is the last column of the dataset (*Exited*) and has two values (0 = no, 1 = yes). The other columns of the dataset are some customer-related data such as credit scores. The goal is to build machine learning models based on customer-related data and predict if a customer churns or not. You should split the data into 70% as the training set and 30% as the testing set.

The project involves the following steps:

1- **Data exploration:** try to know data and represents statistics for the important features among the features and the target attribute.
2- **Use classic machine learning models to build classifiers:** Use the decision tree model and the SVM model and try to train these machine learning models on the training dataset for this prediction task.
3- **Use Neural Network and Deep Learning to build a classifier:** Use Neural Network models, provided by TensorFlow or Pytorch, to train a model based on the training dataset
4- **Test the learned model:** Based on the trained models, you should test the performance of your models on the test set and report the results in terms of different metrics such as accuracy and output error.
5- **Parameter sensitivity analysis:** change the parameters of the neural network and investigate how the performance of the model would change and report the results in terms of accuracy when tuning the parameters of the model. The required parameters are the following ones:
    a. Change number of epochs (your choice)
    b. Change number of neurons (your choice)
    c. Change number of hidden layers (your choice)
    d. Use different activation functions (sigmoid, tanh, ReLU)
    e. Different optimizer functions (SGD, Adam)

From the theoretical point of view describe why changing each of these parameters would result in better/worse performance. I would like you to search and investigate the advantages of each of the parameters' values over its counterparts. For instance, what are the advantages of a specific type of activation function over other types.

What to hand in:

1- Your code (.py files) of this project.
2- A report that contains the following:
    a. Data exploration to show how the input data look like.
    b. The performance of each of the machine learning models (both classic models and neural network models) on the test dataset based on the metrics mentioned accuracy, output error.

c. Parameter sensitivity analysis that represents the results of different evaluations based on different values of the input parameters of the model. The analysis can be done based on accuracy.
d. Any conclusion or discussion that you find during the experiments