

## Chapter 3

# Procedure of Medical Diagnosis

### ABSTRACT

*Drawing flow diagrams is an effective strategy to extract rules for designing an intelligent system. Physicians diagnose the diseases based on flow diagrams. In this chapter, the procedure and required steps for medical diagnosis are explained and the reader can learn the way to find the knowledge from the medical experts to extract the data for the intelligent system. Examples of some flowcharts from the California Department of Health Service are provided to show how the designer should work with the medical data. Medical data and types of patient information are described.*

### 1 PROCEDURE

Following is a typical diagnostic process: the anamnestic data is obtained during the interview of the patient and immediately afterwards the physician records the status data during the preliminary examination of the patient. It is possible that additional laboratory examination be taken for the patient depending on the anamnestic and the status data. For each disease, there are a number of symptoms (the data of patient) that contribute in diagnosing a disease. But some of the symptoms are more significant than some others. Sometimes a combination of symptoms gives better idea for diagnosis a disease. Then the physician takes into account the whole available description of patient data of his/her health status to determine the diagnosis.

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## ***Procedure of Medical Diagnosis***

Depending on the diagnosis, the treatment is prescribed and, after the treatment, the whole process may be repeated. In each iteration, the diagnosis may be confirmed, refined, or rejected.

The definition of the final diagnosis depends on the medical problem. In some problems, the first diagnosis is also the final; in some others, the final diagnosis is determined after the results of the treatment are available; and for some of the diseases there is no way to obtain a 100% reliable final diagnosis. An example is the problem of localization of the primary tumor that an operation is needed to obtain the final diagnosis where the location of the primary tumor is verified, although this examination is avoided and replaced with other laboratory tests unless it is really necessary to obtain the verified diagnosis. In breast cancer diagnosis, for predicting the recurrence of the tumor after removal of the breast, five years are needed after operation to final verification for the prediction. In urology, in the problem of diagnosing the type of incontinence, in practice the final diagnosis is never obtained as there is no practical way to verify the diagnosis.

Medical diagnosis depends on the available data and on the experience of the physician, his or her intuition and biases, and even on the psycho-physiological condition of the physician. Various studies show that the diagnosis of a patient significantly can differ if the patient is examined by different physicians or even by the same physician at different times.

The physician often observes the condition of a patient during his/her examination in terms of intuitive impressions, since some conditions of patient cannot be formally described and therefore cannot be typed into the computer. In some cases, the lack of such information may be of crucial importance to obtain reliable diagnosis. Although intelligent systems may induce more reliable diagnostic algorithms from the limited description of the patient, such diagnostic tools definitely cannot, and also are not intended to, replace the physicians, but should rather be considered as helpful tools that can improve the physicians' performance. The results from many studies and experiences in this chapter and other chapter convincingly demonstrate that the diagnostic accuracy by physicians can be improved with the aid of machine learning.

Drawing flow diagrams is an effective strategy to extract rules for designing an intelligent system. Physicians diagnose the diseases based on flow diagrams. Therefore, any computer expert can apply them as the reliable approach for extracting medical information. A graphic representation of a sequence of operations using symbols to represent the operations is medical flow diagram. Using the flowcharts, the most important steps of a process without detailing of the algorithm for performing it are symbolized. A flowchart or an image can be a source of data. However, it is important to extract effective features, since machine learning tools can use numerical data. An attribute of an image or any parameter in a flow diagram is called

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