SEPHYRES 2: A SYMPTOM CHECKER BASED ON SEMANTIC PSEUDO-FUZZY DIAGNOSTIC MODEL

Ali Sanaeifar[1], MahmoodTara[2], Mitra Ahadi[3,] Ali Bahari[4], Ahmad Faraahi[5]

1: Payam-e-Noor University of Tehran (PNU), Tehran, Iran.
2: Department of Medical Informatics, School of Medicine, Mashhad University of Medical Science, Mashhad, Iran.
3: Endoscopic & Minimally Invasive Surgery Research Center, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Science, Mashhad, Iran.
4: Endoscopic & Minimally Invasive Surgery Research Center, Faculty of Medicine, Mashhad University of Medical Science, Mashhad, Iran.
5: Department of Computer Engineering and Information Technology, Payam-e-Noor University of Tehran (PNU), Tehran, PO.BOX 19395-3697, Iran.

Correspondence:
Tel: +989128093509, Fax: +985138941103, E-mail:AliSanaeifar@yahoo.com

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ABSTRACT

Introduction: The symptom checkers were designed to help patients and health professionals. In SEPHYRES 1 symptom checker, a new viewpoint of medical ontology and two reasoning strategies were developed based on pain-only descriptors and weight spreading. The main objective of the SEPHYRES 2 was to investigate a more comprehensive diagnostic model than the old version, which tackled complex relations among signs and symptoms to help novice general practitioners.

Methods: For the SEPHYRES 2 to be more comprehensive, besides the pain-only symptom in SEPHYRES 1, other signs and symptoms of diseases related to abdominal pain were extracted from evidence-based medical literature and inserted into the ontology. Additionally, considering semantic techniques and weighting methods, the engine could be able enough to match similar terms, terms with the variant generality level, composed terms, terms including several other terms, and so on. The reasoning mechanism was performed based on not only semantic inference guidelines but also medical diagnostic principles. Like SEPHYRES 1, the evaluation of SEPHYRES 2 was done on 20 test cases as sample size that extracted randomly from MEDSCAPE and PubMed. Thus, both system-oriented measures and Wilcoxon signed-rank test were calculated. Obviously, the comparison test was done against Patient.info powered by Isabel engine power.

Results: After performing system-oriented evaluation, precision, and recall, the accuracy level was achieved about 90% in 10 results as differential diagnoses, which improved the SEPHYRES 1 engine power about 15%. Also, the Wilcoxon signed-ranked test in SPSS, with a significance level of 0.05 and confidence level of 0.95, indicated that the difference between SEPHYRES 2 and Isabel engine power was significant (p=0.015)

Conclusion: In this study, the semantic opportunities and weighting methods were integrated with which a semantic pseudo-fuzzy medical diagnostic model was achieved. Even though being pseudo-fuzzy had not the fuzzy-enabled system complexities, it had been implemented as no sensitivity to only special terms. This enhanced the matching process among disease profiles described in medical literature and patient's medical histories. Another finding would be the simple, textual, and flexible user interface, in spite of many complex relations in the internal diagnostic engine, which make it possible to embed into each assisted device, even those with low capabilities.

KEYWORDS: Computer assisted diagnosis, Clinical decision support, knowledge modeling, Computer assisted decision making

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