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E-Health Navigator: A Tool for Selection of Desired Health Care Services

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Abstract—*Health Care services have evolved in the recent years. Digitalization and globalization are the key factors in this transformation. Modern day IT infrastructure equips the health sector to provide better services. Doctors are empowered with technology to provide diagnosis to a patient residing in the other part of the world. During crisis, people often find it difficult to select the best desired health care service providers and health care personnel, wasting their precious time. In this research paper, an innovative tool named E- Health Navigator has been proposed. E-Health Navigator is an effective tool that helps any user to identify the best health care service. E-Health Navigator could easily shortlist health care service providers and health care personnel based on user's preference.*

1. INTRODUCTION

Digitalization and globalization are the key factors in the revolution of health care industry. India is not deprived of modern health care transformation. People are no longer constrained to particular health care service provider.

Users are often uncertain about the health care services they should opt. The factors that user considers for selecting a health care are cost, location, reputation (health care provider, health care personnel), availability of the particular resources, health care personnel, post treatment follow-ups, etc.

The needs of the user are not met by the existing tools. Often the results are out dated. Generic tools just fetch the location of hospital. There is a need for a tool which enables a common man to avail the best health care services. Factors such as cost, location, service quality, reputation, insurance are used by the proposed tool to produce the list of best health service provider.

The tool proposed would help a common man to identify the best health care service. In case of emergency, the tool would be vital in identifying the suitable health care service provider. The tool could help government agency to regulate health care services. Law enforcement agency could pin point locations where health care hubs are present.

There is provision in the proposed tool for users to provide their valuable insight, ratings which would help improvise its efficiency in the future. Based on the patients feed backs, the tool identifies the best health provider. Tools could also enable users to fix appointments with desired health service provider.

1.1 Terminology

End Users: An End User is a person who ultimately uses or is intended to ultimately use this tool. There are two kinds of end users. Unregistered users could use the basic facility of the tool. Registered End Users are privileged users having permission to signin into the system.

Health Care Personnel (HCP): HCP are certified medical practitioner (Doctor / Physician /Surgeon). HCP could be affiliated with one or many health care service provider(HSCP).

Health Care Administrator(HCA): HCA is in-charge of the Health Care Service Provider. The HCA may be owner / manager of the HCSP. He should be the authorized person that updates the facilities in the HSCP, maintain the list of HCP along with their availability.

Administrator. Administrator is a person responsible for maintaining the tool.

1.2 Parameters overview

Parameters are decision variables that enable end-users to identify the best service provider. These parameters are processed along with users input leading the user to select better service among many other services. Following parameters have been identified based on thorough literature survey.

HCSP Location. Location information is often required to spot the health care service. There may also arise the need of land marks to help the end users to correctly identify the location of HCSP. Information such as Door no, Street, City/Village, District, State, Pincode. GPS position of the HCSP would enable a person to correctly identify the location using location aware devices like smart phone.

HCSP Contact details: The details of the hospital to contact during emergency and during normal situation. Contact details include phone numbers, Fax, Email and website.

Type of HCSP: The HCSP service may differ in terms of government and private health care centres. Also HCSP could be a generic hospital or speciality based health care centres. Speciality oriented HCSP could give better service than its generalised HCSP.

HCSP's Facility: The facility includes the various sophisticated equipments needed for the treatment, the labs, type of beds etc.

Insurance Coverage: Whether the Health Service Providers have tie-ups with major insurance company provides comprehensive coverage.

Accreditation: HCSP having accreditation implies the HCSP follows the prescribed benchmark standards. Accreditation guarantees better service.

Medical Experience: The HSP who has vast amount of experience would be in a position to diagnosis the problem and provide relevant treatment. The HCSP which has long years of service, would be adequately equipped with all the facilities required to diagnosis and treat the patient.

Availability: It denotes the availability of HCSP and HCP for treatment. End-users may not know the availability of the HCP, Lab. The availability timings, if known, the benefactors could schedule their appointments

Waiting Time: This denotes the average waiting time of the end-user in HCSP. Certain HCP would be taking in only appointments. However, this guarantees whether the relevant services can be provided in the users required time frame.

Cost: People are often constrained financially. The one major factor of HCSP over the other HCSP would be cost. End-users prefer to analyse the cost involved for advice, diagnosis, treatment, post treatment charges, service charges.

Success Rate: The success rate denotes the rate of success of treatment over the patient.

Confidentiality: Confidentiality is a major priority for many users. This denotes how well your identity is masked and protected in the HCSP.

Continuity of Care: Many HCSP continue to monitor the patients even after discharge. The continuity of care helps patients to recover faster. This denotes whether the patient prefers continuity of care from the service provider.

The remaining paper of this paper is organized as follows. Section 2 discusses the current tools/ method available to find the desired health care service. The proposed tool is presented in section 3. Section 4 shows the implementation of the system. Finally the paper is concluded with future scope in section 6.

2. RELATED WORK

Online Registration System (ORS)[1] is a Digital India initiative by Government of India. Online Registration System (ORS) is a framework to link various hospitals across the country for Aadhaar based online registration and appointment system, where counter based OPD registration and appointment system through Hospital Management Information System (HMIS) has been digitalized. Every Patient who registers would get new Unique Health Identification(UHID) Number. Based on this appointments could be made. Though the system is simple to use and using aadhar interface it falls short of ranking the HCSP and HCP. Thus people are limited to fixed options.

Medindia[2] is a leading online provider of health information and services to consumers, physicians, healthcare professionals and corporations globally through our websites, applications and product offerings. Premium Members would be offered addition services like personal health record page.

HospitalKhoj[3] is yet another tool which let us know the hospitals from a place. It gives detailed information about HCSP, HCP. It has provision of updating its database based on users request via email.

Health India TPA[4] is a third party administrator for health care services. They coordinate among hospitals with respect to treatment and also pass the bills on behalf of the insurance companies.

Table 2.1: Health Care Service Selection Tools

Searching Tools	Ranking	Location	Schedules	Fixing Appointment	Facility Details	Insurance Details	Rating			Review
							HCSP	HCP	Post Treatment Follow-ups	
ORS[1]	✓	×	✓	✓	×	×	×	×	×	×
Medindia[2]	×	×	✓	×	✓	×	✓	×	×	×
Hospitalkhoj[3]	×	×	×	×	✓	×	✓	×	×	✓
Health India TPA[4]	×	×	×	×	×	✓	×	×	×	×
JustDial [5]	×	×	×	×	×	×	✓	×	×	✓
Google[6]	✓	✓	×	×	✓	×	×	×	×	✓

JustDial[5] is a local search engine that provides comprehensive updated information on all business products and services. It lists all the local hospital details to pertaining area.

Google Search Engine[6] is multipurpose search engine. Health care providers indexed in the web would be ranked and provided by the tool.

Table 2.1. gives a brief overview of existing health care selection tools. Each tool is equipped with certain positives and few drawbacks. Location is the way to dynamically suggest HCSP using the current place of the end user. The proposed tool which is need of the hour would comprise all the factors listed in the table.

3. E-HEALTH NAVIGATOR

E-Health Navigator is an interactive web tool. Users having internet enabled device could utilize this tool. The tool would utilize the end-user's search preference to offer better service than existing search tools.

3.1 E-Health Navigator Framework

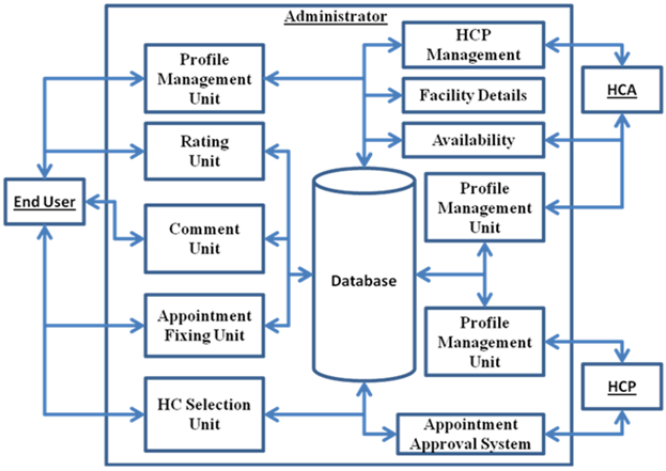

Fig. 3.1: E-Health Navigator Overall Framework.

Fig. 3.1 explain the overall framework of the E-Health Navigator. Each block signifies the operation modules that could be carried out by the specific user.

Profile Management Unit: A Registered User uses profile management unit to update their personal details and preferences. The entire registered user is eligible to use this unit.

Rating Unit: A registered end-user could provide rating to the service provider and the personnel based on their performance. Rating Unit records all these changes into the database.

Comment Unit: A user could post comments based on the service obtained using comment unit. Peer interaction of the end–user's using comment unit would resolve all the doubts inhibited by the user. All the comments are subjected to moderation by the administrator.

Appointment Fixing Unit: A registered end-user could fix an appointment with the desired health care personnel in the desired health care service provider using this tool. The appointment request is initiated by the end-user based on the health care personnel's availability. The initial appointment request is validated and the request is forwarded to health care personnel for approval. In the scenario of health care personnel approving the appointment, the appointment is committed to the database and an acknowledgement is given to the end-user seeking the appointment. And if the health care personnel decline's the appointment request, a notification stating the declining reason is dispatched to the appointment seeking end-user. (Fig 3.2)

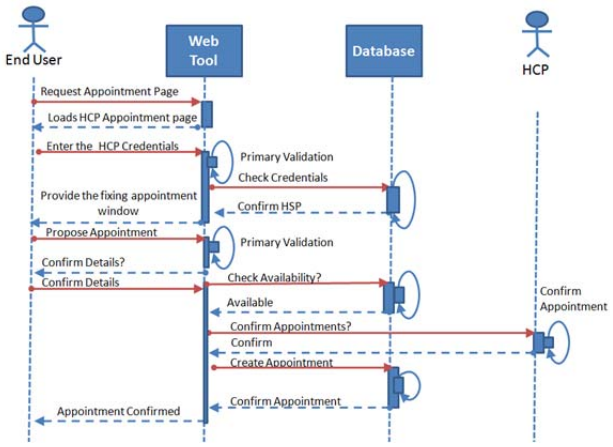

Fig. 3.2: End-user fixing appointment.

When an unforeseen circumstance arises the end-user may want to cancel the committed appointment. Cancelling appointment on time would render other needy end-users to fix new appointment. This tool enables an end-user to cancel prefixed appointment based on valid reasons. The validated request is processed and is notified to concerned health care personnel and cancelation is made to reflect in the database. (Fig.3.3)

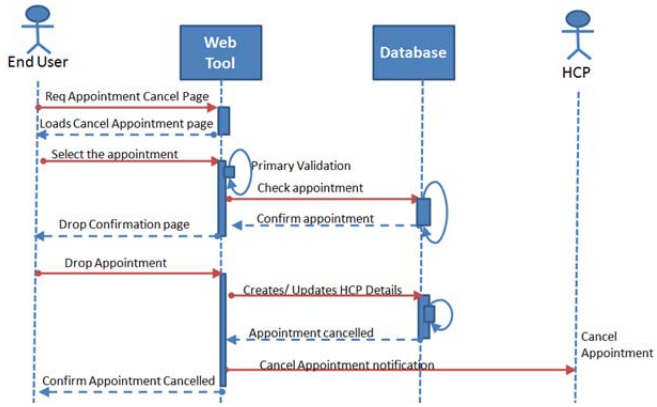

Fig. 3.3: End-user cancelling appointment.

HC Selection Unit: Selection of desired health care services using E- Health Navigator has three stages. They are user preference, searching and ranking.

Step 1. User Preference: The end user may have multiple factors in mind to decide the health providers. The end-user is given an opportunity to set priorities in selection. A normalised priority is set automatically to all criteria's, if the end user fails to give any specific priority. Figure 3.4 explains how the user preference is obtained and updated in the database.

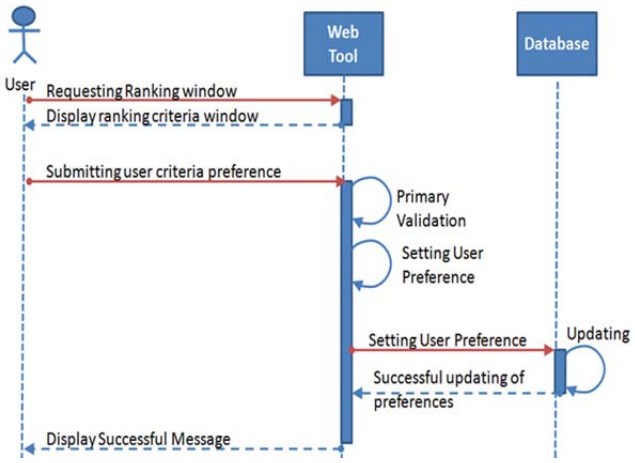

Fig. 3.4: Setting up end user's search preference

Step 2. Searching: As the end-user starts typing the key word for searching in the text box, the tool enables auto-suggest and auto -correct mechanisms to help the user to furnish the key word. Then the tool guides the end-user to select the appropriate genera of the keyword. After the selection of the genera and primary validation, health care facilitates relating to key word is fetched from the database for further processing. Figure 3.5 explains the scenario of over-all process of searching.

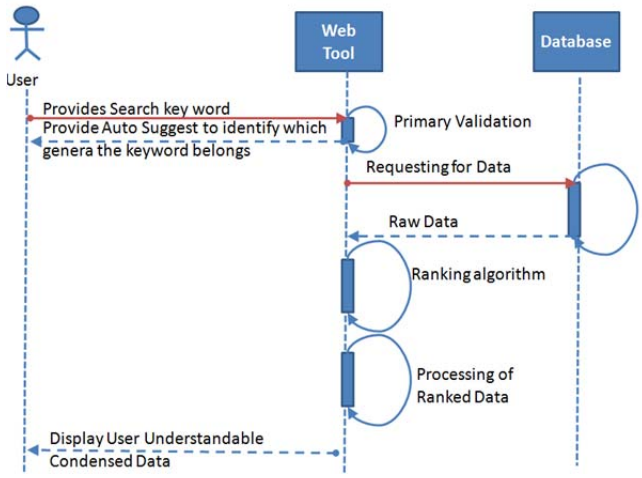

Fig. 3.5

Step 3. Ranking: The ranking mechanism based on end- user preferences is employed over the list of resultant health care service providers obtained from the previous search step. The final ranked list is furnished to the end-user.

HCP Management Unit: A registered Health Care Administrator uses HCP Management Unit to register all the health care personnel affiliated with the health care service provider. It is also used to remove the health care personnel affiliation with the health care service provider.

HCP Facility Details Unit: A registered Health Care Administrator could enlist new facility, update changes in the facility and remove existing facility provided by the health care service provider.

Availability Unit: Health Care Administrator could update the availability of the health care personnel in the health care service provider from time to time.

4. E- HEALTH NAVIGATOR- IMPLEMENTATION

The proposed framework is implemented using PHP as front end on Apache Server with MYSQL server as backend.

Following is the scenario of an end-user having a history of cardio-vascular disease enquiring the best health care service.

The end-user provides his specific preferences in table 4.1

Table 4.1

End-User Preferences	
HCSP Location	Coimbatore
Cost	Minimum
Type of HCSP	Govt / Private
Facilities	Highest
Insurance	LIC
Medical Experience	Maximum
Reputation	Maximum
Availability	11-11-2015, 7:30 pm onwards
Waiting Time	Minimum
Success Rate	Maximum
Confidentiality	Yes

After user preferences are set, the end- user is redirected to search page. Figure 4.1 shows the user providing cardio as a keyword. The tool then provides an automatic drop down menu, suggesting the user to search the key word either in hospitals or doctor or locations.

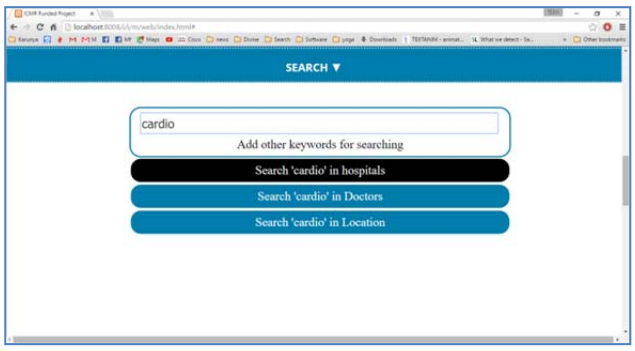

Fig. 4.1

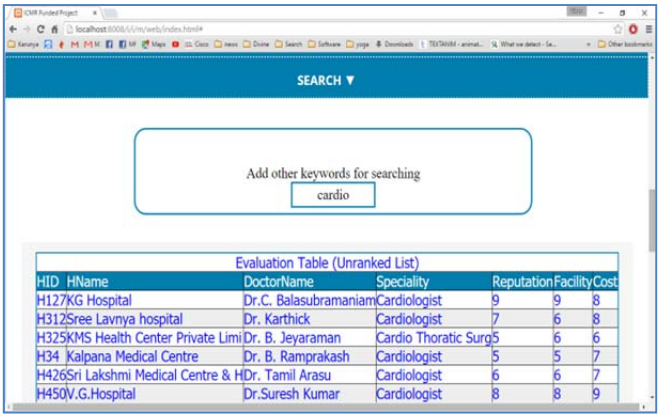

Fig. 4.2

Based on the selection from the drop down menu, a list of health care service provider is generated (Fig.4.2)

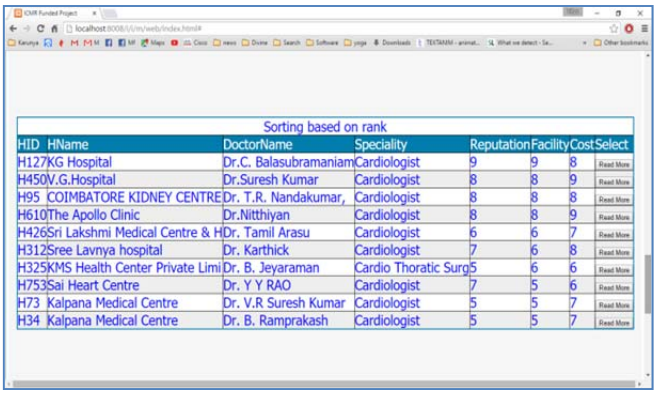

Fig. 4.3

The list generated by the previous step is ranked based on end-user's preferences. Figure.4.3 displays the ranked list of the health care service provider and the end-user can select the first ranked health care service provider for treatment.

5. CONCLUSION

E-Health Navigator is a novel solution used to select the desired health care services. The implemented tool outperforms other tools in term of finding best the desired health care service based on user preferences. Future direction of E-Health Navigator would be designing a mechanism to encounter false feedback given by malicious end-users.

6. ACKNOWLEDGEMENTS

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