Medical Advisor System

A Knowledge-Based System for Medical Advice provision

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Presentation Outline

- Introduction
- Project Statement
- Research Questions
- Related Work
- Proposed Solution
- Project Plan
- Conclusion

Introduction

Knowledge-Based System (KBS)

- Aim to develop a prototype knowledge-based system
- KBS - is an intelligent computer program which captures the knowledge of an human expert and uses the knowledge to solve a real-world problem
- Our focus medical advisor system

Medical Advisor System <MAS>

- A knowledge-based expert system
- Give medical advice
- Not a replacement of doctors
- Not for diagnosis
- Will consist of

1. The working memory
2. The knowledge base
3. Inference engine
4. Interface

Problem Statement

- Expert systems were very famous during 1970s and 1980s
- People stopped using them
- Lack of trust on technology
- Limited processing power
- Now, technology has advanced
- Computers become more compact and incredibly fast

Research questions

- Is it viable to make a usable, reliable, accessible and accurate medical knowledge based system for rural areas?
- Can a mobile platform efficiently run an expert system and interface in real time?
- How can we create an easy to be learn (or more user friendly) interface for people who have low computer literacy?
- Can an interface/expert system be made that rural users will trust?
- How can we make use of the technology available to improve medical expert systems?
- How can an effective medical expert system be built taking advantage of modern technology, to improve on existing techniques?

Research questions

Is it viable to implement a usable, reliable, accessible knowledge-based system for rural areas?

- One needs to consider:
  - Number of people with Android smartphones
  - Downloading the app (bandwidth)
  - Using speech recognition (bandwidth)

Research questions

How can we create an easy to learn system for people with low computer literacy?

- the system should be easy to use
- easy to learn
- The output of the system should be understandable, friendly and used naturally

Research questions

How can an effective medical advisor system be built to improve on existing approaches?

- Improve efficiency
- Processing power and time

Research questions

How can we make use of technology to implement an accurate medical advisor systems?

- the system should be able to present accurate output
- the system's output should be understandable

Outline

- Related Work
- Procedures and Methods
- Project Plan
- Conclusion

Related Work

- Few approaches has been implemented for medical expert system
- most of these approaches are limited to diagnosing of a single medical condition
- Many speech applications exist for phones. From simple search engines to conversational programs.

Related Work cont...

MYCIN

- medical diagnosis expert system
- designed to advice physicians on findings and diagnosis
- in the area of blood infections
- based on patient's medical data and symptoms
- recommend treatment
- is a prototype system
- other improvements were done on MYCIN, but most of them were concentrating on the limitations of MYCIN
- MYCIN's interface was not at all usable, and the user had to answer many "Yes" and "no" questions.
- most of MYCIN's outputs were for the programmers, for debugging and not for physicians. Certainly not for use from inexperienced users.

Related Work cont...

SOPHIE

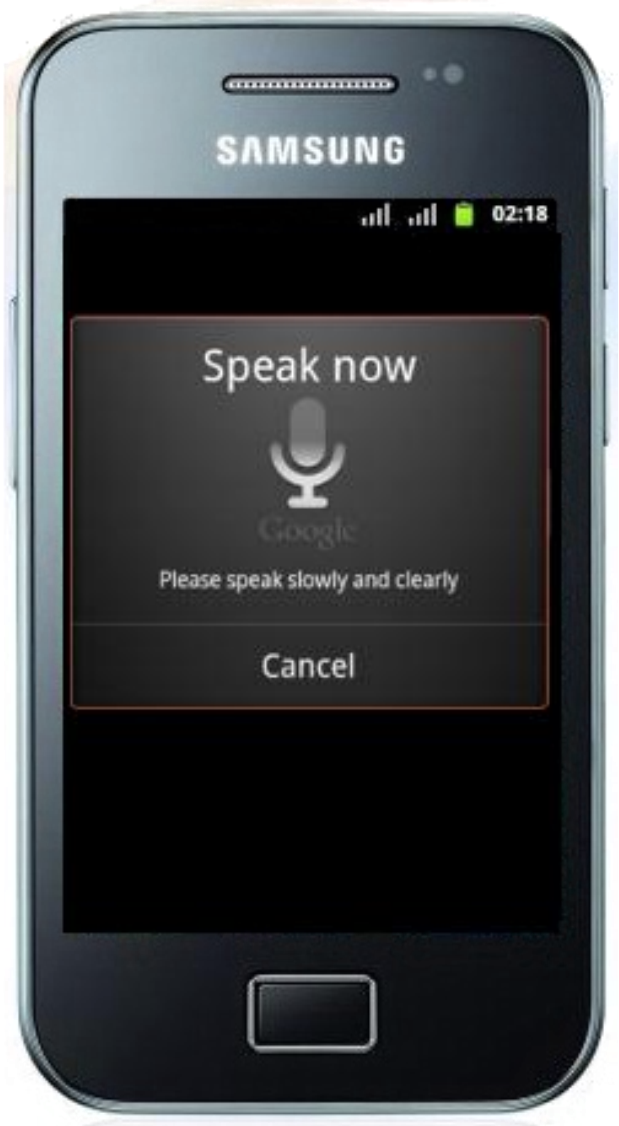
- An expert system dealing with electronic circuits.
- Used a natural language (text) interface
- Could accurately respond to 90% of requests
- Processed queries in ~150ms (on a server)

Related Work cont...

ChEM

- An expert system dealing with Chemical Emergencies
- Used a graphical "Hypermap" interface
- Exploited perceptual processing, which is an order of magnitude faster than text and speech
- Also exploited direct manipulation
- 40% of ChEM's functionality was easily mapped to a graphical interface

Proposed Solution



1. The User will describe the symptoms, though one of the interfaces

Google

speech will be processed by Google

1. The Expert System will process the data, and output a diagnosis.
2. The diagnosis will be presented to the user in a friendly way

Project Plan: Time line

Revised Proposal finalized	11 June 2012
Project Web Presence	12 June 2012
Initial Feasibility Demonstration	25-29 July 2012
Background/Theory Chapter	29 July 2012
Design Chapter	29 August 2012
First Implementation	29 August 2012
Final Prototype	19 September 2012
Final Implementation	**28 September 2012**
Complete Report Outline	03 October 2012
Complete Report outline	10 October 2012
Final Project Report Draft	24 October 2012
Project Report	31 October 2012
Poster	03 November 2012
Web Page Completion	07 November 2012
Project Demonstration	08 November 2012
Reflection Paper	11 November 2012
Final Project Presentation	18 November 2012
Final Project	**23 November 2012**

Project Plan: Risks

Risk	Probability	Impact	Mitigation (Plan)
Group member becomes unavailable	Low	This will results in missing milestones and delay project completion	The other member will try to complete the work
Equipments becomes unavailable	Low	This will delay project completion	Make appointment earlier
Data Loss	Medium		
Unable to reach the project milestones	Medium	This will delay the project completion and will affect the next tasks. The project might results in a failure	Have weekly meeting to keep track on how far we are, this is to make sure that everyone is aware of the deadline
Unable to get a professional physician or medical expert	Medium	This will results in inaccurate results	We will rely on the internet and published books and journals
Misdiagnosis-Legal	Medium	Low	Disclaimers will be placed in the program

Division of work

- **Kulani** will be working on the implementation of a prototype knowledge-based system that includes the text-based interface for the provision of a medical advice

- **Kevin** will work on the interfaces that will be built on of the knowledge based system, that will ensure that the knowledge base is usable by the target audience.

Conclusion

- Avoiding long trips to a far-away clinic.
- Receiving competent advice in cases where a doctor is not present but medical assistants are left in charge.
- Assisting a doctor in mining through large amounts of patient data which would not be practical to do manually.
- Allowing the expert to focus on more complex cases.
- Linking information pertaining to multiple patients in derive patterns.
- The expert system will regularly update its knowledge base with new discoveries that are published
- Humans are highly limited in how often they can update their knowledge.

Questions