Abstract

Use of computers in the field of healthcare is increasing day by day. Mostly the computers are used in healthcare domain for either to store data about patients, or to assist the expert in decision making activities. The computer processes the data and gives analysis of data to the expert and expert decides about disease. Hence, in spite of using computers in decision making activity, the ultimate decisions are taken by human. It is needed that computer can have its own ability to take decisions to improve the accuracy in diagnosis of diseases.

On the other hand, in the field of medical science, practitioners observe nails and palm of patient to get assistance in diagnosis of the disease. Also there are many limitations of human being for minute observation. A branch of palmistry, known as medical palmistry is one branch where scientific study of human palm is done to identify or predict the diseases.

By doing literature survey it has been found that today computers are used in healthcare domain for storage purpose but not for taking decision regarding diagnosis or prediction of diseases, i.e. the experts, who can predict or identify the disease by observing color of nails and palms, do not have support of computer system. To bridge this gap, the model of decision support system for healthcare based on medical palmistry using the techniques of digital image processing and analysis is designed and implemented to identify or predict the disease. The newly developed model has following features/functionabilities:

- Identification of uploaded image. If the uploaded image is not of palm then user cannot proceed.
- All features are executed without human intervention
- Extraction of palm from background
- Extraction of nail from the rest of the palm
- Extraction of mounts from rest of the palm
- Symbol detection on extracted mounts
- Color analysis of nails
- Color analysis of palm
- Tabular display of statistical details about color analysis for pixels of each color
Identification of disease if any with the stage of disease in human body
- Prediction of disease if any
- Dynamic management of knowledge base by knowledge engineer

The whole work is divided into eight chapters.

The first chapter: **Introduction**, introduces the concepts of decision support system, digital image processing and analysis, palmistry, and medical palmistry. It discusses the advantages of computerized decision support system, fundamental concepts of digital image processing and analysis, basics of palmistry, science behind palmistry and medical aspects of palmistry. It also discusses the motivation of this research work and gives briefs about the research work.

The second chapter: **Literature Survey and Scope of Research**, gives idea about existing decision support systems in medical science and prior work done in the area of digital image processing for medical science domain. Moreover, the chapter focuses on the concepts of palmistry and medical palmistry in detail. It also discusses scientific theories and researches done in this field, which proves biological connection between brain, palm, and other organs of human body. Moreover it also discusses the existing system regarding to palmistry. At the end of this chapter, scope of research in this area is discussed and need of the research is identified.

The third chapter: **Study of Related Technology**, gives introduction to the tools and technologies used to design and implement the proposed model of decision support system. Following technologies have been used to design and implement the model.

- Operating system: Windows 7 Enterprise
- IDE: Microsoft Visual Studio 2008
- Server-side scripting language: ASP.NET with C#
- Back-end: SQLEXPRESS
- Other technologies: AForge.NET framework (Open Source)
- Hardware: Flat Bed Scanner – HP ScanJet 4670

The fourth chapter: **Proposed Model**, explains the model for decision support system for healthcare based on medical palmistry through digital image processing and analysis. The main objective of this model is to analyze the human palm automatically, i.e. without human interruption. This chapter explains briefly basic structure of the model and working of the model. To achieve the goal, the model is divided into modules like:

(i) Image Verification Module
Moreover, it also gives overview of each of above modules.

The fifth chapter: **Image Processing Techniques Used in the Model**, explains the image processing techniques used in the model. The techniques used are: automatic rotation of image, resizing of image, converting color image into black and white image, and comparison of images using template matching.

The sixth chapter: **Palm and Nail Color Analysis**, explains the algorithms to extract palm from background of image and to extract nails from rest of the palm. It also shows the code to implement these algorithms and discusses results. It also gives idea about the palm color analysis and nail color analysis performed by the model with corresponding results.

The seventh chapter: **Mount Extraction and Symbol Detection**, explains the extraction of mounts from the front side of left and right palm images and the detection of health indicator symbols on mounts, using template matching. It also gives brief about the result of the mount extraction and symbol detection models.

The eighth chapter: **Conclusion and Further scope**, concludes the research work done and gives brief about the model developed for decision support system for healthcare on the basis of medical palmistry through digital image processing and analysis with its features and limitations. It also discusses further scope of research in this area.