## literature review

Fuzzy Logic is a system used to develop decision making intelligent systems, the working of Fuzzy Inference System follows a crisp input converted in to fuzzy by using the fuzzification method. Fuzzy sets can contain only a partial degree of membership. To determine the membership function, the function can be set a value, assigned to the elements of the universal set which fall within a specific range therefore will indicate membership grade in the Fuzzy set of question. The behaviour of a fuzzy system is characterized by a set of linguistic rules based on expert knowledge, using both antecedents and the consequents, in other words conditional statements, a rule is built based on inputs in membership function. The rule base and database are referred to as the knowledge base. Defuzzification is converting a fuzzy value to the real-world value which is the output. The notion of a fuzzy set from the ordinary set is characterized by a membership function taking the values of either 0 or 1, representing degrees of belonging to the fuzzy set. [2-4]

Fuzzy logic expert systems used in medical examination are of great importance, providing an exact evaluation report of medical data provided to the system. These types of system provide an instant, simple method of medical examination and/or diagnosis. These systems give results based on facts built which are acquired from experts and authorities in the field. [6] The medical diagnosis system can make the result of diagnosis and treatment scheme more reasonable. As an FIS considers known facts which are applied to variables, used to construct outputs established from set of rules. Evaluation of rules is done after the collection of observed data. Identification of pattern and suggestion of problem linked with that pattern is given when the rules are logically satisfied. [5]

The use of expert systems and artificial intelligence techniques in disease diagnosis has been gradually increasing over the years. One method for diagnosing diabetes is by using Fuzzy logic controller which was developed using an Mamdani type fuzzy logic to observe the blood glucose level. Correlation in Fuzzy Logic was proposed to overcome the overlapping problem between each function when plotting the membership function in a fuzzy expert system for diagnosis of diabetes. A fuzzy expert system has been developed to give percentage risk for a person to get diabetes. An expert system involves the collection and encoding of rules, together with an inference engine for evaluating the rule base for a given set of inputs. There are four steps involve in this system development; determine fuzzy set, build membership function, if-then rule development and defuzzification. [4]

Another method for diagnosing diabetes using Fuzzy based expert system is using an Adaptive Nero-Fuzzy Inference System (ANFIS). This system is difference lies in the membership function parameters as they are extracted from a data set that describes the system behaviour. Making this model less reliant on expert knowledge. Many authors believe that using a neural network increases the flexibility in modelling and accuracy in predictions as well as their capacity to find solutions from limited or incomplete data sets. It has been shown that neural networks can combine data of a different nature on one complete system. [7]

The advantages of using a Fuzzy based system to diagnose diabetes means that the system can be widely used as it can give results in a shorter time frame. Equally, the system can give more accurate results since the inputs and outputs give more a specific indication of the main cause for the diagnosis and the best conclusion for treatment. This also means that medical practitioners and professionals can use this software as a support system to improve treatment while taking further steps to preventing this disease.