

A Study on Database for Pulse Rate Diagnosis

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Abstract

In this paper, we devised pulse rate diagnosis database system for provide basic index of Cold-Hot diagnosis. The system consist of database part and pulse rate detection part that for detection pulse wave, respiration and ECG.

The database is constructed windows95 platform using DAO(Data Access Object). Search algorithm used ISAM algorithm. The database consist of patient information and medical report for a subject and detected biological signals.

I. Introduction

Recently, not only digitalized medical instruments but also a computerized diagnosis that relay on clinical records of database in computer is in progress by rapidly developed computer technology. Especially, the computerized diagnosis which base on database of patient records, pathological results and predescription records made more generalize and precise diagnosis.

That kind of research is also does within oriental medicine doctor and biomedical engineer for computerize diagnosis of oriental medicine ^[1-5].

In this paper, we proposed pulse rate diagnosis system which provide Hot-Cold index. The system has biological signals detection hardware and database of oriental medicine information that consist of biological signals data and personal information.

The hardware system are consist of radial pulse detection part and respiration and ECG detection part. The database are constructed on Window95 base and used DAO class of Visual C++ and the ISAM(Indexed Sequential Access

Method) is used as record search algorithm. The database records are consist of personal information, clinical information, and biological signals data.

II. Pulse Rate and biological signals Detection System

The pulse rate is basic decision parameter of Hot and Cold which are basic clinical index of predescription direction decision in oriental medicine.

1. Pulse Rate Theory

The pulse-rate of occidental medicine is define as pulse numbers per minute but in oriental medicine by the Naekung is define as pulse numbers per one respiration period. In this paper, we define three kinds of pulse rate that of a pulse-rate of respiration, a pulse rate of inspiration and a pulse rate of expiration for the stabilized parameter estimation. This pulse rate is define by following equation.

$$\begin{aligned} \text{pulse-rate of respiration} &= \frac{\text{pulse numbers}}{1 \text{ respiration}} \\ &= \frac{1 \text{ respiration period}}{1 \text{ pulse period}} \end{aligned}$$

$$\begin{aligned} \text{pulse-rate of inspiration} &= \frac{\text{pulse numbers}}{1 \text{ inspiration}} \\ &= \frac{1 \text{ inspiration period}}{1 \text{ pulse period}} \end{aligned}$$

$$\begin{aligned} \text{pulse-rate of expiration} &= \frac{\text{pulse numbers}}{1 \text{ expiration}} \\ &= \frac{1 \text{ expiration period}}{1 \text{ pulse period}} \end{aligned}$$

2. Pulse rate detection system

The pulse rate detection system are consist of radial pulse detection part for pulse numbers counting, respiration detection part for respiration shape, ECG detection part for providing pulse starting point and A/D converter part for analog biological signals conversion to digital data. The system shows in Fig 1.

The radial pulse signals can detect by pulse transducer that placing on the radial artery. The pressure variation of radial artery are can convert to voltage signals by pulse transducer that have loadcell.

The respiration detector which for detect respiration shape use a airflow temperature detection method at the nasal entrance. That is lowering to atmosphere temperature when inspiration and rising to body temperature when expiration. The ECG signals can detect by use Ag-Agcl electrode with precordial derive method.

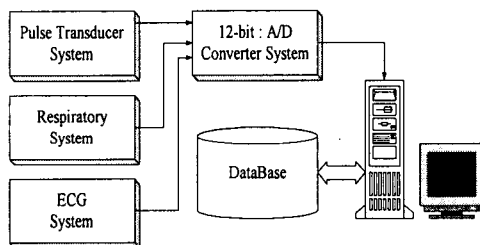


Fig 1. Configuration of pulse rate detection system.

III. Database

In this study, we construct structured database for effective using a personal information and pulse rate information in symptom diagnosis. The DAO(Data Access Object) that supported on Microsoft Visual C++ is used to the database system as base engine. This engine is stand alone type database but its has much variety function and merit of high speed, and has converting efficiency to ODBC which support client-server environment.

The store, insert and delete of records are implemented by the DAO class. The field for the database construction is shown table 1.

Table 1. Field of database.

Patience Registration	Data Registration
Identification(ID)	Signal Type(S_Type)
Name(Name)	Diagnosis Time(Date_Diag)
Identification	Description
Number(ID_Number)	(Description)
Birth Date (Date_Birth)	
Address(Address)	
Sex(Sex)	
Blood Type(Blood_Type)	

The search method of database records are used ISAM(Indexed Sequential Access Method). In this search method, the registration number, name, identification number are set as search field, not search for all field but search indexed file only, so we can get very high speed performance.

To provide biological signals and the pulse-rate in quantitative values in the search process , we must manipulate each biological signals in automatically. Thus, we use lowpass and bandpass filter for power line noise, and applied peak detection algorithm to detect a period of peaks of the each biological signals. From this value, we can derive each pulse rate. This processing algorithm are shown in Fig 2.

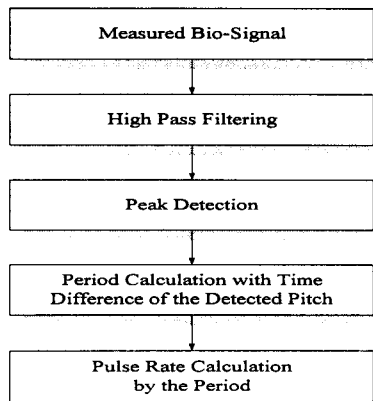


Fig 2. A blockdiagram of pulse rate calculation.

IV. Pulse Diagnosis System

The menu configuration of pulse rate diagnosis system that have DAO database engine consist of the database which have patient information registration and easy patience search ability, the data monitor which can monitoring biological signals, A/D conversion setup, and the communication which can transmit pulse rate information and biological signals. The initial image of database is shown in Fig 3.

We configured a patience information registration of this systems can register personal information, doctor's description and biological signals in examination sequence after biological signals detection process, and personal register image is given in Fig 4.

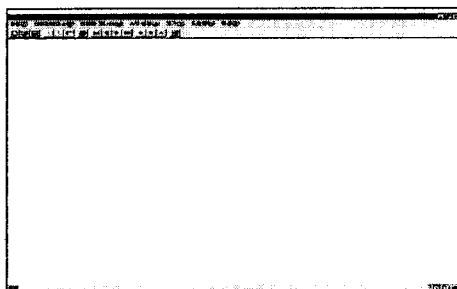


Fig .3. Initial figure of pulse diagnosis system.

An example of resource search that plays auxiliary roles to the pulse rate diagnosis is

shown in Fig 5. In this search, by the registration numbers of patient, name and identification numbers the search is possible and can referencing doctor's description by the date. And manipulating and processing monitored signals are represented to a respiration pulse rate, an inspiration pulse rate and an expiration pulse rate for the pulse rate diagnosis application.

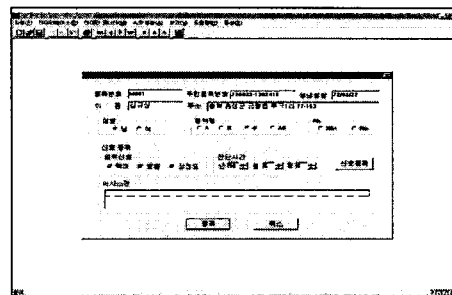


Fig 4. Patient Registration image

The monitored each signals can review in large windows by click the database menu. One of this example is shown in Fig 5.

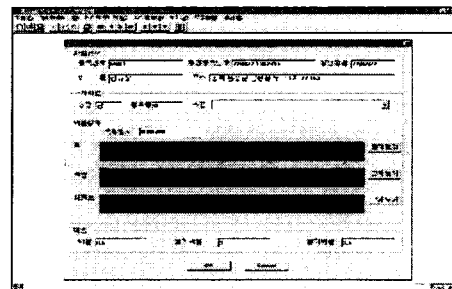


Fig 5. Patient resource searching image

V. Conclusion

In this research, we constructed database for the pulse rate diagnosis which provide Cold-Hot clinical index of oriental medicine. The database are constructed on Windows95 base and used DAO class of Visual C++ and the ISAM(indexed sequential access algorithm) is used as record search algorithm. The developed database systems gave a good results such as easily insert

new record and its searching system can search not only registered information but also registered biological signal waveform and pulse-rate information.

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