MCTA 4362:Machine Learning
Assignment 3

Name:…… Matric No:……

Human Activity Recognition (HAR) with Smartphones

Please refer to the following dataset which represents Human Activity Recognition (HAR). This Human Activity Recognition dataset was built from the recordings of 30 participants performing activities of daily living (ADL) while carrying a waist-mounted smartphone with embedded inertial sensors. The objective is to classify activities into one of the six activities performed (Walking, Walking Upstairs, Walking Downstairs, Sitting, Standing and Laying). Access to this popular dataset together with further details can be found on Kaggle: https://www.kaggle.com/datasets/uciml/human-activity-recognition-with-smartphones?resource=download

A) Based on this data set select which parameters (independent variables) will you feel will be suitable/useful to form your matrix of features. Justify your answer.
B) Perform the necessary data preparation for applying supervised machine learning classification, Describe what data preparation was necessary (approximate missing data, removing outliers, One Hot Encoding, scaling, etc)
C) Perform Logistic Regression to classify the various activities. Evaluate and describe your results.
D) Perform K Nearest Neighbours (KNN) to classify the various activities. Evaluate and describe your results.
E) Perform Linear Support Vector Machines (SVM) to classify the various activities. Evaluate and describe your results..
F) Perform Non-Linear Support Vector Machines (SVM) to classify the various activities. Evaluate and describe your results.
G) Perform Naive Bayes to classify the various activities. Evaluate and describe your results.
H) Perform Decision Trees to classify the various activities. Evaluate and describe your results.

I) Perform Random Forest to classify the various activities. Evaluate and describe your results.

J) Based on your results, determine the best model for this data and justify your answer,

K) Develop a simple GUI using tkinter or any other Python tool where users can upload an excel file consisting of human activity data and the GUI will display whether the activity corresponds to walking, running, etc