# Main Points and Structure (around 2000 words)

*Dissertation Title for Reference - Blood Glucose Levels Analysis and Predictions Using Data Mining Techniques*

* Data mining
  + What is it?
  + What are its uses?
  + Different types of data mining techniques
* Data mining in the medical field especially diabetes
  + Mining techniques most used in medical data mining *(paper 2)*
  + Short overview of diabetes (what it is, its symptoms and effects …)
  + Briefly explain CGMs (and their use for diabetic people) and how data can be mined and used to make predictions
* Prediction Algorithms and their uses
  + Classification Algorithms *(paper 1)*
  + Results obtained by some papers using specific algorithms
* Best algorithms chosen for scenario

# Literature Review

Section 1 – Introduction

Data mining is the process of analysing pieces of data and processing it into useful information. It is the process of exploring hidden knowledge from large amounts of data in search of consistent patterns and meaningful relationships between variables.

Data mining is part of the Knowledge Discovery Process (KDP). Before data mining algorithms can be applied, data from varies sources gets integrated into a single data store called target data, it is them pre-processed and transformed into standard format. At this point data mining algorithms can be used to process the data and produce patterns or rules. The output can now be interpreted into useful knowledge or information.

Over the past years several data mining techniques have been developed the most commonly used ones being Association, Classification, Clustering, Prediction and Sequential Patterns.

Many industries are using these tools to extract recurring tendencies in order to predict behaviours and future trends, allowing businesses to make intelligent and productive decisions. In the medical field, data mining can be used to make predictions on patients based on their records to be able to predict conditions and symptoms related to some conditions in advance therefore, thanks to an early diagnosis, precautions can be taken to prevent future complications.

Section 2 - Data Mining in the Medical field especially Diabetes

The Medical field has enormous amounts of data and because of this, medical data mining has grown in its popularity over the past years. While classification is the technique generally used in medical data mining, other techniques that have proven useful in finding patterns in medical data are clustering, association and outlier.

In the health care sector data mining is especially useful as it uses medical data for analysis to offer improved health care at better costs. Data mining in health care plays a significant role in prediction and diagnosis of several health problems such as heart disease, diabetes, cancer and skin disease among many others. This is important since early diagnoses of diseases and medical conditions are vital in order to prevent future complications.

1. *Diabetes*

Medical data mining in regard to diabetes has become quite a researched subject as it is a chronic disease that affects millions of people worldwide. In fact, according to WHO (World Health Organization) and the International Diabetes Foundation, it has become one of the leading causes of death worldwide. Statistics show that in 2017 it caused around 4 million deaths and affected about 1 in every 7 births. It is also a leading cause of obesity and it has a significant impact on the quality of life of people suffering from diabetes and their families, especially when complications arise.

Diabetes, otherwise known as Diabetes Mellitus occurs when the pancreas is unable to produce enough insulin, or when the body cells cannot make proper use of the insulin produced, due to reduced sensitivity. Without the ability to produce or effectively use insulin, glucose (sugars found in carbohydrates) levels in the blood are elevated (this is known as hyperglycaemia). Characteristically a person is diagnosed with diabetes because of high levels of sugar in their blood. A person is considered diabetic when blood glucose levels are higher than 11mmol/L or higher then 7mmol/L when fasting. Symptoms associated with diabetes include unusual thirst, weight change (gain or loss), lack of energy, blurred vision and frequent or recurring infections as the body takes longer to heal. Diabetes can lead to many complications like heart disease, kidney failure, blindness and amputation. However, this can be prevented with an early diagnosis.

There are three main types of diabetes Type 1, Type 2 and Gestational. Type 1 is autoimmune disease occurring at a young age of below 20 years, here the pancreatic cells that produce insulin have been destroyed. Type 2 occurs when various organs of the body become insulin resistant, and this increases the demand for insulin. At this point, pancreas doesn’t make the required amount of insulin. This usually occurs in age groups above 40. Gestational diabetes occurs during pregnancy, as the pancreas don’t make enough insulin.

1. *Diabetes Management and Technologies*