*CA2 Data Preparation and Machine Learning*

***Predicting the respondent diabetic using***

***different machine learning algorithm.***

*By*

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**Assessment Cover Page**

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| **Module Title:** | Strategic Thinking |
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**Declaration**

By submitting this assessment, I confirm that I have read the CCT policy on Academic Misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source. I declare it to be my own work and that all material from third parties has been appropriately referenced. I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

**Abstract**

One of the major popular topics in the United Stated is the health and nutrition of the people. We all know that many cases of imbalance nutrition United States have. Since there are a lot of cases of unhealthy lifestyle that they eat, there are many cases of different age that has the nutrition problem.

One example of the nutrition problem is obesity that can lead to a serious disease. One of the popular diseases in the United States that obesity has increase of the severe risk of having a health condition of high blood pressure, diabetic, stroke and heart disease. There are many cases of type 2 diabetic in the Unites States because there are many people there that eat unhealthy food that cause them to be overweight.

The report aim is to have a thorough determine the comparison which of the LDA and PCA is more accurately to be used to train the model. This will forecast by using KNN, Decision Tree Classifier, Random Forest and kmeans clustering.

Finally, the report will follow the Cross-Industry Standard Process for Data Mining (CRISP-DM) methodology to explain in detailed stages of Business Understanding, Data Understanding, Data Preparation, Modelling and Evaluation and Deployment.

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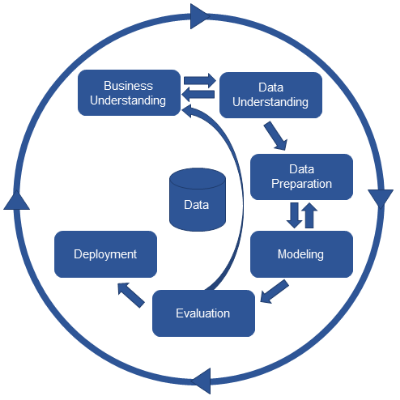
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**Business Understanding**

Business understanding is the first phase of the CRISP-DM methodology. The main purpose is to well understand the business and its necessity, which is the objective and the requirements to use this project.

The principal objective of this project to predict the respondent that has diabetic in relation with their age and who undergo the blood glucose after fasting. This provide the comparison prediction which of the LDA and PCA is most accurately to be used in preparation of machine learning model. The hypothesis of this project is to compare the accuracy results of the machine learning models to determine which one provide the most efficient accuracy.

**The requirements of this project are:**

* Identify the features and target variable.
* Use the Exploratory Data Analysis (EDA) to understand the data.
* Apply machine learning models to choose one with a moderate accuracy score. To avoid the over fitting and under fitting of the models.
* Implement the chosen machine learning model to predict the respondent diabetic using the PCA to have the better accuracy score.

General Goal:

The project aim to asses some machine learning models to predict the respondent diabetic in classes features and compare supervised and unsupervised machine learning which of them will give the best efficient accuracy score.

The list of important tools and technologies that will be used in the project are:

* List of the Python Libraries:

1. Pandas
2. Numpay
3. Matplotlib
4. Seaborn

* Modelling: KNN, Decision Tree Classifier- a machine learning model to test using of branching of nodes, Random Forest, and kmeans clustering.

**Data Understanding**

Data understanding is the second phase of the CRISP-DM Methodology, it means to know about what I have understand to the data.

In this second stage of the CRISP-DM it is crucial to take some time to look every detail of the project data that is stated on the dataset. In order to avoid and encounter some errors when I will proceed to the data preparation. Data preparation is the vital part of the data analysis which is on the third phase of the CRISP-DM methodology. On that part I need to execute the data analysis like cleaning the data which vital before performing the modelling.

The dataset is based on the National Health and Nutrition Examination Survey (NHANES). administered by the Canters for Disease Control and Prevention (CDC), collects extensive health and nutritional information from a diverse U.S. population. (archive.ics.uci.edu, n.d.). And this dataset is explained in detailed the features and target variables, But I choose the DIQ010 (Respondent is diabetic) because as I check the unique of this column it showed me the 0, 1, 2 numerical value which make me interested to used this as my feature and target variable.

As I begin to load the dataset using the df.head() code, It help me to show the first 5 rows and the 10 columns that help me to understand which column has the categorical variable and which columns has the numerical variables.

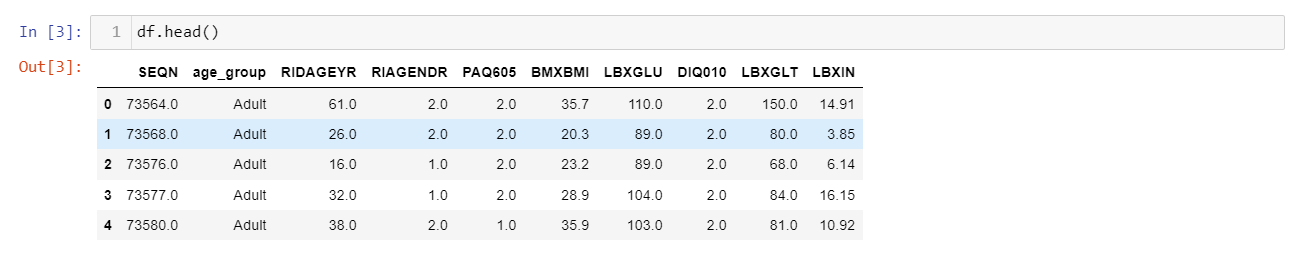


Figure 1: Head of the dataset

To fully understand the dataset here is the data dictionary that has the columns names, definition and the data types.

**Data Dictionary**

|  |  |  |
| --- | --- | --- |
| Columns name | Definition | Data Types |
| SEQN | Respondent Sequence Number. | Float64 |
| age\_group | Respondent's Age Group (senior/non-senior). | object |
| RIDAGEYR | Respondent's Age. | Float64 |
| RIAGENDR | Respondent's Gender. | Float64 |
| PAQ605 | If the respondent engages in moderate or vigorous-intensity sports, fitness, or recreational activities in the typical week. | Float64 |
| BMXBMI | Respondent's Body Mass Index. | float64 |
| LBXGLU | Respondent's Blood Glucose after fasting. | Float64 |
| DIQ010 | If the Respondent is diabetic. | float64 |
| LBXGLT | Respondent's Oral. | float64 |
| LBXIN | Respondent's Blood Insulin Levels | float64 |
| Reference | Reference for these columns and definition of the dataset (archive.ics.uci.edu, n.d.). | object |

In Figure 4 using the df.isnull().sum is very important to determine and evaluate if there is null values of the each columns and rows. The code df.isnull().sum() help me to understand that the dataset has no null values. In order for me to double check and make sure that completely has no null values I used the df.duplicated and it give me the results of false meaning there is no null values in the dataset that I want to do my data analysis.

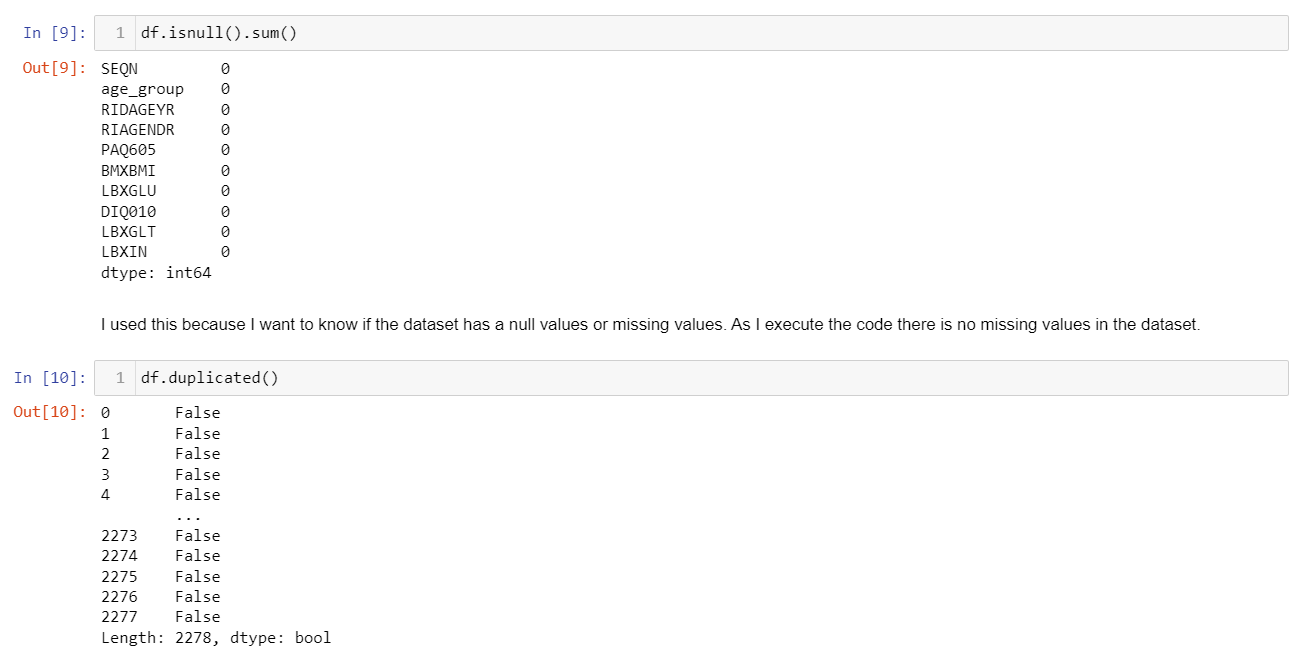


Figure 2: Using isnull().sum() and duplicate().

Proceeding to the next step which is the summary statistics of the data frame which is the df.describe(). It is responsible for the central tendency dispersion and the std shows the amount of change in the data and determines how it expands the values that come from the mean. The min shows the values of each column from higher to lower. Also, it helped me understand the numerical columns properly. (pandas.pydata.org, n.d.).



Figure 3: Describe of the dataset.

References List:

archive.ics.uci.edu. (n.d.). *UCI Machine Learning Repository*. [online] Available at: <https://archive.ics.uci.edu/dataset/887/national+health+and+nutrition+health+survey+2013-2014+(nhanes)+age+prediction+subset>.

pandas.pydata.org. (n.d.). pandas.DataFrame.describe — pandas 1.0.3 documentation. [online] Available at: <https://pandas.pydata.org/pandas-docs/stable/reference/api/pandas.DataFrame.describe.html>.