

Design and Develop a Web-application for Providing Pharmaceutical Product Leaflets Information

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ABSTRACT

Information on pharmaceuticals is beneficial for patients, most patients like to read patient information leaflets for their pharmaceuticals. Nevertheless, the quality of the information written on pharmaceuticals gives space for improvement. To improve the inadequacies of patient information leaflets, an alternate approach for the provision of information on pharmaceuticals will be illustrated. This work aims to design and develop a web application that will provide pharmaceutical product leaflets information as well as the proposed web application will provide supplementary services. The proposed work was designed and developed using the Unified Modeling Language (UML), SQL, XML, and ASP.Net programming languages.

Keywords : Web application, patient information leaflet, pharmaceutical, and Unified Modeling Language (UML).

I. INTRODUCTION

Recently, people are increasingly becoming conscious about their health and seek knowledge about the received medicines from the pharmacists. Due to the large load of patients, doctors often provide limited information for the patients about their disease and usage of medication. Most patients may not be able to save the verbal information provided by the doctors for much time. Printed information is valuable during these conditions to retain information related to medication usage [1, 2]. Print materials can carry the basic information concerning the disease or medication and permitting the health care professional to pay attention and concentrate on the treatment and diagnosis process [1, 2].

Providing medical information for the patients results in positive health impact and most patients are

motivated to read patient information leaflets for their pharmaceuticals. In Saudi Arabia providing patient information, leaflets are obligatory with every pharmaceutical supply [3-10].

Nevertheless, written information on pharmaceuticals is often need to be improved [9]: The font size provided is too small. Also, aspects of formatting such as margins or line spacing are not appropriately chosen. Readability is decreased because of printing on unsuitable paper with distractions. The required reading level is too high and many difficult/technical terms are used. Bullet and headings points may be used more efficiently for text structuring. Moreover, an excessive amount of irrelevant information is provided.

The technological revolution influenced everything [11-88]. Nowadays; the artificial intelligent (AI)

algorithms were used extensively in solving many difficult problems, such as Healthcare Monitoring [51, 62], nurse rostering problem [89], river flow forecasting [43, 90, 91], image segmentation [14, 32, 33, 48, 92-96], medical image analysis [34, 38, 97-99], patterns recognition and information retrieval [21, 27, 29, 36, 37, 42, 47, 100-104]. Recently; a number of researchers reported that the opportunities for AI for spreading health awareness are clear [105-108].

A web application to provide information on patient information leaflets can mend insufficiencies of patient information leaflets. Unlike patient information leaflets, a web application is not confined to a paper sheet, can be accessed easily before purchasing the pharmaceutical, and can help to locate the information desired. Furthermore, a web application can more easily head users to further information, can be updated easily, and provide a customizable structure and interactive content.

This work aims to design and develop a web application that will provide pharmaceutical product leaflets information as well as the proposed web application will provide supplementary services. The proposed work was designed and developed using the Unified Modeling Language (UML), SQL, XML, and ASP.Net programming languages.

II. METHODS AND MATERIAL

The Unified Modeling Language (UML) offers a standard way for visualizing the system design (commonly a software) using an object-oriented diagram. UML consists of many diverse diagrams' types; everyone is intended for modeling goals.

2.1 Use Case Diagram

Use-case diagrams define the scope and high-level functions of a system. Also they identify the interactions between the actors of the system and the system [49, 50, 59, 60, 63, 65, 66, 69, 73, 78, 79, 85, 109-116]. The actors and use cases in use-case diagrams illustrate the system work and how it is used by the actors. In the proposed application, the actors are the Pharmacist, Expert, Support, Patient, and Admin. Figure 1 shows the use case diagram for the proposed system.



Figure 1: Use case diagram for the proposed system

2.2 Context Diagram

A Context Diagram is a picture with the system of interest in the middle of the elements in its environment that interacts with it, with no details about the function or interior structure, [109-112].

Figure 2 represents the context diagram of the proposed system.

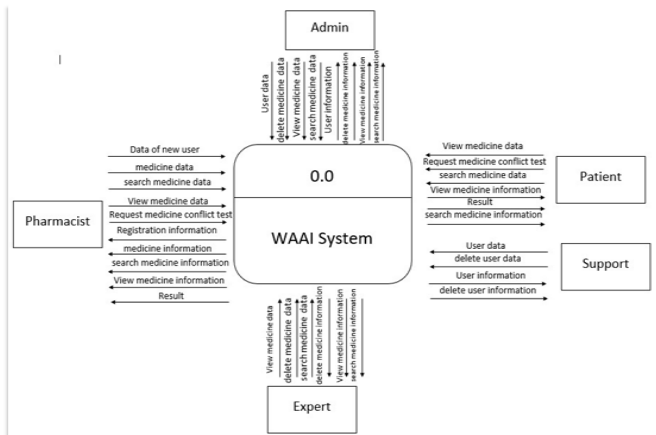


Figure 2: Context diagram of the proposed system.

2.3 Entity Relationship Diagram (ERD)

An Entity Relationship Diagram (ERD) is a visual representation of the entities inside a system and their relations with each other [73, 78, 79, 85, 115]. ERD is used during the stages of planning for the software project in software engineering. They assist in identifying the elements of the system and their relationships with each other. Figure 3 shows the ER diagram for the proposed system.

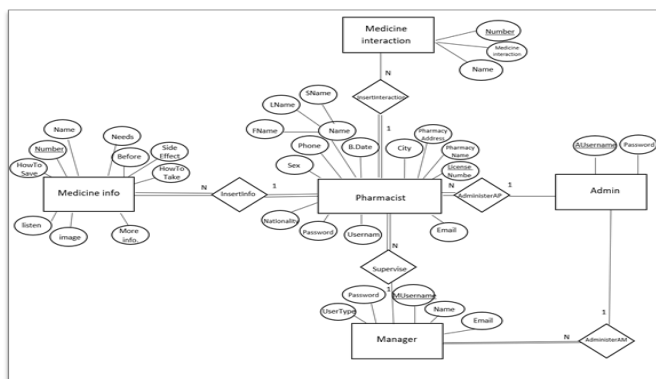


Figure 3: ER diagram for the proposed system

2.4 Database Testing and Construction

Testing the database is vital to detect errors that affect the system consistency, reliability, security and

performance. It also helps to validate the system against the user-specified requirements [63, 65, 66, 116]. SQL was used for database implementation. Some tables were created as follows:

Table 1: Pharmacist table.

ID	FName	SName	LName	Bdate	Nationality	gender	UserName	Password	Email	Phone	City	PharmacyName	PharmacianLicenseNo.
1	khalid	saeed	alghamdi	1/12/2000	السعودية	ذكر	raz_kg	razan123	razan@g...	0561988107	الدمام	البحري	11111111
2	Rola	khalid	alghamdi	5/8/1998	السعودية	أنثى	rolakhalid	rola123	rolakhalid...	0561988108	دمشق	الورد	223965
3	raghad	khalid	alghamdi	12/19/19...	السعودية	أنثى	raghadkh...	raghad1...	rolakhalid...	124567895	دمشق	pharmacy	223967
4	aljahah	faraj	altoabi	6/13/1998	السعودية	أنثى	aljaharah1	Aljaharah...	aljaharah...	0504841765	الدمام	البحري	223968
...	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Table 2: medicine information table

Column Name	Data Type	Allow Nulls
MedicineName	nvarchar(50)	<input type="checkbox"/>
MedicineNumber	nvarchar(50)	<input type="checkbox"/>
Needs	nvarchar(MAX)	<input type="checkbox"/>
Before	nvarchar(MAX)	<input type="checkbox"/>
HowTake	nvarchar(MAX)	<input type="checkbox"/>
Sideeffects	nvarchar(MAX)	<input type="checkbox"/>
Howsave	nvarchar(MAX)	<input type="checkbox"/>
info	nvarchar(MAX)	<input type="checkbox"/>
image1	nchar(100)	<input checked="" type="checkbox"/>
listen	nvarchar(50)	<input checked="" type="checkbox"/>

Table 3: medicine interaction

MedicineName	MedicineNumber	Medicineinteraction
متعادول	06281086000090	تفاعل مع الكلورفينيرامين (phenylephrine) من المحتمل أن يرفع ضغط الدم لدى الأشخاص الذين يعانون من ارتفاع ضغط الدم.
سكوبان	06285079801125	تفاعل مع الكلورفينيرامين (phenylephrine) من المحتمل أن يرفع ضغط الدم لدى الأشخاص الذين يعانون من ارتفاع ضغط الدم.
باتاري	08815408	تفاعل مع الكلورفينيرامين (phenylephrine) من المحتمل أن يرفع ضغط الدم لدى الأشخاص الذين يعانون من ارتفاع ضغط الدم.

2.5 Interface Design

The user interface is the graphical design of an application. It is composed of the text users read, the buttons they click on, the sliders, images, text entry fields, and the other items the user interacts with. This comprises interface animations, transitions, screen layout and every micro-interaction. Any type of visual element, animation or interaction, should be designed. The figures below are examples of designed interfaces.



Figure 4: Registration page.



Figure 7: Manage medicine information page.

III. RESULTS AND DISCUSSION



Figure 5: Pharmacist page.

The proposed system was tested to measure usability, where it was operated on Internet Explorer, Mozilla Firefox, and Google Chrome using the localhost server. Twenty students from Imam Abdulrahman Bin Faisal University (IAU) tested the system prototype. After they were briefed about the usage of the system, the students tried out the proposed system and answer a questionnaire of 10 questions measured by 5-point Likert Scale. The goal of the proposed questionnaire is to measure the satisfaction of the user about the proposed system and to verify its usability. The results attained demonstrates that high percentage of the students agreed that the proposed web application is useful, usable and achieved the main target of the project (see figure 8).



Figure 6: Medicine information

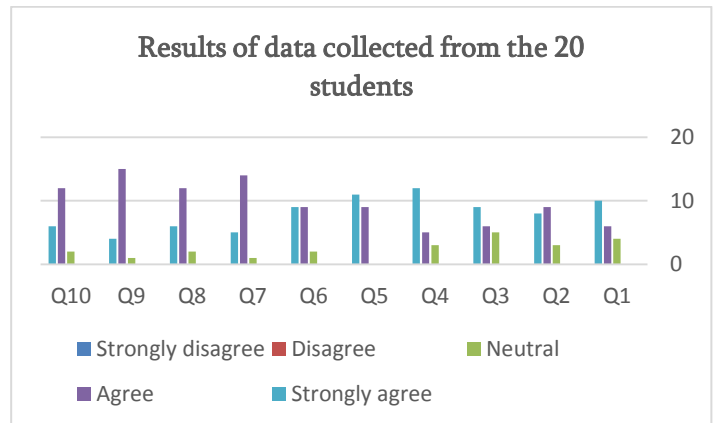


Figure 8: The results of data collected from the 20 students.

IV. CONCLUSION

Information on pharmaceuticals is beneficial for patients, most patients like to read patient information leaflets for their pharmaceuticals. Nevertheless, the quality of the information written on pharmaceuticals gives a space for improvement. To improve the inadequacies of patient information leaflets, an alternate approach for the provision of information on pharmaceuticals will be illustrated. This work aims to design and develop a web application that will provide pharmaceutical product leaflets information as well as the proposed web application will provide supplementary services. The proposed work was designed and developed using the Unified Modeling Language (UML), SQL, XML and ASP.Net programming languages.

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