

Supplementary Materials

Table S1: Demographics of the participants in the dataset.

ID	Gender	HbA1c
13	MALE	5.7
1	FEMALE	5.5
3	FEMALE	5.9
4	FEMALE	6.4
5	FEMALE	5.7
2	MALE	5.6
6	FEMALE	5.8
7	FEMALE	5.3
8	FEMALE	5.6
10	FEMALE	6.0
9	MALE	6.1
11	MALE	6.0
12	MALE	5.6
14	MALE	5.5
15	FEMALE	5.5
16	MALE	5.5

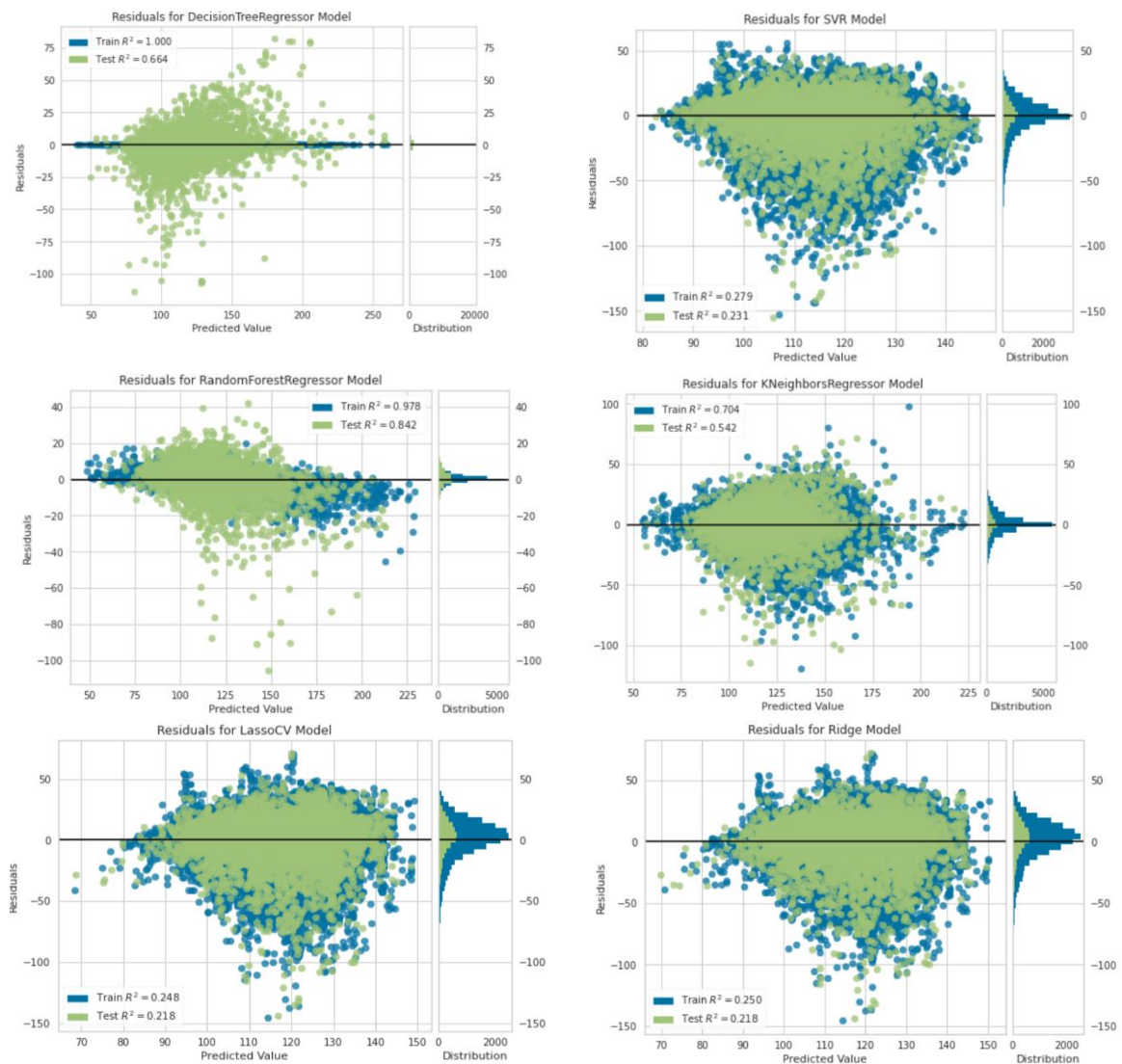
Table S2: Features Definition

Feature	Description	Mathematical Expression
Biological Sex		
HbA1C	Glycated hemoglobin usually measured before the longitudinal data collection	
Mean of Senors from Electrodermal Activity sensor (EDA) , Heart Rate (HR), Interbeat Interval (IBI), Temperature (T) and Acceleration (a) here represented as S	The mean of S (Sensor value for the window for the prediction usually equal to 5 minutes)	$\mu_S = \frac{\sum_{i=0}^N S}{N}$
Standard Deviation of EDA,HR, IBI, T and a	The standard deviation of the S values for the length of the window	$\sigma_S = \sqrt{\frac{(\sum_{i=0}^N \mu_S - S)^2}{N}}$
Minimum Value of EDA,HR, IBI, T and a		$\min_N S$
Maximum Value of EDA,HR, IBI, T and a		$\max_N S$
First Quartile of EDA,HR, IBI, T and a	The value of 25% data point when the data is arranged in ascending order	$S(I)$ Where I is the index of the S values in the ascending order rounded off to the nearest integer $I = \frac{N + 1}{4}$

Third Quartile of EDA,HR, IBI, T and a	The value of 75% data point when the data is arranged in ascending order	$S(I)$ Where I is the index of the S values in the ascending order rounded off to the nearest integer $I = \frac{(N + 1) \times 3}{4}$
Skewness of EDA,HR, IBI, T and a	It is a measure of how symmetric the data is from the mean	$S = \frac{(\sum_{i=0}^N \mu_s - S)^3}{(N - 1) \sigma_s^3}$
Peak of EDA values	Peak of EDA values in the prediction window for peaks of prominence 0.3	$\sum_{i=0}^N P$
Rolling mean of two hours of EDA values		
Rolling Sum of 2 hours of EDA peaks		
Standard Deviation of IBI (SDNN)	It is measure of the heart rate variability	
Root mean square of successive differences of inter beat interval (RMSSD)	It is measure of heart rate variability that is related to autonomic nervous system tone	$RMSSD = \sqrt{\frac{1}{N - 1} \sum_{n=1}^{N-1} [IBI_{n+1} - IBI_n]^2}$
Number of time IBI exceeds 50ms (NN50)	It is a measure of heart rate variability and sympathetic nervous system activation.	$NN_{50} = \sum_{i=1}^n a$ Where a = 1 if $IBI_{i+1} - IBI_i > 50$ Else a = 0
pNN50	It is the measure of how many times in the time N the IBI has exceeded 50ms	$pNN_{50} = \frac{NN_{50}}{N}$
Calorie Sums	Rolling sums of 2 hours, 8 hours and 24 hours of calorie estimates are used	
Protein Sums	Rolling sums of 2 hours, 8 hours and 24 hours of protein consumption estimates are used	
Carbohydrate Sums	Rolling sums of 2 hours, 8 hours and 24 hours of carbohydrate consumption estimates are used	
Sugar Sums	Rolling sums of 2 hours, 8 hours and 24 hours of sugar consumption estimates are used	

Rolling mean of two hours acceleration values	Used to estimate the activity levels	
Rolling maximum value of two hour acceleration values	Used to estimate the activity levels	
Activity bouts	When the mean of the window exceeds the rolling mean of acceleration values	
Individual Number	Used to model the individuality	

Figure S1: Performance comparison of the regression models.



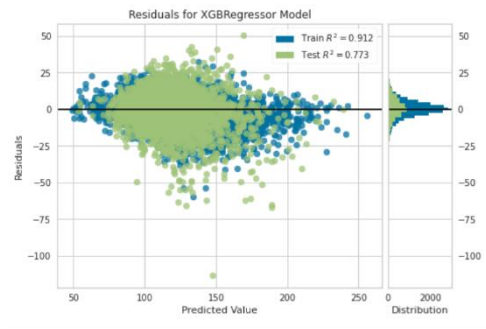
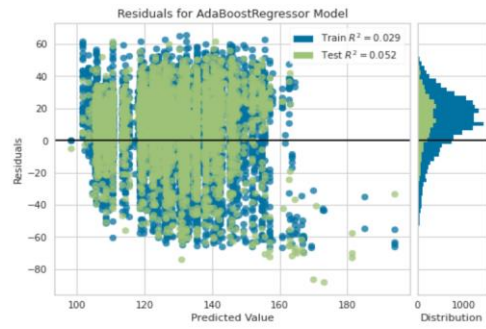


Figure S2: QQ plot of the Regression models

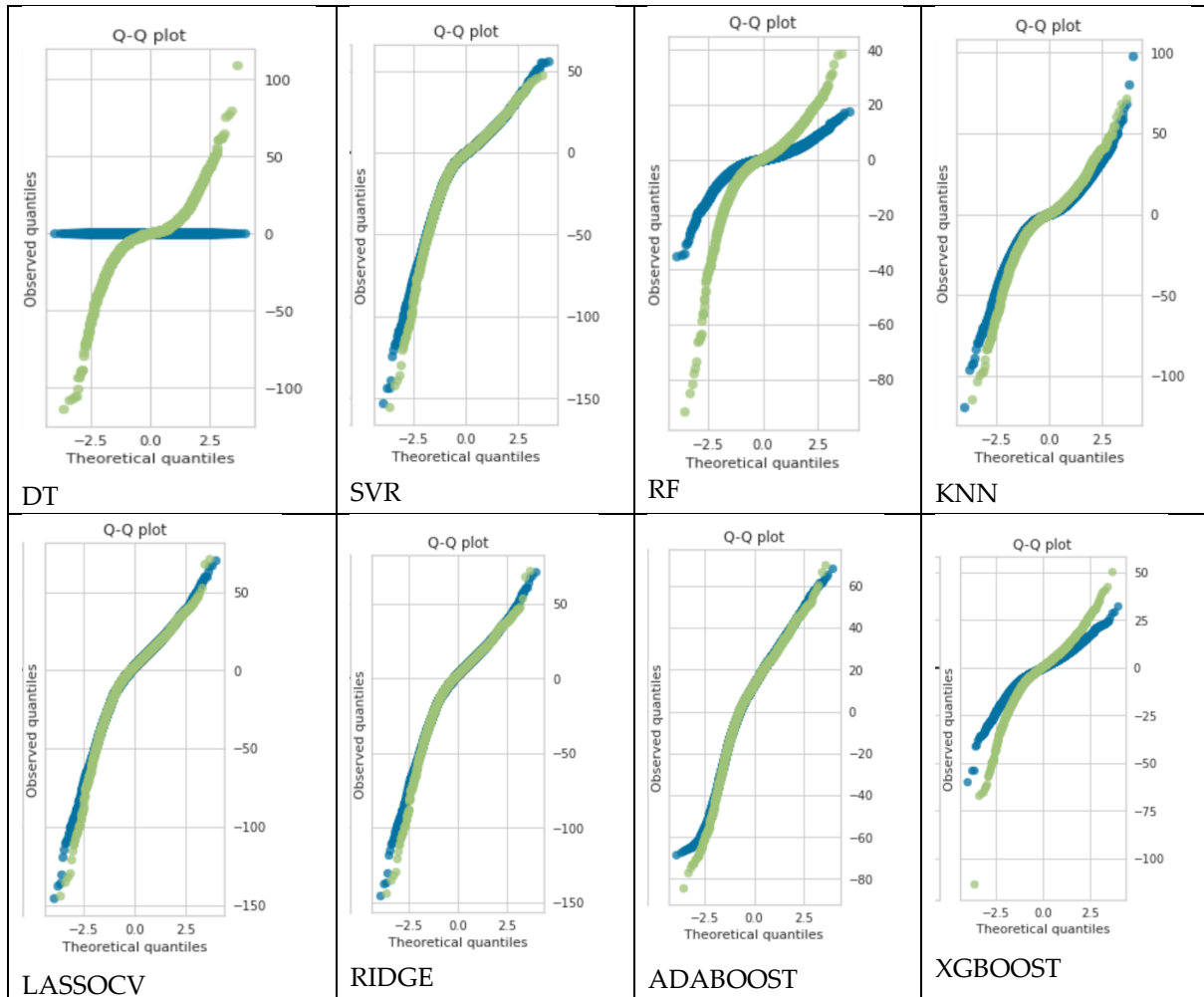


Figure S3: Prediction Error of the Regression Models

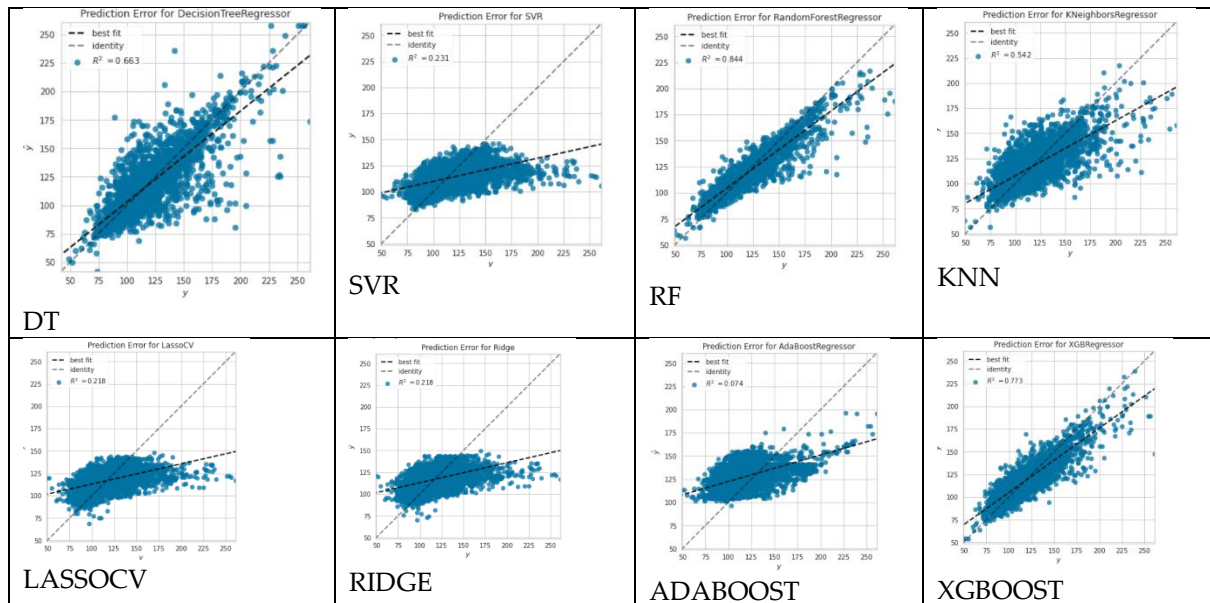


Figure S3: Regression Model performance (kfold k=10).

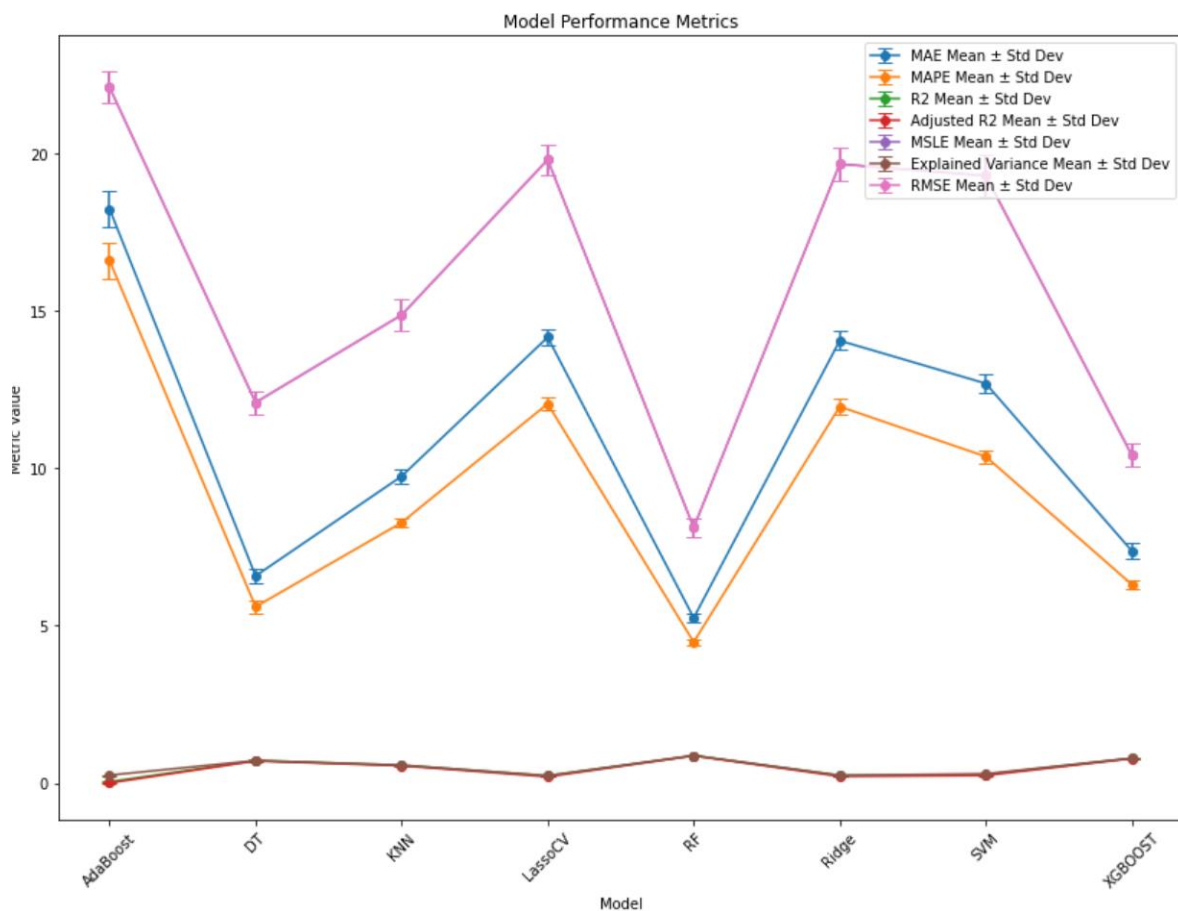


Figure S4: t-SNE plot of the features.

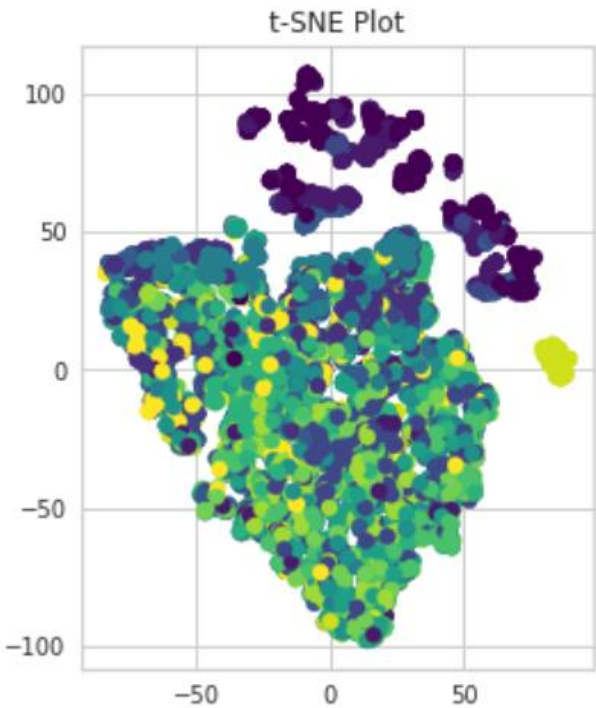


Figure S5: Confusion Matrix of the Classification Models.

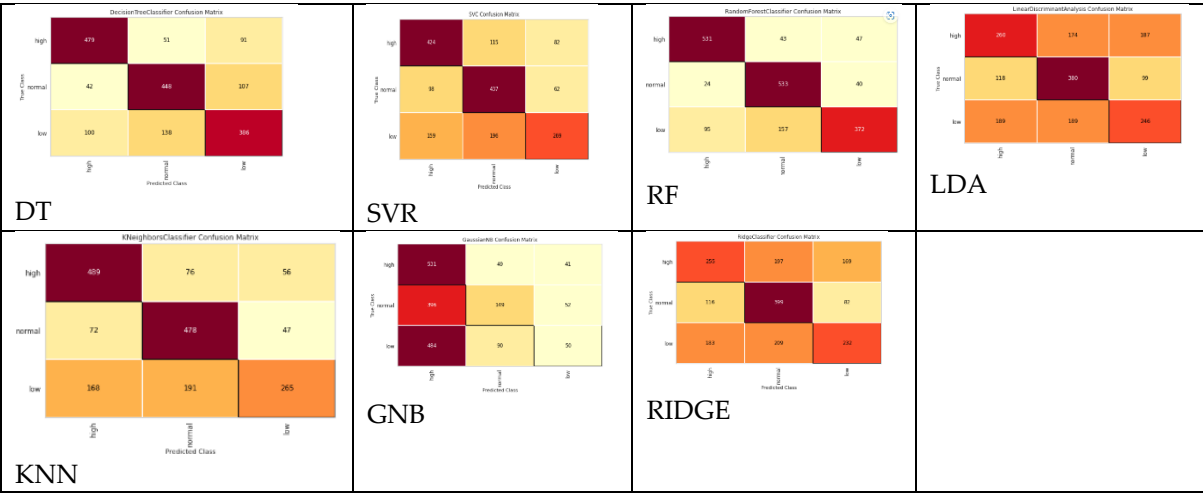
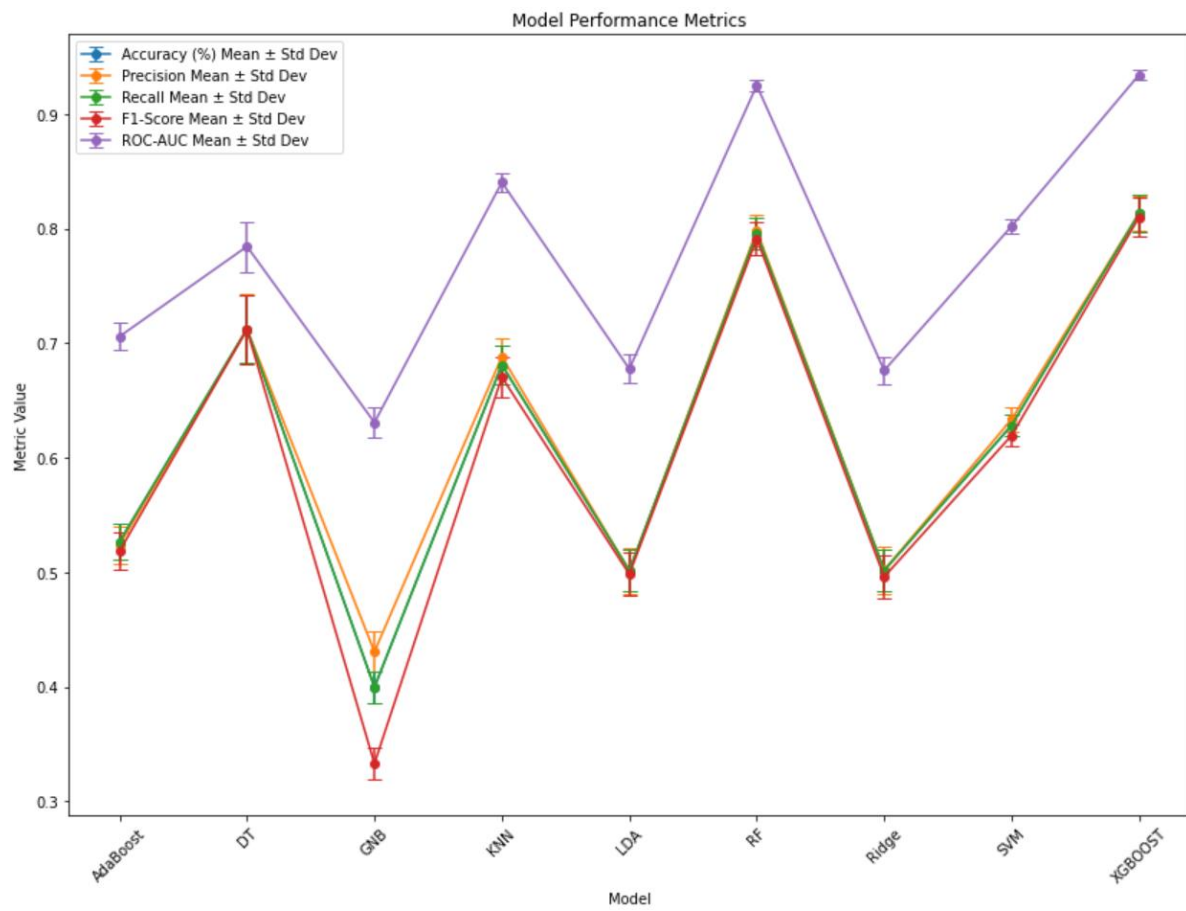


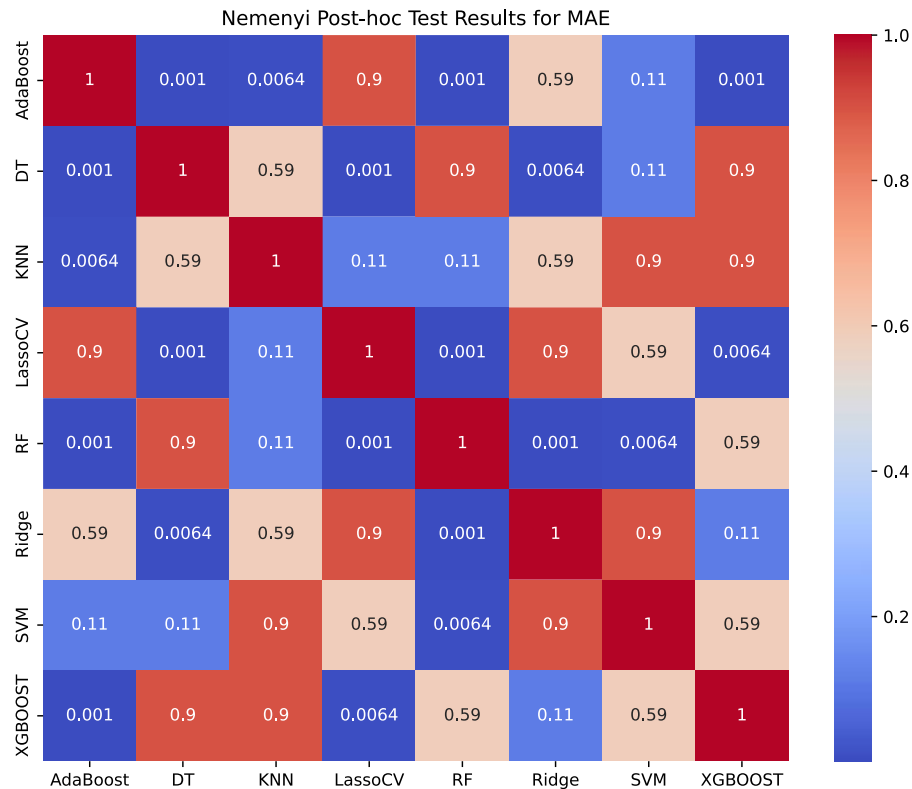
Figure S3: Classification Model performance (kfold k=10).



Comparison of significance of performance parameters for Regression

Firstly a Friedman Statistic is calculated and then a Nemenyi post hoc analysis is performed on the results of Friedman test.

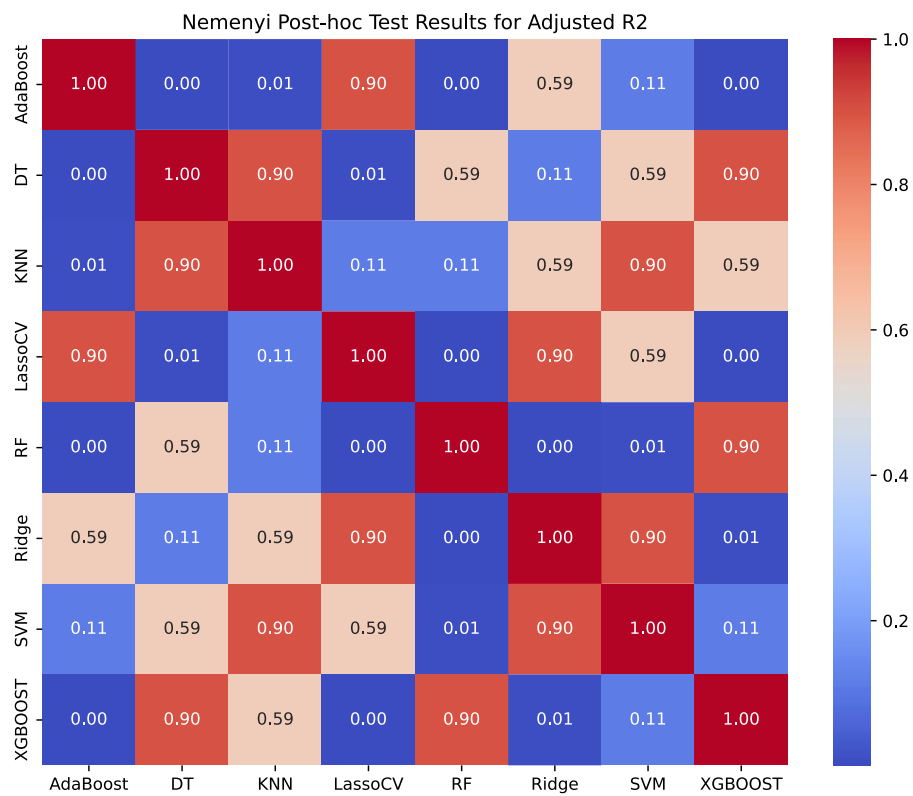
1- Mean absolute error (MAE) (Regression Model)



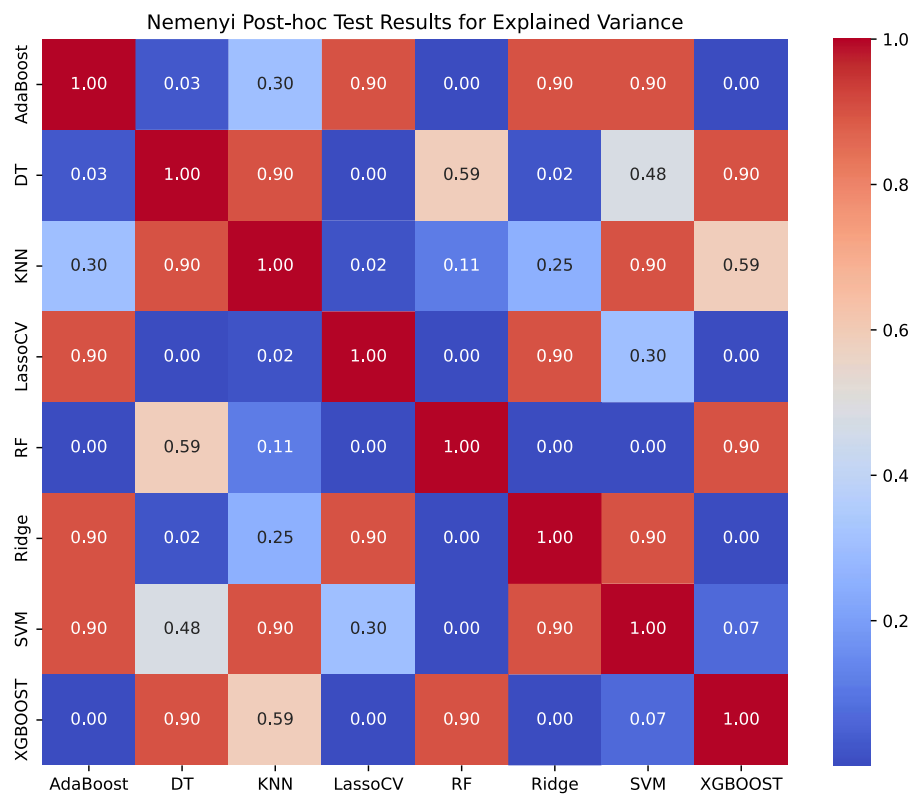
Explanation:

The Nemenyi post-hoc test results for Mean Absolute Error (MAE) reveal significant and non-significant differences in model performance. Significant differences ($p < 0.05$) were observed between AdaBoost and Decision Tree ($p=0.001$), AdaBoost and KNN ($p=0.006$), AdaBoost and Random Forest ($p=0.001$), AdaBoost and XGBoost ($p=0.001$), Decision Tree and LassoCV ($p=0.001$), Decision Tree and Ridge ($p=0.006$), Random Forest and LassoCV ($p=0.001$), Random Forest and Ridge ($p=0.001$), SVM and Random Forest ($p=0.006$), and XGBoost and LassoCV ($p=0.006$). No significant differences ($p \geq 0.05$) were found between AdaBoost and LassoCV, AdaBoost and Ridge, AdaBoost and SVM, Decision Tree and KNN, Decision Tree and Random Forest, Decision Tree and SVM, Decision Tree and XGBoost, KNN and LassoCV, KNN and Random Forest, KNN and Ridge, KNN and SVM, KNN and XGBoost, LassoCV and Ridge, LassoCV and SVM, Random Forest and XGBoost, Ridge and SVM, Ridge and XGBoost, and SVM and XGBoost.

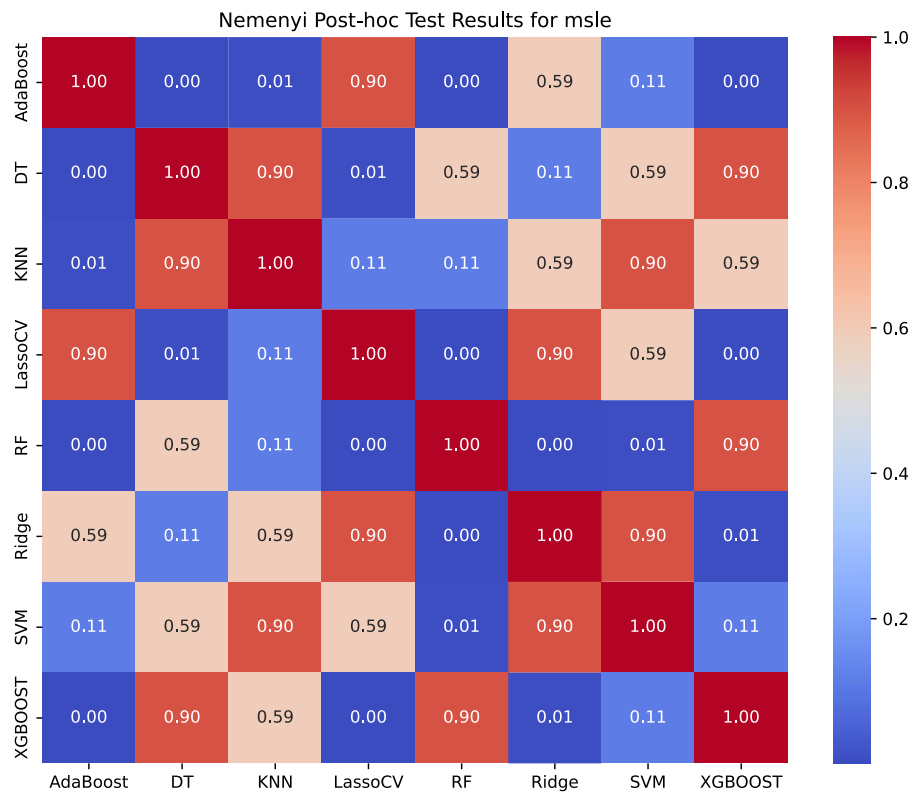
2- Adjusted R2:



3- Explained Variance



4- RMLE:



5- R2

