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The work entitled “ARTIFICIAL NEURAL NETWORK BASED NEURO-GENETIC ANALYSIS OF DIABETES MELLITUS” is proposed for the study and analysis of diabetes mellitus in Pima Indian Women Population by analyzing and interpreting the various factors causing the disease. Both genetic and phenotypic factors were found to be responsible for the cause of the disease. Mathematical, Neural Network and Data mining algorithms are applied in the identification and recognition of this dreadful genetic disease Diabetes Mellitus. Genes are carried by the chromosomes in the cell nucleus and the biochemical composition is characterized by a long string of DNA nucleotides. These strings carry the hereditary characteristics from parents to offspring. The different forms of the genes are called alleles. Genotype refers to be genetic constitution of the individual or an organism while phenotype denotes the observable characters of an individual as determined by the genotype and environment. The collection of all the genes of an organism forms the Genome. In this work the various genes and their mutations (HLA – DQ, HLA – DR) which are significant in the cause of various forms of diabetes mellitus are discussed. Graphical demonstrations are shown to stress the risk behind the acquiring of diabetic genes.

The work also discusses the definition and identification of various types of diabetes mellitus by external symptoms in the diagnostic model. Here,
the endocrine pancreas is described to highlight the insulin production in human bodies. The model also discusses the genetics of type 1 and type 2 diabetes. The tables showing the diabetic prevalence in different ethnic groups like Caucasians, African, American and Asian origin are shown in the diagnostic model, to indicate the prevalence of diabetes all over the world.

Next a fuzzy-genetic study has been carried out to analyze the cluster of selective genes, identify the mutated and normal regions of DR, DQ alleles and determine the susceptibility probabilities to Diabetes Mellitus. Statistical and graphical interpretations are developed to analyze and discuss the results obtained from a restricted set of available alleles of the HLA region. The module indicates the probability of an individual inheriting a risky gene leading to the susceptibility of the disease. The category to which each pattern is classified are tabulated and Fuzzy-classifier is applied to predict the risk level of Diabetes. Since environmental factors like stress in everyday life food habits and sensitive nature are significant factors involved in Diabetes Mellitus, and the proximity to the genetic risk can only be modelled to create an eye opening for the diabetic patients. Artificial neural network and data mining models have been developed to prove the hereditary nature of the disease. The eight major factors, PRG (No. of times pregnant), PLASMA (Plasma glucose concentration in Salvia), BP (Diastolic blood pressure), THICK (Forceps skin fold thickness), INSULIN (Two hours serum insulin), Body (Body Mass Index (weight/height), PEDIGREE (Diabetes pedigree function), AGE (in years),
RESPONSE (1: Diabetic 0: Non Diabetic), play a significant role in causing the disease are brought by mathematical algorithms in the Mathematical model. Neural Networks are applied to the study of diabetes mellitus in the sample population. Posterior probability method brings out the hereditary nature of the disease. It is followed by the analysis of data sample by Bayesian method in Data mining model. The prediction of diabetic probability is implemented using Naive Bayesian classifiers. Next logistic regression is applied to bring out the significance factors like age, obesity, etc. in the cause of the disease. Data mining model is implemented with the decision trees formed by ID3 algorithm.

It is observed that mathematical, Artificial Neural Network, Data mining algorithms based predictions provide the capability to anticipate the onset of Diabetes Mellitus and the findings can stress the need to control the various factors causing the disease. The analysis is significant because if these factors are left uncared, it may lead to the damage of major organs of human body like heart, kidney, eyes and brain and the Artificial Neural Network and Data mining algorithms promise better predictions.