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Providing Security to Health Care Systems based on CRISP-DM

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Abstract **–**All the health data are considered to be the personal private data and those data should need security. Like confidentiality, integrity, authority should be preserved in the case of medical data. Nowadays, there is no framework for health supporting the data modeling design, i.e. the existing models are generic and therefore are not suitable to support personalized systems and they do not consider the quality of clinical and personal data, required in health care. Based on the CRISP-DM methodology, a framework is proposed to design a data model for personalized health systems. This framework ensures the security of personal and clinical data to relate it with health standards, particularly with the Personal Health (PHR) ISO/TR 14292 standard, which addresses the recommendations of the parameters that must be within a personalized health system. To perform accurate recommendations it is important to make a data mining process, data mining is the process of analyzing the data from different perspective and summarizing it into useful information.

Keywords:*Data Model, Personalized Health System, Data Mining,PHR*

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I. INTRODUCTION

The ICT (Information and Communication technologies) seeks to promote healthy habits and lifestyles influencing in a positive way on the health of people, so are decreases the risk factors affecting the health of people. The large amount of data that is stored on the cloud related to ICT interventions and its users become a problematic issue, since it is important to discover through data mining, some useful, unexpected and understandable models and data patterns, to provide knowledge which will be used in order to the user.

For this reason it is consider necessary to count with personalized systems to promote healthy habits and lifestyles based on a user model capable of collecting, managing and relation the personal information of each user in order to know the key aspects of that person and make a proper pre-processing of data, generated by the user according to the data model(its conceptual level);besides the user model must be according to the personal health record standard, since it is necessary to manage the clinical information of a person.

Having in mind the previous considerations, this paper describes a frame work for data model of health, where the user model used to generate the data model (conceptual) is in accordance with the ISO/TR 14292 standard is implemented in a personalized system through data mining technique, all of this based in the CRISP-DM methodology for the pre-processing of information to support the promotion of healthy habits and lifestyles.

When large amount of data is handled, it is important to obtain the desired compatibility between such data to perform activities of access and storage of information data models are a tool that helps to determine the structure of the information, in order to improve the communication and accuracy in applications that use and exchange data with each other for a common purpose. Nowadays, there is no framework for health supporting the data modeling design, i.e. the existing models are generic and therefore are not suitable to support personalized systems and they do not consider the quality of clinical and personal data required in health care.

II. LITERATURE SURVEY

From a literature review are listed the following papers: highlights the state of art of translational bioinformatics to design supported decisions and case-based reasoning systems and presents the design of a tele-health system which is capable of combining text mining. Search literature and case-based retrieval. On other side are the web based syste.ms connected with an EMR. presents a methodology for ontology engineering to generate case base in the medical domain using a based case reasoning system for a case study of diabetes diagnosis and finally [8] that shows a platform with an agent-based three-layer architecture supported on a multi-agent system for home care.

[9] and [10] where the first one describes a personalized system using advanced information algorithms, text and data mining and other computational techniques to support health decisions for patients and the second one presents an approach to medical knowledge recommendations based on collaboration.

Tn [11] an algorit.hm for classifying personal health records is introduced and it is designed a personalized search engine matching PHR systems to search the web **user** so he/she can get answers really relevant for him/her and his/her health status. It is important to highlight time work done by Meyer in [12], since this work comprises concepts covered in this

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article: presents a personalized system based on a user model that is eHealth oriented to a standard of PHR to promote healthy habits and lifestyles. However, it differs in the way the information is obtained to create the user model, because it comes from his/her context and not from the inherent characteristics from his/her personality, where a data analysis technique is used to inter such contextual characteristics.

III. PROBLEM STATEMENT

Communication and accuracy in applications that use and exchange data with each other for a common purpose. Nowadays, there is no framework for health supporting the data modeling design, i.e. the existing models are generic and therefore are not suitable to support personalized systems and they do not consider the quality of clinical and personal data required in health care.

IV. METHODOLOGY

For the development of this article, the Engineering Research Methodology was used. Following this methodology through its stages:

- It is obtained a conceptual basis through a Literature review.
- The Delphi methodology is used for the selection of items from the user model based on the recommendations of the ISO/TR 14292 standard to design the data model.
- For system development, the user-centered design (IJCD) methodologyis used, and the CRISP-DM methodology describes the data mining tasks. In order to distribute the information management and concretize appropriate data miningmodels to the context this project.
- To make the evaluation, the DESMET methodology is used to ensure the quality of the development system.
- At last, it is important to conclude, socialize and present the obtained results. Model level from the proposed framework is created using these two phases.

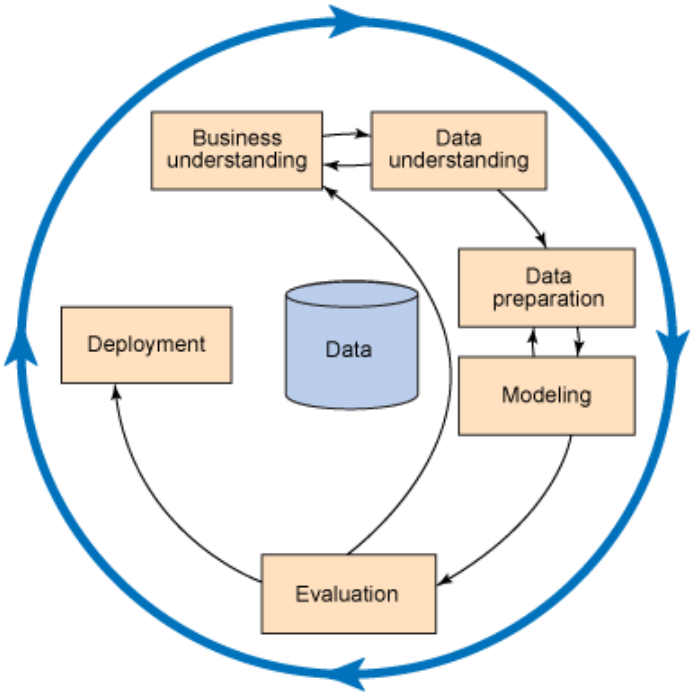

Fig.1:CRISP-DM Methodology

V. FRAMEWORK DESCRIPTION

Fig.2: Data model levels

1. **Conceptual data model**

Describes the semantic of a domain, being the scope of the model. A conceptual schema specifies the types of facts or propositions that can be expressed using the model.

2**. Logical data model**

Describes the data in as much detailed as possible, without regard to how they will be physical implanted in the data base.

3. **Physical data model**

Describes the physical means by which data are stored. Table specifies the characteristics of each attribute that is considered for a physical activity recommendation. It is important to prepare the information according to the tool that is going to be used to create a mining model.

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VI. RESULTS

VII. CONCLUSION

The salient contributions to the development of this work are:

The CRISP-DM methodology suggests that prior treatment of information that can be analyzed is vital to the expected results quality when applying any data mining technique.

The inference relationships obtained front the user model elements which are covered by the logical data model allows tile system leans tile user personality inherent characteristics in a more efficiently way so the personalization process could be more accurate and appropriate.

The proposed components architecture resulting from the framework application is generic and flexible to be implemented in any personalized system in health promotion.

Through tile test with Weka. Tile relations of tile data model inference are evaluated verifying tile validity of the framework for a personalized system. So the efficiency and satisfaction of the given recommendation are guaranteed.

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