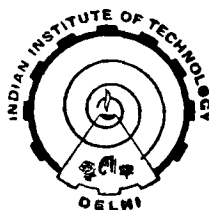


**MEMCONSULT : AN APPROACH TO USER-ORIENTED
COMPUTER-ASSISTED DECISION MAKING IN
MEDICINE FOR DIFFERENTIAL DIAGNOSIS AND TREATMENT**

By
Lieut. Colonel N. G. RAO
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Thesis submitted to the
INDIAN INSTITUTE OF TECHNOLOGY
for the award of the degree of
DOCTOR OF PHILOSOPHY



Centre for Biomedical Engineering
INDIAN INSTITUTE OF TECHNOLOGY NEW DELHI
1985

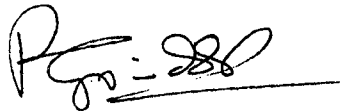
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The contents of this thesis have not been submitted in part or full to any other university or institute for the award of any degree or diploma.



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Dedicated to

My parents Dr (Late) N. Rama Rao and
Mrs (Late) Rajeswari

and

My organisation, ARMY MEDICAL CORPS

To parents go love, faith and honesty

To teachers go obedience and respects among many-a-thing

To colleagues go gratitude, loyalty and modesty

To parent organisation let go everything.

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ABSTRACT

Making an early and correct decision in diagnosis of a disease and a therapeutic schedule for it when faced with a case of not an ordinary and common nature has always been a challenging task to clinicians. Since the earliest introduction of computers in medical field, an intensive search is going on to find whether computers can be of some help in this type of situations. Many systems and programs have been developed based on different methodologies suiting some specific diseases and disease groups. Suitability for generalised application, user-orientation and user satisfaction have been lacking in many of these. The nature of the 'expert systems' in medicine and their purpose have been clearly defined by many research workers. Mimicking a human expert's thinking and mode of action has been identified as the major factor for earning users' acceptance and making a routinely usable system. The main aim of the computer-assisted clinical consultation has been accepted as imparting the clinical acumen and expertise of an experienced clinician of a consultant level to an inexperienced junior clinician to achieve the best possible health care delivery to the society.

Considering essentially, the conditions of Indian hospitals and their environment, the search for

a simpler expert consultation system with a semi-artificial intelligence approach and a minimum response time to obtain the consultation resulted in a user-oriented methodology named 'MEMCONSULT' meaning in short consultation of memory of past experiences on similar types of patients. In this method of decision making, the program consults a large number of actually occurred and treated past cases (both typical and atypical) stored in the memory in the form of a data base to find the nearness of an undiagnosed fresh case to one of the stored cases and thereby to come to a decision on the most likely diagnosis and a desirable therapeutic schedule. This process is similar to the action of a human clinician who consults his own memory on similar cases when faced with a problematic patient.

Many useful facilities have been incorporated to make 'MEMCONSULT' equivalent to an ideal expert system such as self reviewing and decision revising capability, detection and differentiation of atypical cases, a simple access to past cases of similar nature, as a step towards reasoning of the decision on the most likely diagnosis and accessing standard text book knowledge base to serve as a counter check for the accuracy of 'MEMCONSULT's decisions.

A most common and complex disease group, 'Anaemia' which has many differential diagnoses has been taken for evaluation of the presented methodology. The results are very encouraging.

The procedure and methodology of validation of clinical data also has been planned on the basis of qualitative requirements of users and also based on importance as a prerequisite for usage of the computerised clinical data for diagnostic and therapeutic decision making. A non-statistical approach aimed at multi-user satisfaction has been adopted for validation.

This research work is a step towards the development of a user-oriented computer-assisted medical expert system to have a quick consultation equivalent to an experienced clinician of consultant status and it can fulfil the existing needs of Indian hospitals.

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