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Detecting Health Problems Related to Addiction of Video Game Playing Using an Expert System

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Abstract

Today's everyone normal life can include a normal rate of playing computer games or video games; but what about an excessive or compulsive use of video games that impact on our life? Our kids, who usually spend a lot of time in playing video games will likely have a trouble in paying attention to their school lessons. In this paper, we introduce an expert system to help users in getting the correct diagnosis of the health problem of video game addictions that range from (Musculoskeletal issues, Vision problems and Obesity). Moreover, this expert system provides information about the problem and tell us how we can solve it. SL5 Object expert system language was used to design and implement the expert system.

Keywords: Artificial Intelligence; Expert Systems; SL5 Object; Video Games; Health; Video Game Addiction

Introduction

There are Different point of view in video game that include societal and scientific arguments about whether the content of video games can lead to a negative behavior and attitudes in a player normal life, and whether this is reflected to the overall video game industry.



Fig 1: Video game addiction

Even though from the 1980s, the starter of games development industry has confirmed their industry as a very meaningful space for any person that will play, and event it can be used as an educational tool in the schools. On the other hand, another opinion was rising because of the negative effects that link between addiction of video games, violence, aggression and other issues that appeared specially for specific video game genres [3].

The Entertainment Software Association (ESA) made a survey [4] in 2016 about the Computer And Video Game Industry and gathered data from more than 4,000 households and surveyed about their game play habits and attitudes, and found that every house contain at least one person who play games for at least 3 hours/week with average of 13 years from his life. About half of this is female (48%), with high percent of 21% of the total ages of 18 or younger, and the majority of parents (91%) say it must be present on purchasing video games and want to check Entertainment Software Rating Board (ESRB) [30] before letting their children play the game.

One of the extensive games playing is Musculoskeletal issues that are physical complaints that happen during video game playing and range from pain in (hands and wrists, back and neck) or lower back pain to tendon injuries (tendinosis) of the hands and wrists that happen

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from game controller, which contain numbness and a blister caused by friction between the thumb and the controller because of the rapid game play [31]. The other one is the Vision problems that are happened because of mass viewing sessions of electronic games devices and can cause eye strain, on cornea, pupil, and iris [32] and that can lead to headaches, dizziness, and evens chances of vomiting from focusing on a screen. Over that, the Obesity are linked to increase Body Mass Index (BMI) when the child spends more time in playing game over his day [33].

Expert System Language

Expert Systems language is a set of programs which allow the building of an expert system through the creation of

knowledge and rules, [6,10,11,13,21] see figure 2 for details. Expert systems have three essential components:

1. User interface: presents questions to the user and accepts inputs from them.
2. Knowledge base: contains data, facts, rules and objects in a specific knowledge domain. The knowledge base obtained from the human expert is prepared by a knowledge engineer as most human experts are not skilled in computer programming.
3. Inference engine: this is software that matches the users input with data contained in the knowledge base to reach appropriate answers. This is done using inference rules e.g. IF conditions THEN statements ELSE statements rules.

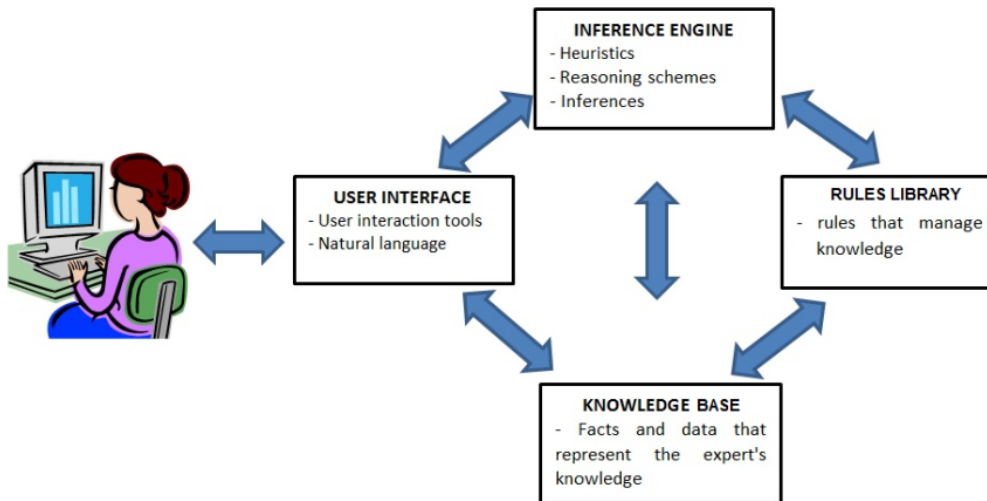


Fig 2: Component of the expert systems

The Expert System for detecting gamers health problems was implemented using SL5 Object language which stands for Simpler Level 5 Object expert system language [2]. It is a forward chaining expert system that can make inferences about facts of the world using rules, objects and take appropriate actions as a result. The SL5 Object language is implemented in Delphi Embarcadero RAD Studio XE6[2]. SL5 Object language is easy for the knowledge engineer to build the expert system and for the end users when they use it.

Literature Review

There are many expert systems that were designed to diagnose diseases in human[1,5,9,14-20,26-29,34-37] and plants [7]. But there is no specialized expert system for detecting gamers health problems.

Although it's linked to several human diseases such as: Diabetes, bacterial, Ear, Eye, foot, Mouth Problems. Talayeh developed an expert system for diabetes diagnosis [12]. MYCIN is a famous expert system for diagnosing

bacterial infections [24]. Some of these Expert Systems are specialized in one specific disease and other in a few diseases. However, the current proposed expert system is specialized in the diagnosis of video games playing health problem.

Materials and Methods

The proposed expert system performs diagnosis of video games playing health problem by asking questions that requires Yes/No answers. The proposed expert system will ask the user to choose the correct answer in each question window. At the end of the diagnosis session, the proposed expert system provides the proper diagnosis of the problem and offer a recommendation of the symptoms to the users. Figure 3 shows the first screen of the expert system session. Figure 4 shows an example of STRING question. Figure 5 shows an example of NUMERIC question and Figure 6 shows how the expert system displays the info for the patient, the health problem -if patient have one- and the recommendation for treating the health problem.

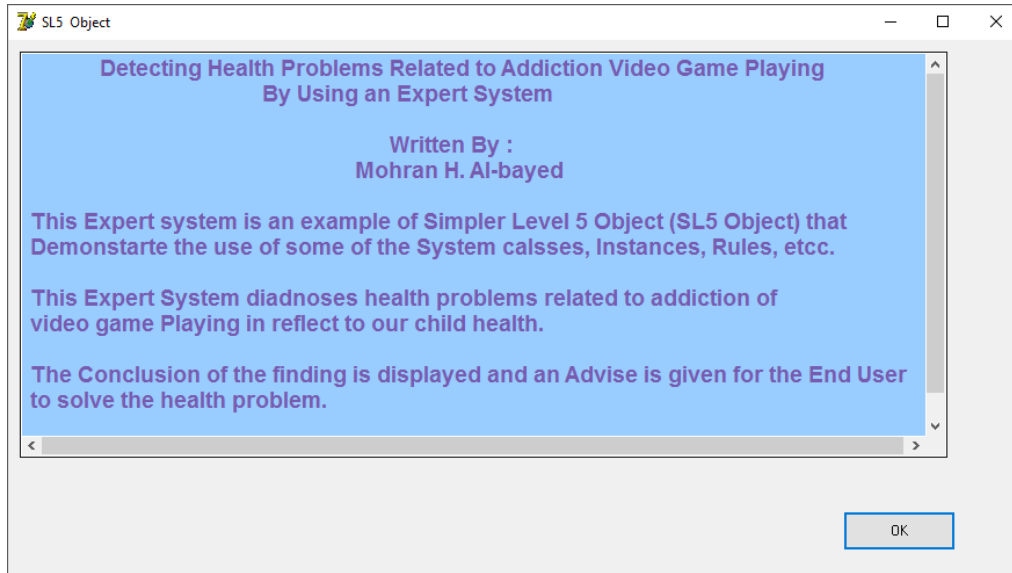


Fig 3: Shows start screen of the expert system session

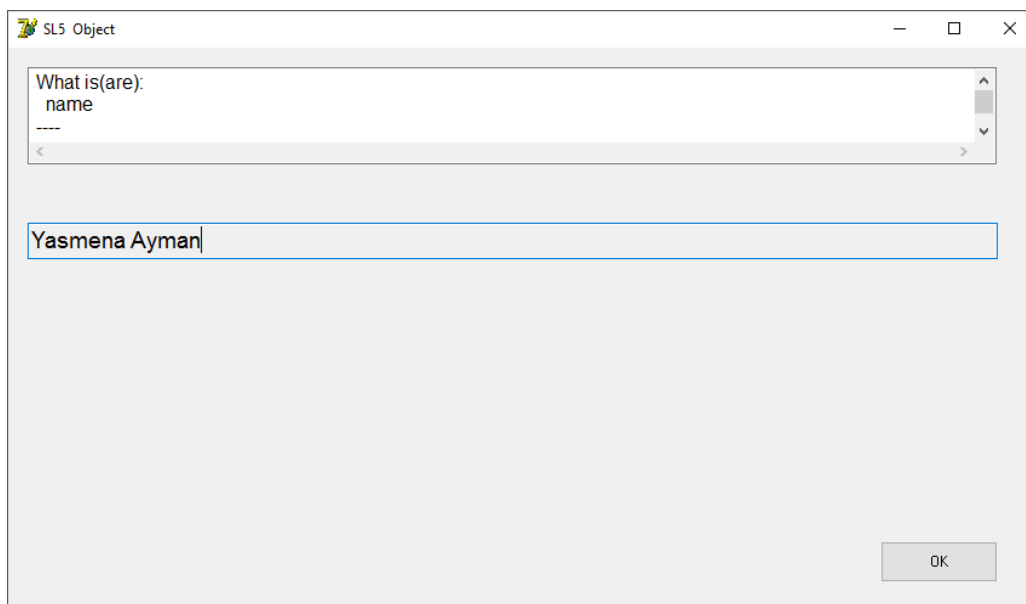


Fig 4: Shows an example of STRING question type

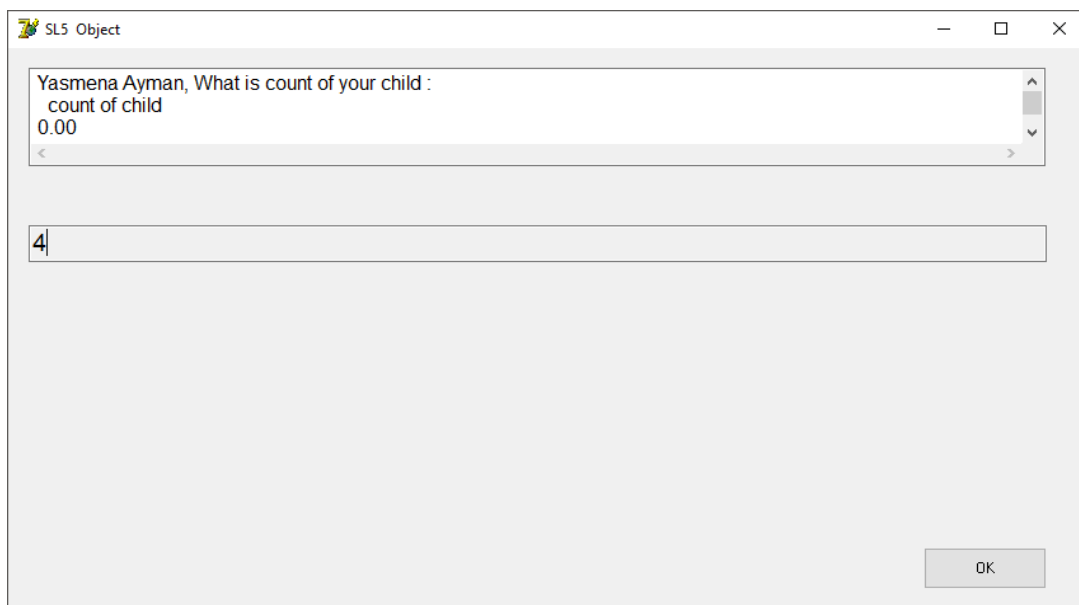


Fig 5: Shows an example of NUMERIC question type

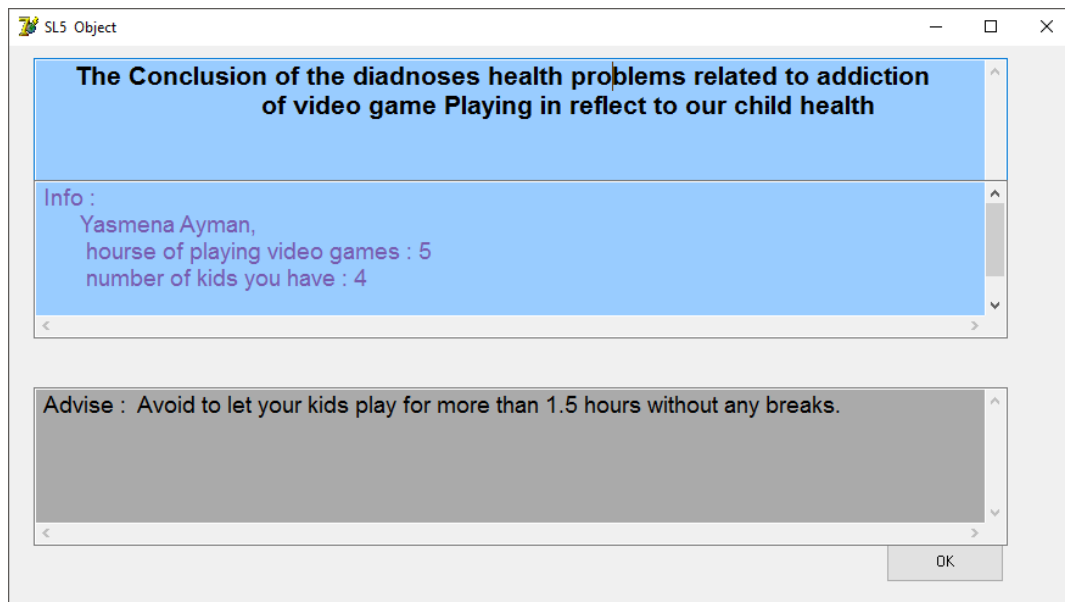


Fig 6: The expert system displays the diagnosis of the problem and the recommendation for treating the health problem.

Knowledge Representation

The main sources of the knowledge for this expert system are physician and specialized websites for the impact of the long period video game playing. The collected knowledge has been transformed into SL5 Object Knowledge base syntax: Facts, Rules and Objects. Currently the expert system has 31 rules which cover 3 major health problem. The core cause of these problems are the long period of playing video games. In numerous cases, a physician may not discover a cause for the ache. When a cause is recognized, general explanations take account of [3, 31-33]:

- Child will have pain in hands and wrists.
- Child will have pain in the back and this can be in the lower back.
- Child will have pain in the neck.
- Child could be having tendon injuries on the hands or wrists.
- Child may have an overweight problem.
- Child could be having cause eye strain, on cornea, pupil, and iris.
- Child may have headaches, dizziness, and even chances of vomiting from focusing on a screen.

Causes of Gamers Health Problems

- Long time playing without any breaks.
- Eat while playing.
- Less healthy seats on the playing location.
- Fatigue.
- Migraines due to intense concentration or eye strain.
- Carpal tunnel syndrome caused by the overuse of a controller or computer mouse.
- Poor personal hygiene.

Kids Video Games Health Problems

As much as it hurts to observe your child's health go down while he/she is playing video games, but you need to watch your child's gaming time and check what are the types of games that he is playing. Here are the top causes that need your handle as fast as you see them:

If your kid plays for more than 1.5 hours, then you need to

move him away to take a break from time to time. Typically accompanied by letting him busy with something different for about 10-minute rest.

Hands and wrists pain, in this case happen from un-fitting controller to your kid's hand size or from long time playing, and this is solved by buying the correct size controller for your kid.

Back and neck pain, are happened from un-healthy seats that are our kids' seat on the playing time.

Tendon injuries on the hands or wrists are situations that happen with the escalating use of computers both in the home for recreational purposes and in schools for teaching, the possible incidence of hand and wrist problems may need to be highlighted. Perhaps "hand care" instruction should be implemented to solve this problem.

Overweight happens because playing games make the player hungry and encourage them to eat more fast food rather than the healthy food. Typically, this happens because of spending more time on playing games without stopping and this is not because they don't exercise, and this can be solved by making exercise on the gym.

Play games for hours, all of that staring can put a real strain on your eyes. Computer Vision Syndrome (CVS) is not one specific eye problem. Instead, the term encompasses a whole range of eye strain and pain experienced by computer users.

Here are some home advices to deal with your kids before the problem gets bigger:

- Do not give the child the freedom to play games without checking if it is appropriate or not from its ESRB.
- Avoid to let your kids play for more than 1.5 hours without any breaks.
- Make a health seat and location for your kids playing.
- Play with your kids selected video game while you can, so you can observe him in a real gaming situation.
- Give your kids a nice massage from time to time.

Conclusion

In this paper, an expert system was developed for aiding

Physicians in diagnosing patients with possible Games Health Problems. This diagnosis is faster and more accurate than the traditional diagnosis which is done by physicians. This expert system does not require rigorous training to be used; it has a straightforward and user friendly interface. It was developed using SL5 Object expert system language. The results of the preliminary testing of the expert system was a success.

Future Work

This expert system is considered to be a base of future ones; more Gamers Health Problem are planned to be added to the expert system and to make it more accessible to users from anywhere at any time.

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