**An adaptive doctor-recommender system**

Published year : 2019

Link to the paper : <https://www.tandfonline.com/doi/full/10.1080/0144929X.2019.1625441>

Author : **Muhammad Waqar, Nadeem Majeed, Hassan Dawood, Ali Daud & Naif Radi Aljohani**

**Summary :**

In this article, a hybrid doctor-recommender system is proposed, by combining different recommendation approaches: content base, collaborative and demographic filtering to effectively tackle the issue of doctor recommendation. The proposed system addresses the issue of personalization through analysing patient’s interest towards selecting a doctor. It uses a novel adoptive algorithm to construct a doctor’s ranking function. Moreover, this ranking function is used to translate patients’ criteria for selecting a doctor into a numerical base rating, which will eventually be used in the recommendation of doctors.

**Main Contribution of the Research** :

* The features of a doctor, which influence patients, are identified through a survey.
* It proposes an algorithm to construct a ranking function from the identified attributes using analytical hierarchical processing. This helps patients to identify and locate a doctor who meets their requirements, which is unprecedented, to the best of knowledge.
* Propose algorithm constructs a hierarchical structure to assign weights to above-identified attributes.
* An effective hybrid recommender system is con- structed by combining different machine-learning techniques, i.e., content, collaborative and demo- graphic filtering. This system will use our proposed doctor ranking function to evaluate a doctor.
* The performance of our proposed model is analysed by comprehensive experiments, with baseline and proposed features.

**Recommender Systems** :

1. In healthcare
   1. Patient-based recommender systems
      1. Finding patients similar to patient X.
      2. Recommending treatment based on patient symptoms.
      3. Recommending medical tests based on symptoms – makes use of Random forest + sequential minimal optimisation.
      4. Using patient’s emotions to design recommender system.
   2. Experts recommender systems in the healthcare domain.
      1. Time sharing mechanism to reserve doctors for patients – ie effective appointment scheduling.
      2. Recommending disease using multiple tree classification models.
      3. Recommending diet to the patient.
      4. Prevention of heart disease using patient history + family history.
   3. Existing doctor recommender systems “
      1. Recommender systems that used the semantic relationship between patient’s symptoms + his/her treatment -> finds similar patients and recommends doctors who are rated highly by them.
      2. Recommender systems based on the key / influential personalities.

**Proposed Methodology** :

1. **Analytical Hierarchy Model** :
   1. helps in decision making
   2. AHP assists in evaluating both subjective and objective parts of a decision-making process.
   3. First, by understanding the patient’s criteria of choosing a particular doctor, some important attributes of doctor are identified using a survey that was conducted through questionnaires
   4. These features were assigned weights , where higher weights indicates more importance, combining all weights we get a final score.
2. **Dataset features :**

Graphical user interface, application

Description automatically generated with medium confidence

1. **Weights assigned :**

Application

Description automatically generated with low confidence

1. **Proposed system is a web app implemented in php/mysql.**
   1. It consists of a doctor module and a patient module.
   2. The overall system workflow is that doctors register themselves on the system and update the information on their specialty, experience, location, and average check-up fee.
   3. Patients register themselves on the system and upload information such as their location, age, disease, severity, and average expenditure limit.
   4. The patients rate doctors on the basis of their experience of a particular doctor.
   5. The proposed novel adoptive algorithm generates a doctor ranking function using AHP.
   6. A weighted average is used to develop the overall rat- ing of a doctor
2. **Flowchart :**

Diagram

Description automatically generated

1. **Proposed Algorithm :**

A picture containing text

Description automatically generated

1. **Proposed system home page :**

A picture containing text, person, screenshot

Description automatically generated

Graphical user interface, application

Description automatically generated

1. **Improvements made :** Made use of trimmed mean. The trimmed mean has also been used as way to improve system reliability. It is an efficient way to improve the accuracy of ratings by removing a certain percentage of the smallest and largest values before calculating an overall rating.
2. **Evaluation** : Precision , Recall , F-Score

Chart, bar chart

Description automatically generated