

# Disease Detection on the Basis of Multiple Symptoms by Expert System

Ekbal Rashid

*Associate Professor,  
Department of Computer Science and Engineering  
Aurora's Technological and Research Institute,  
Parvathapur, Uppal, Hyderabad, 500092  
ekbalrashid2004@yahoo.com*

## **Abstract**

*The aim of this paper is to develop a system for making the interface between the doctors and patients for immediately diagnose disease using tools which was usually done through manual processes. The novelty of the paper is to rapidly find out the disease on the basis of multiple symptoms. It checks generated reports about the patient status, which will be useful for further understanding to deal with the case. This system does not require any interference of doctor for analyzing case; the system will analyze and give reports to doctor and patient based on symptoms. This software is developed using C++ language and, hence it provides the complete solution for the current disease recognition system. Further, after analyzing patient's detail, information related symptoms will be stored in a database which can be viewed any time in the future or further analysis. Using report, which has been generated by the system, doctor can provide treatment for patient and system will guide patient with doctor's information who can solve his/her problem. This application system will provide effective service for rural area people where medical treatment is not available every time. Users can use this application software even if the doctor is not available online and get basic information to treat disease.*

**Keywords:** *Disease Detection, Diabetes, Disease Recognition, Expert System*

## **1. Introduction**

Due to unawareness or lack of knowledge, people do not know from which type of disease, he/she were suffering especially in rural areas. As we know so many lifestyle diseases such as diabetes, heart, etc. The main idea of this application software which is working as an expert system is to detect the disease on the basis of various symptoms, especially for diabetes. This tool or application software can be used in the absence of doctors. The patient can detect the disease only by giving input to the system. This software also uses medical diagnosis report to examine the level of the disease, *i.e.*, what is the level of disease? In this system, all the detail information about the patient is stored in a database or file system.

This research is inspired from the recent developments in these fields and the tremendous importance that it has in the realm of research and other related work. Through this expert system, multiple types of symptoms have been used for recognizing and detecting the disease. Especially for the case of diabetes where the frequency of thirst increases, and in medical term it is called polydipsia. Due to lack of awareness and unavailability of commercialized software or online software diabetes has become the biggest lifestyle disease or sometimes it is called disorder in the world. As everyone

---

Received (November 17, 2016), Review Result (May 9, 2017), Accepted (May 11, 2017)

knows, this disease affects the various parts of body, especially organ system [13]. Diabetes also affects the vision of the patient [14]. In diabetes vision of the patient can get blurry and they also greater risk of cataracts, glaucoma and retinopathy. In diabetes, excess sugar builds up in the blood. Patient kidneys are forced to work overtime to filter and absorb the sugar. Due to this frequency of urination increases, this causes dehydration. People who were suffering from the above said symptoms may feel fatigued, weight loss, *etc.*, especially in the case of type1 diabetes. Detection of Diabetes is divided into three levels. First, Level 1 symptom, it includes Appetite, Frequency of thirst, Frequency of urination, Vision, Family history of diabetes. Second, Level 2 symptoms, it includes Pancreatitis, Sugar level in urine, Hormonal disorder, Carcinoma, Hepatitis. Third, Level 3 symptoms, it includes Age, Body weight, Ketonuria, Auto antibodies [15] [16] [17] [18]. Finally, on the basis of these three levels of symptoms, level of diabetes is detected and the results are known, whether the person is diabetic or not.

The rest of the paper is structured as follows: Section 1 discussed about introduction, section 2 describes the literature review in detail, Section 3 gives information about existing system in brief, section 4 discussed about objectives and proposed model, discussed about results, Section 5 describes the results. In Section 6, conclusions and future scopes have been presented.

## 2. Literature Review

Considerable writings are available in related works. In search of concrete World Health Organization (WHO) suggestions to minimize the risk of metabolic disorder such as diabetes from the world. The prevention and control of Noncommunicable disease like diabetes has been recognized by WHO Global Strategy as one of its priority[1]. Both type of diabetes for instance Diabetes mellitus and diabetes insipidus are multifaceted set of metabolic disorders characterized by chronic hypoglycaemia and hyperglycaemia and disturbances of fat, carbohydrate, and protein metabolism consequential from defects in insulin action or insulin secretion, or both [2]. People with diabetes have considerably greater risk of cardiac, cerebrovascular and peripheral arterial disease. The long-term, effects include the damage of nephropathy, retinopathy, and neuropathy. However, all types of diabetes involve both genetic susceptibility and exposure to unhealthy environments or lifestyles and it exists in some low-and middle income countries [3]. This metabolic disorder consumes around 10-15% of the entire health care budget [4]. The burdon of diabetes treatment cost is significantly increasing. As per WHO report, the frequency of currently known genes associated with susceptibility to diabetes is going to high, but their value in predicting future diabetes remains low [5] and it is expected that 285 million people have diabetes in 2010, in which about 70% of people live in developing countries [6]. Due to diabetes, deaths rate has been projected in people who have aged between 35-64 for 6-34% of total mortality in low-and middle-income countries [7]. There are so many lifestyle factors that increase the risk of diabetes especially type 2 diabetes. The biggest reasons are poor-quality diet and physical inactivity linked to overweight and obesity [8]. Alcohol and Smoking both are increases the risks of type 2 diabetes [9][10]. Type 2 diabetes has become one of the fastest-growing health problems in both developed and developing countries due to worldwide epidemic of sedentary lifestyle and obesity [11].

On the otherhand, Type 1 diabetes is basically an immune-mediated disease in most cases, resulting in insulin deficiency. In this case, patients need daily insulin for survival. As on date, the reason of type 1 diabetes is still unidentified and it cannot currently be prevented. Data indicates that one half of type 1 diabetes presents in childhood and early adulthood but nearly 50% of cases develop after the age of 25 years in most of the developed countries [12].

### 3. Existing System

Existing system refers to the system that is being followed till now. Presently, all the disease, detection is done manually by the doctors. For instance, if a patient wants to know the disease, then they have to go through medical diagnosis and their responsibility to consult a doctor with the report. The biggest drawback of existing system was time consuming.

#### 3.1. Limitations of Existing System

In this section, I have given the limitations of present system, which is shown below.

- Time consuming.
- Unnecessarily wastes of paper due to more paper work.
- Patients data is not fully secured.

To overcome above limitations and making the system working more accurately it needs to be computerized.

### 4. Objective and Proposed System

The main objective of the system is detecting the disease of the patient on the basis of multiple symptoms. Detecting diseases on the basis of symptoms. Following objectives has given below.

- Cost effective.
- Effective in urban and rural areas both.
- Consumes less time.

For achieving above cited objectives, I have proposed a model for detecting as well as recognizing such type of metabolic disorder, which has shown below. (See Figure 1 through Figure 3).

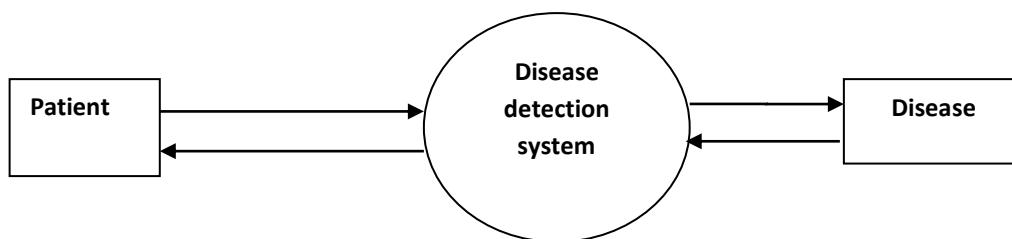
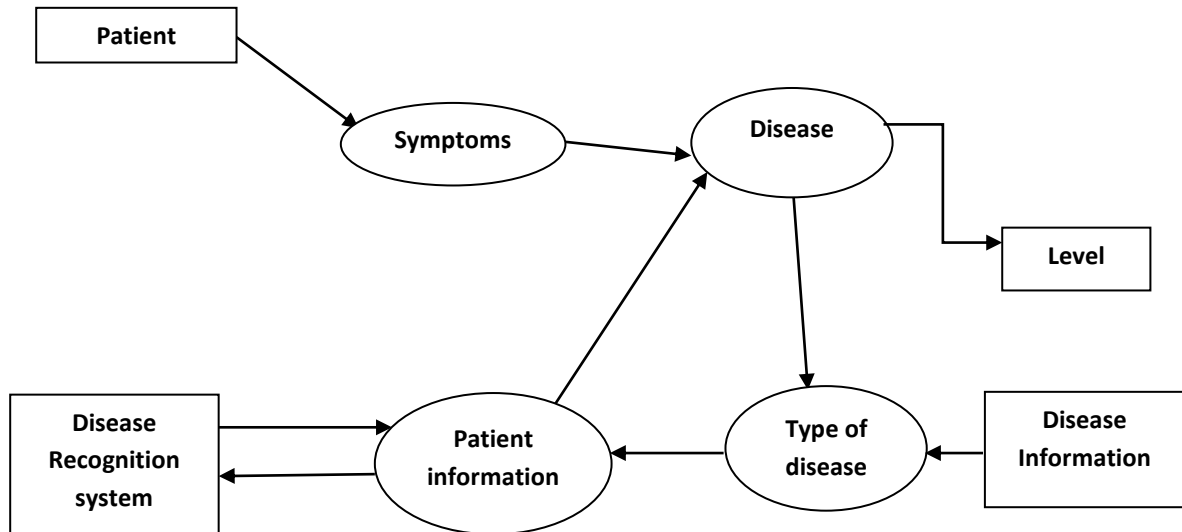
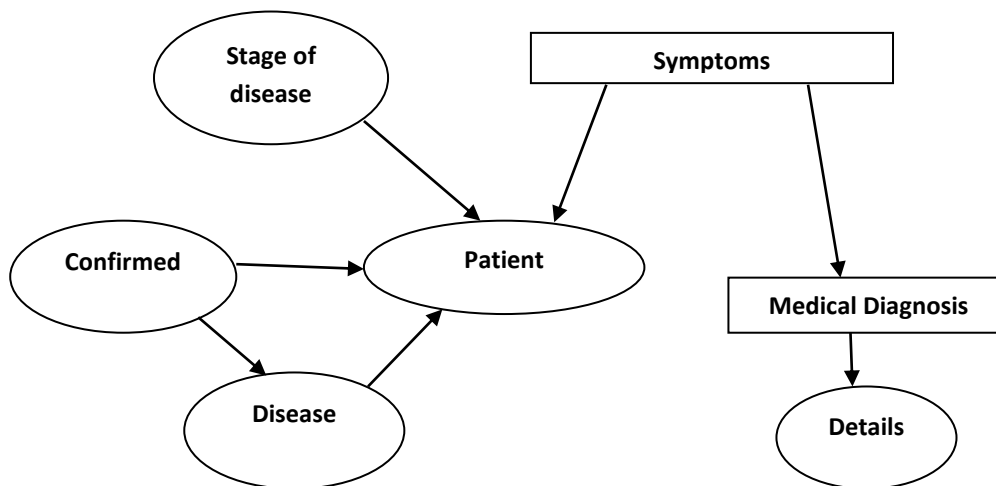


Figure 1. Context Level Diagram



**Figure 2. Recognition of Disease**



**Figure 3. Disease Detection Systems**

#### 4.1. Advantages of Proposed System

The followings advantages of proposed system which has given below.

- Security of data.
- Ensure data accuracy.
- Administrator controls on the entire system.
- Reduce the damages of the machines.
- Minimize manual data entry.
- Greater efficiency.
- User friendly and interactive.
- Minimum time required.

## 5. Results

In this paper, I have developed a system for medical diagnosis especially for people who were suffering from some life style disease such as diabetes. In this paper, I have made an indigenous tool for detecting the disease on the basis of multiple symptoms. (See snapshot 1 through snapshot 7).

```
*** MEDICAL DIAGNOSIS FORM ***

APPETITE (H(HIGH),/L(LOW),/N(NORMAL)):          h
FREQUENCY OF THIRST(H(HIGH),/L(LOW)/N(NORMAL)):  h
FREQUENCY OF URINATION(H(HIGH),/L(LOW),/N(NORMAL)): h
VISION (I(IMPAINMENT),/N(NORMAL)):                i
URINE SUGAR(P(PASSIVE)/A(ACTIVE)):                 a
KETONUREA(P(PASSIVE)/A(ACTIVE)):                   a
FASTING BLOOD SUGAR(H(HIGH)/L(LOW)/N(NORMAL)):    h
R B S (H(HIGH)/L(LOW)/N(NORMAL)):                  h
FAMILY HISTORY OF DIABETES(P(PASSIVE)/A(ACTIVE)):  a
OGTT(D/N):                                         d_
```

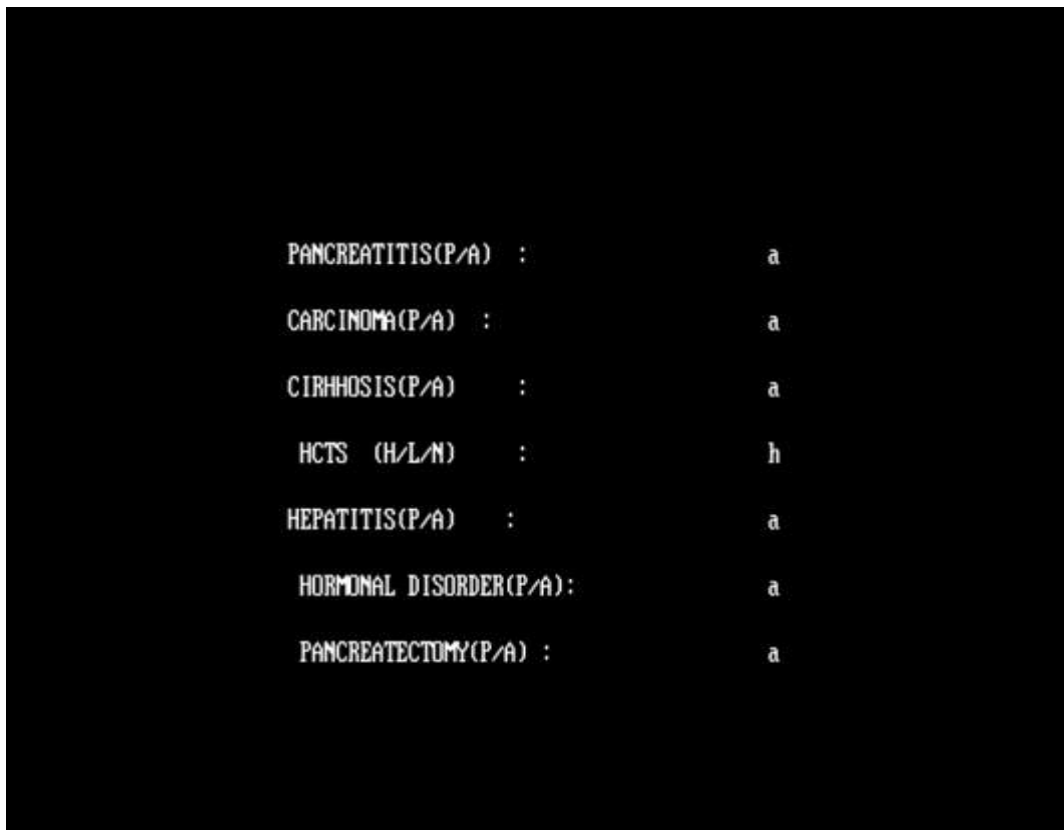
Snapshot 1:Medical Diagnosis Form.

```
THE PERSON IS DIABETIC PROCEED (Y/N)?::y_
```

Snapshot 2:Confirmation Form regarding whether person was suffering from diabetes



Snapshot 3:Primary diabetes found on the basis of symptoms



Snapshot 4:Level 2 Symptoms contained following parameters



Snapshot 5:Confirmation of secondary diabetic.



Snapshot 6:Level 3 symptoms contained following parameters



Snapshot 7:Not diabetic

## 6. Conclusions and Future Work

Through this expert system one can know about type of diabetes on the basis of symptoms whether he/she was suffering. After proper validation on data, it can be concluded that system is highly effective and efficient and meeting all user requirements as well. The system is portable and it can be plugged in many other systems. Further, it allows us to store the patient details and simplify the work. It is used to detect disease and it contains a database where all the information will be stored safely. This is an effort to develop a simple system of disease detection which may be useful in the rural areas or where the need of instant detection is essential. It is a simple system which can detect the disease and store the information of the patient. I hope everyone will prefer it, especially in the class of doctors. In the future, I can also make this system web enabled so that every person can access the system online.

## References

- [1] "2008–2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases", Geneva, World Health Organization, (2008).
- [2] "Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia". Geneva, World Health Organization, (2006).
- [3] "Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus", WHO/NCD/NCS/99.2 ed. Geneva, World Health Organization, (1999).
- [4] "Diabetes atlas", 3rd ed. Brussels, International Diabetes Federation, (2006).
- [5] P.J. Talmud, "Utility of genetic and non-genetic risk factors in prediction of type 2 diabetes: Whitehall II prospective cohort study", *British Medical Journal*, vol. 340, (2010), pp. b4838.
- [6] "IDF diabetes atlas", 4th ed. Brussels, International Diabetes Federation, (2009).
- [7] G. Roglic, "The burden of mortality attributable to diabetes: realistic estimates for the year 2000", *Diabetes Care*, vol. 28, (2005), pp. 2130–2135.
- [8] P. Zimmet, K.G. Alberti and J. Shaw, "Global and societal implications of the diabetes epidemic", *Nature*, vol. 414, (2001), pp. 782–787.
- [9] J.C. Will, "Cigarette smoking and diabetes mellitus: evidence of a positive association from a large prospective cohort study", *International Journal of Epidemiology*, vol. 30, (2001), pp. 540–546.



- [10] N. Chaturvedi, J.M. Stephenson and J.H. Fuller, “The relationship between smoking and microvascular complications in the EURODIAB IDDM complications study”, *Diabetes Care*, vol. 18, (1995), pp. 785–792.
- [11] S. Colagiuri, “There really is an epidemic of type 2 diabetes”, *Diabetologia*, vol. 48, (2005), pp. 1459–1463.
- [12] T. Urakami, “Annual incidence and clinical characteristics of type 2 diabetes in children as detected by urine glucose screening in the Tokyo metropolitan area”, *Diabetes Care*, vol. 28, (2005), pp. 1876–1881.
- [13] C. Dharuman and P. Venkatesan, “Markov Chain Monte Carlo based Pattern Analysis for Diabetic Spectral Data”, *Indian Journal of Science and Technology*, Doi no: 10.17485/ijst/2015/v8i33/77184, vol. 8, no. 33, (2015).
- [14] IK. R. Ananthapadmanabhan and G. Parthiban, “Prediction of Chances - Diabetic Retinopathy Using Data Mining Classification Techniques”, *Indian Journal of Science and Technology*, Doi no:10.17485/ijst/2014/v7i10/51098, vol. 7, no. 10, (2014).
- [15] T. Karthikeyan and K. Vembandasamy, “A Novel Algorithm to Diagnosis Type II Diabetes Mellitus Based on Association Rule Mining Using MPSO-LSSVM with Outlier Detection Method”, *Indian Journal of Science and Technology*, Doi no: 10.17485/ijst/2015/v8iS8/53631, vol. 8, no. S8 (2015).
- [16] <http://www.diabetes.co.uk/symptoms/polyphagia.html> [Date of access 08.12.2015].
- [17] <http://www.healthline.com/health/diabetes/blurry-vision#Overview1> [Date of access 1.02.2016].
- [18] <http://www.healthline.com/health/diabetes-risk-factors#GeneticFactors2>[Date of access 10.02.2016].

## Author



**Ekbal Rashid**, he is working as an Associate Professor in the Deptt. of Computer Science and Engineering with Aurora's Technological and Research Institute, Uppal, Hyderabad. He received his M.Tech in Computer Science in year 2009 from BIT, Mesra and his Ph.D in Computer Science and Engineering in May 2015 from Siksha 'O' Anusandhan University (Deemed University), Bhubaneswar, Orissa. Dr. Rashid has more than 30 International and National publications in journals and conference proceedings of repute including Springer, IEEE, Inderscience. His research area is software engineering, machine learning, data mining and artificial intelligence. Dr. Rashid has written two books on the topic of “Analogy-Based Software Cost Estimation” published by Advance Academic Publisher, India and “Enhancing Software Fault Prediction with Machine Learning : Emerging Research and Opportunities” that would be published by IGI Global, USA. He has more than fourteen years of teaching experience in various reputed Institutes/Universities across the country.

