

Design of a Fuzzy Expert System for the Impact of Diabetes Mellitus on Cardiac and Renal Impediments

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Abstract : Diabetes mellitus is now one of the most common non communicable diseases globally. India leads the world with largest number of diabetic subjects earning the title "diabetes capital of the world". In order to reduce the mortality rate, a fuzzy expert system is designed to predict the severity of cardiac and renal problems of diabetic patients using fuzzy logic. Since uncertainty is inherent in medicine, fuzzy logic is used in this research work to remove the inherent fuzziness of linguistic concepts and uncertain status in diabetes mellitus which is the prime cause for the cardiac arrest and renal failure. In this work, the controllable risk factors "blood sugar, insulin, ketones, lipids, obesity, blood pressure and protein/creatinine ratio" are considered as input parameters and the "the stages of cardiac" (SOC) and the stages of renal" (SORD) are considered as the output parameters. The triangular membership functions are used to model the input and output parameters. The rule base is constructed for the proposed expert system based on the knowledge from the medical experts. Mamdani inference engine is used to infer the information based on the rule base to take major decision in diagnosis. Mean of maximum is used to get a non fuzzy control action that best represent possibility distribution of an inferred fuzzy control action. The proposed system also classifies the patients with high risk and low risk using fuzzy c means clustering techniques so that the patients with high risk are treated immediately. The system is validated with Matlab and is used as a tracking system with accuracy and robustness.

Keywords : Diabetes mellitus, fuzzy expert system, Mamdani, MATLAB

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