PULSE DIAGNOSIS IN TRADITIONAL CHINESE MEDICINE

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Abstract:

Traditional Chinese Medicine which is commonly known as "TCM", Disorders are analyzed by reading pulse from the wrist. Some quantitative systems are needed to modernize in this diagnosis due to subjectivity. But in clinical medicine, it limits the practical applications when it is effective modelled.
Based on " Bayesian networks (BNs) the pulse diagnosis was made for a novel quantitative system. It is used to map the relationships between pulse waves and pulse types where 84% accuracy rate is feasible. It can facilitated in popular applications of TCM[1].
Index Terms: TCM, fuzziness, subjectivity

INTRODUCTION:

Generally doctors diagnose the patient by feeling his/her pulse in the radial artery. The repeatability of the pulse is recorded for finding the disorders. In Traditional Indian Medicine also, the pulse reading from a single artery has to be in the ratio of 1: ½: ¼. High level of skill and experience is needed to read the pulse [2]. Recording the repeated pulses will give a clear detail about the disorders. Concentrating more on the reliability and repeatability of pulse while at the time of diagnosis, the disorders can easily be observed. Most of the recent researchers come up with good results having been put lots of effort in mapping the pulse waves and its types undoubtedly limits their practical applications in clinical medicines.

It has been found that the efficient and reasoning task is done only on Bayesian networks (BNs) compared with other methods [4].

- Firstly, Based on rigorous theory, it has been modelled. Having a vast amount of known results, researchers claim the probability is the only sensible descriptions of uncertainty and is adequate for all purposes.
- Secondly, BNs describe casual relationships in graphical mode[4].

- Thirdly it is often insensitive to imprecision in the numerical probabilities.

    A mapping is done with pulse diagnosis and its types based on Bayesian networks. It is a new Quantitative system for diagnosis [3]. This system constructs the mapping relationships between pulse wave parameters and pulse types [7].

Pulse Wave Database:

In Wangs system, the pressure can be adjusted to maintain a constant pressure so as to have the accurate reading. When the amplitude reaches its maximum, the regulated pressure is 25 – 150 g.

The sample pulse database Consists of two parts

- It has been observed by Huiyan wang that total of 407 pulse waves collecting from 298 patients and 109 healthy volunteers and kept as a data base.
- Classify the pulse type

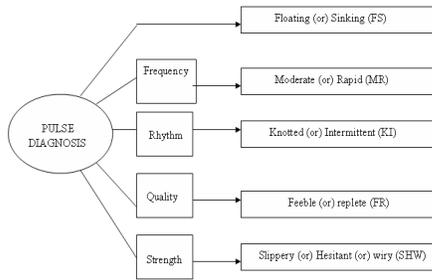- The pulse parameters are continuous variables.

Fig 1: Pulse Recognition Contents

Feature Extraction of Pulse Wave:

There are seven factors are to be taken in to consideration for classifying the pulse types i.e. Strength, Rhythm, Depth, Length, Width and Frequency [5].

Ex: Pulse transducer output recorded for pulse wave.

When the amplitude increases the Contact Pressure also will increases, reaching a maximum and then decreases
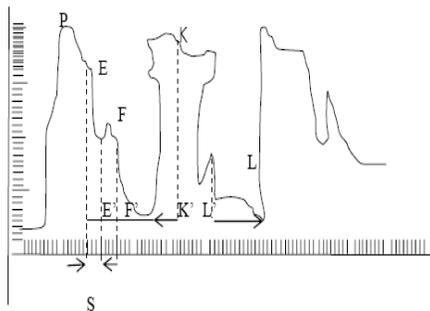

Fig 2: Pulse wave

Wave SP ,EF and FG are the three sub waves present in the pulse wave form.

- Pulse parameter used [15]
  Observations are made by Huiyan Wang are as follows

(a) Contact Pressure P1 at which the maximum amplitude of pulse wave is attained

(b) Height of the maximum amplitude of AC (HA_{AC})-> pp'

(c) Height of the maximum amplitude of EF (H_{ef})-> kk'

(d) Height of the maximum amplitude of FG(H_{fg})->ll'

(e) Height of the start point of FG (H_{ff})->FF'

(f) Height of the start point of EF (H_{cc})-> EE'

(g) $R_{AC} = H_{cc}/H_{AC}$

(h) $R_{fp}=H_{ff}/H_{AC}$

(i) $R_{es}=H_{ef}/H_{AC}$

(j) $R_{fs}=H_{fg}/H_{AC}$

(k) The cycle of pulse wave C1

QUANTITATIVE DIAGONOSIS MODEL BASED ON BN'S
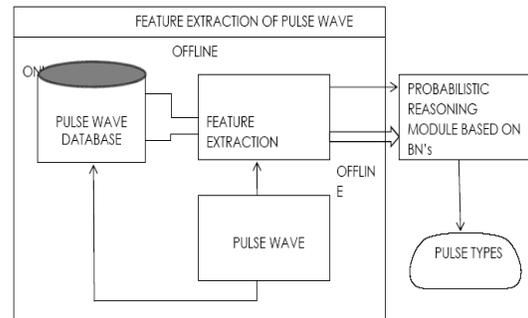
E.g.: Fining the pulse types by feature extraction.

- Using Bayesian networks the dependency relationship is found. By which the parameters can be obtained.

- In a directed graph, the minimum set of nodes that renders node X is independent of all other nodes in Markov blanket to perform casual conference. [15].

- These Markov blanket of a node X, has the information about the parents and children's of X as well as the parents of the children X. it has a complete data structure about the parents and children's of X

- From the Bayesian networks, the PAR can be predicted and we can obtain ND for the remaining nodes.

EXPERIMENTAL RESULTS

Obtaining a sample size, periodical recording should be done. some observed data's may be relative small such as hesitant, intermittent,

knotted etc., but it is difficult to obtaining. To estimate the accuracy of the system, a α-fold cross validation technique is used so as to overcome the difficulty.

Rate of Accuracy = SR/ T

SR – Number of samples recognized.

T – Total number of samples present

EXAMPLE:

There are number of databases taken for classifying the pulse and its types. Researchers are conducting more experiments in identifying the types of pulses

Graphical structures of Markov blanket of SHW and FR has only 5 parameters namely r_{fp}, r_{es}, h_{AC}, h_{ef}, and t [15].

- Six parameters h_{AC} r_{es} , h_{ff} , r_{fp}, r_{fs} p, and are most relevant to the diagnosis [13].

ERRORS

It can be of three occurrences,

- Information is not adequate,
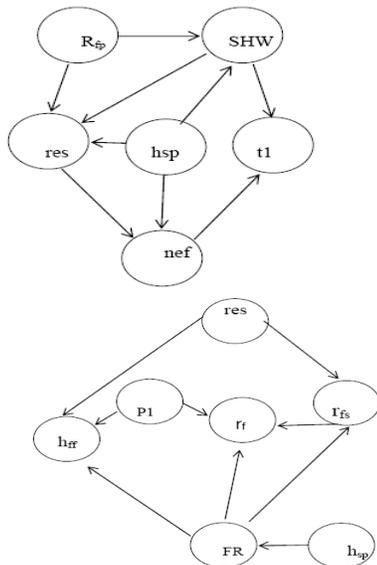- Not discriminating or accurate[15].
- Samples are not sufficient.

Fig 3: The Markov Blanket of SHW and FR

PREDICTIVE PRESULTS OF THE SYSTEM FOR PULSE

PULSE TYPES

    SF   MR   KI   FR   SHW   AVG

PAR

 0.95 0.97   0.76   0.84 0.69   0.84

CONCLUSION:

Finding the parameter of pulse wave forms and its types are the main motivation in TCM

- Generalization is too complex for obtaining these pulses
- Relationship among the wave and its types are identified by [4].
- Experts who know it manually can able to predict the accuracy [7].
- Based on the disorders, the change in pulse is obtained can be considered for rectification. A statistical process are to be taken for classification.
- Traditional Chinese medicine ad in Traditional Indian medicine, it has an important role in identifying the disease by looking and listening etc.,

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