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Multipurpose Intelligent Medical System Using Machine Learning Approach.

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Abstract:

For Storage, analysis and sharing about health issues, Health Information Technology (HIT) is used. Most of the healthcare providers rely on the Health Information Technology (HIT) to provide health related information about disease to public. Now-a-days patients need instant answers about health issues. So, Question answering forum is attracted by both health seekers and healthcare providers. When health seekers ask their question in their language. Expert provides answers using medical terminology. So, there is wide vocabulary gap prevailing between patients and provider. For example, "kidney failure" and "Renal failure" used by different experts to refer same disorders. In such cases patients don't understand the medical terms. So, to avoid this vocabulary gap between health seeker and health provider, this paper presents a system in which user will post their queries in free text format and then system will provide efficient answers to the health seeker.

Keywords:

- J.3 LIFE AND MEDICAL SCIENCES
 - Biology and genetics
 - Health
 - Medical information systems
- I.2.7 Natural Language Processing
 - Discourse
 - Language generation
 - Language models
 - Language parsing and understanding
 - Machine translation
 - Speech recognition and synthesis
 - Text analysis

Introduction

The field of study that focuses on the interactions between human language and computers is called Natural Language Processing, or NLP for short. It sits at the intersection of computer science, artificial intelligence, and computational linguistics. Natural Language Processing is a field that covers computer understanding and manipulation of human language. Machine learning explores the study and construction of algorithms that can learn from and make predictions on data. Machine learning is closely related to computers. Many of the healthcare providers rely on the Health Information Technology (HIT) to provide health information about disease to public. One of the advancement of HIT is EHR used to store patient health information for long time in a digital format. Electronic Health Record (EHR) contains

healthinformation about health seekers medical condition, laboratory test reports, patient history, treatment description-rays and scan report which is securely shared among other department like laboratories, pharmacies, specialists.

Problem Definition:

When patient consults a doctor, sometimes they don't know the meaning of medical term. This leads to vocabulary gap between health seeker and health care provider. To avoid this, we have presented a system in which patient will submit his query and the health provider will return efficient answer.

Objectives

- 1- To simplify the medical terminologies for better understanding of an end user.
- 2- To reduce communication gap between healthcare system and users with no expertise in medical field.
- 3- We present techniques capable of extracting semantic locations from GPS data. We capture the relationships between locations and users with a graph

System Architecture

This system is multi-purpose system. Our intelligent system has been divided into three modules. System provides functionality to contact the ambulance near your location. Also, the system provides meaning of medical terms by referring dataset. Last module of the system is for prediction of disease based on the symptoms.

1. Find meaning of medical term:

User will have to enter medical term. System will look out that term into dataset. If found then system will fetch its meaning available in dataset. And that meaning will be displayed as output of this module.

2. Prediction of disease:

For prediction we have provided 20 questions to the user related to their health and any other symptoms. User will answer those questions in yes or no. Then by using naïve bayes algorithm and arff files the system will predict the disease. Also, system will provide recommendation of medicines for that disease and do's and don'ts of that disease.

3. Emergency contacts:

User will select his/her location. Based on this location system will fetch the ambulance details available in that area.

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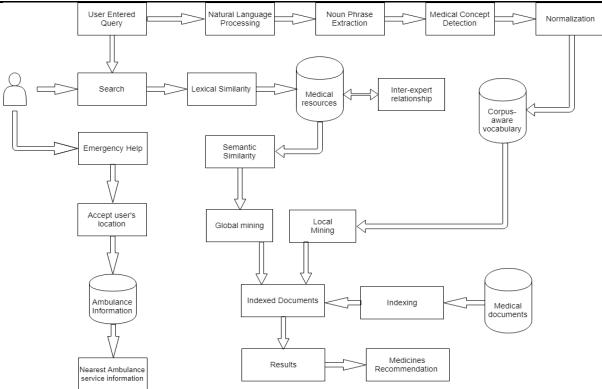


Fig 1: System Overview

Related Works

Author	Paper Title	Description	Limitation
Arshdeep Bahga,	A Cloud-based	This paper prop <mark>oses</mark> an	Devel <mark>opment of</mark> a
and Vijay	Approach for	EHR system - Cloud	cloud-based
K. Madisetti,	Interoperable	Health Information	
Fellow	EHRs	Systems	Information
		Technology Architecture	Integration and
		(CHISTAR), that	Informatics (III)
		achieves semantic	framework for
			healthcare applicat
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		which uses a reference model that defines a general-purpose set of data structures and	allow development of smart and connected healthca re applications backe d by massive scale healthcare data integrated from heterogeneou s and distributed health- care systems within a scalable cloud

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H. Khanna	Optimiz <mark>ation</mark>	extracted with data	is still a broad area
Nehemiah A.	Approac <mark>h for</mark>	minin <mark>g tools</mark> and	of research. The
Kannan	Clinical	techniques are optimized	optimizer can be
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	Knowledge	heuristic approaches in	tested over many
	Mining	order to improve the	real world and
		quality of	synthetic datasets
			in order to gain a
		the rule bases. In this	better perspective
		work, a meta-heuristic	to
		approach called Wind-	design and develop
		driven Swarm	efficient Rule-
		Optimization (WSO) is	based Clinical
		used. The uniqueness of	Decision Support
		this work lies in the	Systems.
		biological inspiration	
		that underlies the	
		algorithm.	
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and Mitsuru	Based	exist between two given	
Ishizuka	Approach to	words, we propose	sentence, second, a
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		showing a high	input, deep
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	Knowledge	paper presents a novel	aware
		scheme to code the	
		medical records by	ontology by
		jointly utilizing local	leveraging the
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Limitation of Study:

In this paper we have used dataset to find the meaning of medical term. If user will enter term that is not available in dataset then system won't be able to fetch the meaning of the term.

Design of the Study

- Input: Medical Term, User Location, Symptoms, Historical Report.
- Output: Meaning of medical term, Ambulance details according to users location, disease prediction and medicine recommendation.
- Classifier: Naïve Bayes.
- Natural Language Processing techniques.

Tools Used

- Software Requirement:
 - Operating System : windows 8 and above.

0	Application Server	: Tomcat5.0/6.X
0	Language	: Java
0	Front End	: HTML, JSP
0	Database	: MySQL

• Hardware Requirement:

0	Processor	- Pentium –III
0	RAM	- 1 GB (min)
0	Hard Disk	- 20 GB

Statistical Technique Used

We have developed Login and Registration which manages the user profiles, so that the users can post the Medical term and get its meaning. Database stores the information of all users, doctors, reports, also ambulance details are stored in the database.

Algorithm

This paper use Naïve Bayes algorithmsfor prediction we have provided 20 questions to the user related to their health and any other symptoms. User will answer those questions in yes or no. Then by using Naïve Bayes algorithm and ARFF files the system will predict the disease. Also, system will provide recommendation of medicines for that disease and do's and don'ts of that disease.

Our Approach:

This system is multi-purpose system. Our intelligent system has been divided into three modules. System provides functionality to contact the ambulance near your location. Also, the system provides meaning of medical terms by referring dataset. Last module of the system is for prediction of disease based on the symptoms.

1. Find meaning of medical term:

User will have to enter medical term. System will look out that term into dataset. If found then system will fetch its meaning available in dataset. And that meaning will be displayed as output of this module.

2. Prediction of disease:

For prediction we have provided 20 questions to the user related to their health and any other symptoms. User will answer those questions in yes or no. Then by using Naïve Bayes algorithm and ARFF files the system will predict the disease. Also, system will provide recommendation of medicines for that disease and do's and don'ts of that disease.

3. Emergency contacts:

User will select his/her location. Based on this location system will fetch the ambulance details available in that area.

Experiment Result:

This system will return meaning of medical terms, ambulance details of users location, prediction of disease, medicine recommendation of predicted disease, do's and don'ts for predicted disease.

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Future scope:

This project is used for non-expert user. it is difficult to understand the meaning of medical terminologies. So, we proposed a system to minimize the communication gap between health seeker and health provider. Effective answers will be provided to the queries raised by user. In future, we are trying to develop the process by uploading images and videos.

Acknowledgment: (optional)

Conclusion:

The system provides way to overcome communication gap between healthcare provider and heath seeker. The efficient answers will be provided to user by using machine learning approach. System provides results with accuracy around 90% as the question is passes to classifier, Naive Bayes.

Reference:

• A Web Search Engine-Based Approach to Measure Semantic Similarity between Words.

http://ieeexplore.ieee.org/document/5582093/

Automatic Code Assignment to Medical Text
 <u>http://portal.acm.org.sci-hub.cc/citation.cfm?doid=1572392.1572416</u>

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Bridging the Vocabulary Gap between Health Seekers and Healthcare Knowledge

http://ieeexplore.ieee.org/document/6843980/

• Discover the Expert: Context-Adaptive Expert Selection for Medical Diagnosis http://medianetlab.ee.ucla.edu/papers/Tekin_TETC2015.pdf

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