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Diabetes Classification with Healthcare System Application

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Abstract: Diabetes is a chronic disease with the potential to cause a worldwide health care crisis. According to International Diabetes Federation 382 million people are living with diabetes across the whole world. By 2035, this will be doubled as 592 million. Diabetes mellitus or simply diabetes is a disease caused due to the increase level of blood glucose. Various traditional methods, based on physical and chemical tests, are available for diagnosing diabetes. However, early prediction of diabetes is quite challenging task for medical practitioners due to complex interdependence on various factors as diabetes affects human organs such as kidney, eye, heart, nerves, foot etc. Data science methods have the potential to benefit other scientific fields by shedding new light on common questions. One such task is to help make predictions on medical data. Machine learning is an emerging scientific field in data science dealing with the ways in which machines learn from experience. The aim of this project is to develop a system which can perform early prediction of diabetes for a patient with a higher accuracy by combining the results of different machine learning techniques. This project also aims to propose an effective technique for earlier detection of the diabetes disease which is capable of giving diabetes care based on rule-based technique. Specifically, this system enables the user to select the symptoms that they have without having to see the doctor as part of early screening. Using these techniques, this patient can aware whether they are potentially at risk for diabetes or not. In the current version, this technique is capable to detect three possible outcomes which is healthy, Diabetic Type 1, and Diabetic Type 2.

Keywords: Healthcare System Application, Machine Learning, Diabetic Type 1, Diabetic Type 2

1. Introduction

Diabetes is a condition that happen when the blood glucose is too high, often called blood sugar. A pancreatic-made hormone, helps food glucose get into the cells to be used for energy. The main cause is by the immune system destroying the cells in the pancreas that made insulin. Meanwhile, insulin is a

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hormone produced by the pancreas and helps glucose absorption into cells for use of energy but when there is too much glucose in the body can lead to health issues. Among the risk of diabetes is heart attack, strokes and other cardiovascular disorders by contributing to elevated blood pressure and related to high cholesterol.

Another organ at risk of damage as a result of diabetes is the kidneys, which is exacerbated by poorly regulated diabetes, high blood pressure and high cholesterol. People who have a diabetes will experience nausea, constipation or diarrhea as a result of nerve damage. Usually, diabetes will also effects on skin by affecting the nerves and circulation which can cause dry skin, burns, wounds, bacterial infection, slow healing of cuts and sometimes loss of feeling in the feet. There are many systems that have been developed related to diabetes diseases such as monitoring glucose and insulin [1]-[4]. Besides, many of the systems are proposed to predict diabetes either in type or symptoms [5]-[10].

2. Materials and Methods

The materials and methods section, otherwise known as methodology, describes all the necessary information that is required to obtain the results of the study.

2.1 Materials

There are a few procedures that must be followed in order to accomplish the project. The procedures are separated into sections, starting with detecting voltage signals at an energy meter, processing data, storing data on a cloud platform, and finally displaying the results.

- The patient's data that been sorted into Microsoft Excel has been separated into section which act as a data. The data uses for the application that been build and will be imported into the application.
- Adobe Animate software is a main source for the project to build an application and using a machine language.
- The final result will determine whether patients have diabetes or not and the healthy diet will be provided to the patients.

The major hardware components in this project are as follows:

i. Adobe Animate software to develop 2-dimension application interactively by using audio, text, video, graphic and animations.

ii. Using various programming languages HTML5, Actionscript 2.0 and Actionscript 3.0

2.2 Methods

This project will through the process step by step, using a flowchart to aid visualization. The flowchart in Figure 1 depicts how the diabetes healthcare system application will function.

The diabetes healthcare application is developed using Adobe Animate CC, Adobe Illustrator and Adobe Photoshop CS6 software. Next, this phase involves five main processes namely interface development, animation, audio, graphics and programming. Interface development is the thing that influences users to use the application. Interface development is very important in application development especially in terms of interface layout, text selection, button layout and background graphic selection. All these elements play a major role in attracting users to use this application. In addition, in this phase, the interface layout should look uniform and not too compact to make it easier for users to use the application.

Next, the selection of text is also very important because the text is the main basis for the distribution of information. Developers also need to keep the text used concise and not make it difficult

for users to read the text. The choice of font type and font colour is also important and should be in accordance with the needs of the target user. The selected font type is *Komika* and *Impact*. This font was chosen because it is easy to read and not too static. The chosen font colour is white and black so that it looks contrast with the background colour.
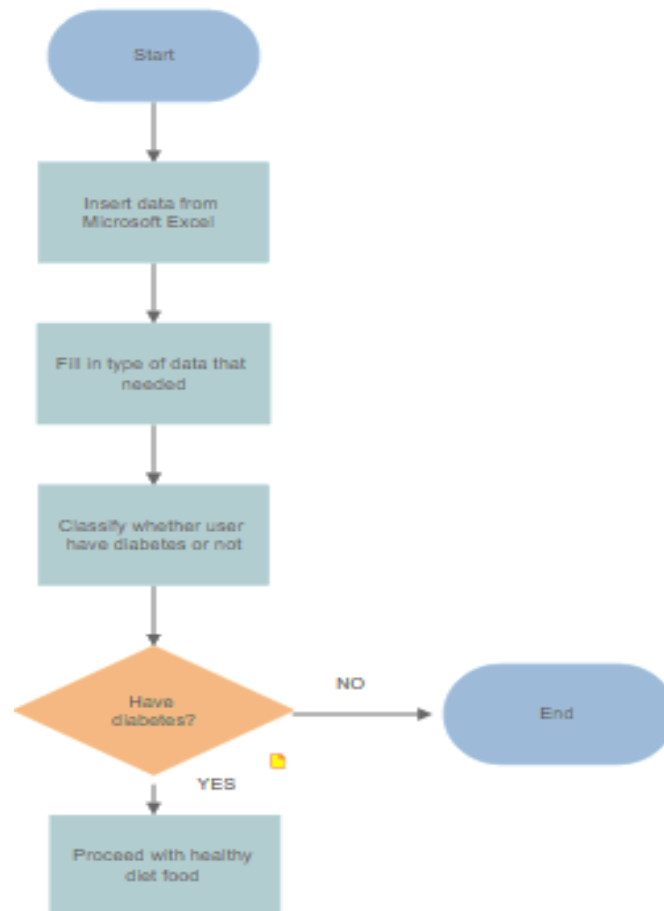

Figure 1: Flowchart Process of Project

Next to the audio, the developer uses background music and special sound effects that can be found for free on the website. Then included in the development assets in the Adobe Animate CC development software. To turn on the functionality of each logic in this game such as button functions, game modes, sounds, animations and logic, this thing uses programming integrated in Adobe Animate CC software. The language used in Adobe Animate CC is Actionscript 3.0. Once all these aspects are successfully run this application goes through the process of alpha and beta testing. This learning game application is used as a prototype before being used as an actual product.

3. Results and Discussion

The results and discussion section presents data and analysis of the study. This section can be organized based on the stated objectives, the chronological timeline, different case groupings, different experimental configurations, or any logical order as deemed appropriate.

3.1 Results

The proposed system of the project is to developed on how many people are exposed to the diabetes disease. There are respondents that have been involved in the survey. All the result of the respondents have been imported into Microsoft Excel as shown in Figure 2.

Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
A	B	C	D	E	F	G	H	I
0	157	72	21	168	25.6	0.123	24	0
1	122	64	32	156	35.1	0.692	30	1
4	179	70	0	0	35.1	0.2	37	0
2	102	86	36	120	45.5	0.127	23	1
6	105	70	32	68	30.8	0.122	37	0
2	118	72	19	0	23.1	1.476	46	0
7	107	74	0	0	29.6	0.254	31	1
1	103	30	38	83	43.3	0.183	33	0

Figure 2: Data diabetes patients

The diabetes healthcare application has been created using the Animate software platform. Adobe Animate is a multimedia software platform used for animation production, Internet applications, desktop applications, mobile applications, mobile games and web browser video players.

Figure 3 shows a diabetes healthcare application that contains a navigation button to go to the main menu page. In addition, there is a navigation button to the next page where each level has a different level. The page screen is shown in Figure 4.
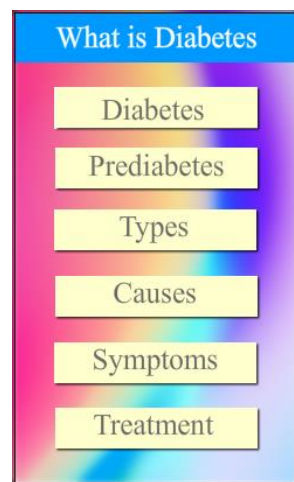

Figure 3: Application interface display

Figure 4: Page screen display

This project uses Adobe Animate CC to design Actionscript 3.0 programming scripts. The program used for this drag and drop health application has 5 functions, namely button function, movement function from scene to scene, target button function and timer function. This program is used at each level of the drag and drop health application but is set to differentiate attributes based on the number of different pages and scenes. The Actionscript 3.0 for "drag and drop" is shown in Figure 5.

```
function stopdragpuzzle(e:MouseEvent):void{
    if(e.target.hitTestObject(getChildByName(e.target.name + "Drag"))){
        e.target.x = getChildByName(e.target.name + "Drag").x;
        e.target.y = getChildByName(e.target.name + "Drag").y;
        poin++;
    }
    else {
        e.target.x = posx;
        e.target.y = posy;
    }
    if(poin == 2) {
        nxtlvl.visible = true;
        status.text = "Correct";
        myTimer.stop();
    nxtlvl.addEventListener(MouseEvent.CLICK,nxt);

    function nxt(event:MouseEvent):void
    {
    gotoAndStop(1,"Stage 1 Lv 2");
    }
    }
    e.target.stopDrag();
}
```

Figure 5: Actionscript 3.0 for "drag and drop"

A brief note screen display in the diabetes healthcare system application display, where the user is provided with a brief note for reference after the user gets a decision on whether he or she is prone to diabetes or not. This serves to explain to the consumer about the appropriate way of eating. Health sharing screen is shown in Figure 6.
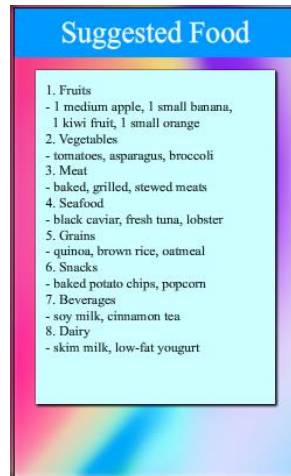

Figure 6: Health sharing screen

3.2 Discussions

The resulting application design refers to the selected and specified application title. The purpose of this application development design using the model is to ensure that the development design meets the objectives of the study and serves as a simple guide for developers to develop these applications systematically.

The developer made an initial sketch at the beginning of the development of this application which was used as a storyboard. Sketches from storyboards are created to aid the creation of appropriate interactive elements and objects. As a result, developers have created all the multimedia elements so

that the developed applications can function well and convey information effectively. Developers have incorporated multimedia elements from text, graphics, audio and animation through storyboards and have used buttons and icons to tailor user -directed interests.

In addition, developers can help users find information in detail and easily. The developer created a variety of two -dimensional graphic illustrations related to electrical circuits using Adobe Photoshop CS6 software to make it easier for users to understand the content to be presented and used as an attraction in this application. Developers then use Adobe Animate CC as animation and computer interface design creation software. In addition, Adobe Animate CC also has programming features for animations or buttons found in this application Using graphics that are visually appealing to the user. In addition, Adobe Animate CC also has programming for animations or buttons available in this application using graphics that visually appeal to the user. In addition, the developers have included animated elements that make frames and motion. In the end, all the elements in this framework are used by the development to function efficiently and effectively.

4. Conclusion

In conclusion, the development of this application has provided an interactive platform where individuals who has a diabetes can get early awareness about the illness and prevent it quickly. This application development process requires careful preparation, such as an initial sketch of a digital element by a storyboard, to ensure that the content is delivered efficiently and effectively. Therefore, the development of diabetes healthcare system applications is expected to help improve the awareness among peoples.

Acknowledgement

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